



Greenhead College, Huddersfield

Noise impact assessment

NE8659-APX-ZZ-ZZ-RP-YA-0002

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Revision P04



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2 Summary

- 2.1 This report has been prepared in support of a Planning Application for proposed development at the existing Greenhead College, Huddersfield site including the development of a new teaching block, courtyard infill, relocation of car parking and reorientation of the existing sports pitch.
- 2.2 Planning policies and guidance relevant to the proposed scheme of works have been reviewed and the Local Authority Environmental Health Department have been consulted by the project design and planning team.
- 2.3 Based on Apex' understanding of the scheme proposals and the assessment included in this report, there is potential for there to be an adverse impact on the identified noise sensitive receptors.
- 2.4 To satisfy the aims of the National Planning Policy Framework and relevant Local Authority requirements, noise mitigation measures have been proposed to reduce the potential for significant adverse impacts. Details of the recommended mitigation measures are provided in Section 9 and include:
- Provision of baseline noise survey data for the existing site to inform plant noise limits of the proposed development
 - Location of recommended noise barrier to the new teaching block rooftop area (preliminary assessment)
 - Location of recommended noise barriers to the relocated sports pitch
- 2.5 Based on the proposed mitigation measures, noise levels due to activities associated with the operational development are predicted to be below the noise limits proposed within this report for compliance with the aims of the National Planning Policy Framework (NPPF) and the Local Authority noise related guidance.

3 Introduction

- 3.1 This report relates to the proposed development at the existing Greenhead College site at Greenhead Road, Huddersfield, Kirklees HD1 4ES, including the development of a new teaching block, courtyard infill, relocation of car parking and reorientation of the existing sports pitch.
- 3.2 Apex Acoustics has been appointed to undertake a noise impact assessment associated with the development in support of a Planning Application.
- 3.3 The scope of our instruction includes:
- Assessment of the existing noise environment locations representative of the nearest noise-sensitive receptors to facilitate the future plant noise impact assessment;
 - Model the noise impact from sports pitch and car parking facilities;
 - Calculate noise propagation using proprietary noise modelling software to identified noise-sensitive receptors (NSR) and assess the impact;
 - Advise on a scheme for noise mitigation to satisfy usually accepted Local Authority requirements;
- 3.4 The NSR are identified as residential properties around the site.
- 3.5 The report addresses:
- The representative baseline noise climate and background sound levels at the NSR for future plant noise impact assessment;
 - The noise impact assessment from the proposed relocated car parking between 07:00 and 21:15 hrs on weekdays and 08:45 and 18:15 hours at weekends;
 - The noise impact assessment due to use of the proposed reorientated sports pitch for additional hours of use to the existing pitch between 08:00 and 21:00 hrs on weekdays and 09:00 and 18:00 hours at weekends.



Figure 1: Site boundary in red and identified locations of the nearest Noise Sensitive Receptors in green

4 Planning policy and guidance

National Planning Policy Framework (NPPF)

4.1 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 development can be produced. In respect of noise, Paragraph 174, 185 and 187 of the NPPF states the following:

4.2 Paragraph 174:

"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..."

4.3 Paragraph 185:

"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:

- 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];
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; ... "

4.4 Paragraph 187:

"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)

4.5 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.”

4.6 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

4.7 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.”

Planning Practice Guidance – Noise

4.8 Further Government guidance on how planning can manage potential noise impact in new development is outlined in Planning Practice Guidance (PPG-N) notes on the Government website: www.gov.uk/guidance/noise--2

4.9 The terminology and noise effect hierarchy are summarised Appendix A.

BS 4142

4.10 The principal guidance for the assessment of industrial noise impact is BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142), Reference 3.

4.11 This method involves the determination of a specific sound level due to the source in question at the NSR, hence a rating level.

4.12 According to BS 4142, typically, the greater this difference, the greater the magnitude of the impact.

4.13 “A difference of around +10 dB or more is likely to be an indication of a significant adverse impact”;

4.14 “A difference of around + 5dB is likely to be an indication of an adverse impact”;

4.15 “Where the rating level does not exceed the background sound level, this is an indication of the specific source having a low impact”.

4.16 BS 4142 requires a rating level to be calculated based on the character of the specific sound.

4.17 The rating level is calculated by adding a character correction to the specific sound. The character correction can be determined in three different ways:

- Subjective method
- Objective method
- Reference method

4.18 The final noise impact is assessed based on the exceedance of the rating level over the background sound and the context.

WHO: Guidelines for community noise

4.19 For the outdoor living areas, the World Health Organisation Guidelines for Community Noise, 1999 (WHO), Reference 4, includes the following guidance:

4.20 To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on 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} .

4.21 For the daytime indoor noise level, the WHO guidance provides: To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB L_{Aeq} .

4.22 For night-time noise levels: The indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{AFmax} for single sound events. At night-time, outside sound levels about 1 metre from façades of living spaces should not exceed 45 dB L_{AFmax}

4.23 If “the noise reduction from outside to inside with the window open is 15 dB” as described in the guidance, the indoor and outdoor guideline values are consistent.

BS 8233:

4.24 In BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233), Reference 5, it states that:

4.25 For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

Sport England guidance on Artificial Grass Pitches (AGP)

- 4.26 Sport England issued guidance in 2015 including noise impact related considerations Artificial Grass Pitch (AGP) Acoustics - Planning Implications, Reference 6.
- 4.27 The guidance suggests the consideration of the criteria set out by The National Planning Policy Framework and Local Planning Authority planning policies.
- 4.28 This guidance also refers to the WHO guidance to achieve outdoor noise level of 50 dB L_{Aeq} and indoor noise level of 35 dB L_{Aeq} with open windows as the criteria.
- 4.29 For changes to an existing natural turf or AGP pitch or where existing noise levels in the area are high, alternative assessment methodology may be appropriate such as comparison of AGP noise against existing noise climate.

West Yorkshire Planning Consultation Guidance, Noise & Vibration 2016 (WYPCG)

- 4.30 The West Yorkshire Planning Consultation Guidance dated May 2016 (WYPCG), Reference 7 sets out advice when reviewing planning applications on matters related to noise and vibration. The guidance takes into consideration the noise-related guidance contained within the National Planning Policy Framework (NPPF) and the Noise Policy Statement for England (NPSE).
- 4.31 The WYPCG guidance identified as most relevant to the proposed scheme are summarised below and reproduced in Table 1.
- 4.32 WYPCG section 4.2 provides recommended maximum sound levels for noise generating uses including internal and external plant equipment noise, which can be summarised as follows:
- The Rating Level (calculated in accordance to BS 4142:2014) is at least 10 dB below the existing Ambient noise level L_{Aeq}
 - The Rating Level (calculated in accordance to BS 4142:2014) is at least 0-5 dB below the existing Background noise level L_{A90}
 - Between the hours of 19:00 and 07:00 the maximum noise levels (L_{AFmax}) from the guidance document shall not exceed the L_{A90} by more than 10 dB; however, where the existing background noise level is 45 dB L_{A90} or less, the maximum noise levels shall not exceed 60 dB L_{AFmax}
- 4.33 WYPCG section 4.8 provides guidance on the assessment of noise impact due to use of new Multi-Use Games Areas (MUGA). Guidance on noise assessment due to new MUGAs includes the following criteria:
- MUGA Noise Level $L_{Aeq, 1min}$ should not exceed Representative Background Noise Level L_{A90}
 - The external noise level from a MUGA should not exceed 50 dB $L_{Aeq,T}$ at the boundary of the nearest noise sensitive premises, in accordance with World Health Organisation Guidelines of Community Noise 1999

- 4.34 Section 4.10 Schools identifies that the sound insulation criteria for schools formulated for the prevention of noise break-in is set out in Building Bulletin 93, Acoustic Design of Schools, Performance Standards (BB 93), Reference 8 and that Developers should adhere to these criteria. It should be noted that contractually the scheme is also subject to Department for Education (DfE) technical requirements which also require compliance with BB 93.
- 4.35 BB 93 Table 1 identifies upper limits for the indoor ambient noise level (IANL) for new build spaces according to the room use and noise sensitivity.
- 4.36 The BB 93 Table 1 IANL performance parameter identifies upper limits for the combination of external noise sources (not related to the school's own activities) and building services noise.

Leeds Planning Guidance, Noise & Vibration 2019 (LPGNV)

- 4.37 Whilst the proposed development is outside of the jurisdiction of Leeds City Council, the reference below is included as guidance relevant to assessment of MUGA noise impact.
- 4.38 The Leeds Planning Guidance Noise and Vibration dated December 2019 (LPGNV), Reference 9 is based on the WYPCG 2016 guidance and includes an additional reference for MUGA noise impact assessment as follows:
- Between the hours of 19:00 and 07:00 the maximum noise levels (L_{AFmax})...not exceed the L_{A90} by more than 10dB; however, where the existing background noise level is 45 dB L_{A90} or less, the maximum noise levels shall not exceed 55 dB L_{AFmax} .
- 4.39 It is proposed that the updated LPGNV guidance reference to L_{AFmax} noise levels due to MUGA use as above is appropriate for use for the scheme.

Summary of the guidance

4.40 Table 1 lists the reviewed guidelines on the limits for outdoor noise.

Guidance (reference)	Parameter	Criteria	Comments
WHO External residential amenity	L _{Aeq,16hour}	≤ 50 dB	Protect the majority of people from being moderately annoyed
	L _{Aeq,16hour}	≤ 55 dB	Protect the majority of people from being seriously annoyed
	L _{AFmax}	≤ 60 dB	To achieve ≤ 45 dB L _{AFmax} indoor noise level by assuming 15 dB reduction with opening windows
BS 8233 External residential amenity	L _{Aeq,16hour}	≤ 50 dB	Desirable
	L _{Aeq,16hour}	≤ 55 dB	Acceptable
Sport England	L _{Aeq,T}	≤ 50 dB	To achieve 50 dB L _{Aeq,T} guideline values as described in WHO To achieve 35 dB indoor level by assuming 15 dB reduction with opening windows
WYPCG Transportation Noise	Ambient Level LOAEL L _{Aeq,16hour}	≤ 55 dB	External amenity areas, daytime
	Ambient Level LOAEL L _{Aeq,16hour}	≤ 35 dB	Habitable room, daytime
WYPCG Plant Noise	BS 4142 Rating Level	≤ 10 dB below ambient L _{Aeq}	Rating Level is at least 10 dB below existing ambient level L _{Aeq} at noise sensitive premises
		≤ 0-5 dB below background L _{A90}	Rating Level is at least 0-5 dB below existing background level L _{A90} at noise sensitive premises
	L _{AFmax}	≤ 10 dB above Background L _{A90}	Applies between the hours of 19:00 and 07:00 Or ≤ 60 dB L _{AFmax} if L _{A90} is < 45 dB. At the facade of the closest noise sensitive premises
WYPCG Multi Use Games Areas (MUGA)	L _{Aeq,T}	≤ 50 dB	At the boundary of the nearest noise sensitive premises
	L _{Aeq,1min}	Should not exceed Representative Background L _{A90}	Refers to '...inside of residential premises...'
LPGNV MUGA	L _{AFmax}	≤ 55 dB L _{AFmax} between 19:00 and 07:00 hrs	LPGNV 2019 document is an updated version of the WYPCG 2016 guidance
WYPCG Schools	L _{Aeq,30min}	BB 93	Should adhere to BB 93 criteria relevant to prevention of noise break-in.

Table 1: Reviewed guidelines for assessment of outdoor noise

5 Noise Impact Assessment criteria

5.1 Based on the review of the national and local guidance, noise assessment criteria are proposed as shown in Table 2.

5.2 If the proposed criteria are achieved, typically applied requirements for noise control for the identified types of activities are considered in this assessment to be satisfied.

Noise source	Referenced guidance	Assessment criteria	Comment
Fixed plant	WYPCG	Rating level is at least 0-5 dB below the background sound level L _{A90} and at least 10 dB below the ambient sound level L _{Aeq} and between 19:00 and 07:00 maximum noise levels shall not exceed 60 dB L _{AFmax} at facades of residential properties	Assessment undertaken according to BS 4142 at façade of most affected residential properties, with where relevant, reference to BS 8233 for noise intrusion levels and also context of the noise climate, such as consideration of L _{Aeq,T} levels rather than solely background L _{A90} .
Car park	WHO, BS 8233	≤ 55 dB L _{Aeq,1hr}	Protect the majority of people from being seriously annoyed. Noise emission should be calculated following the guidance in RLS 90, Reference 10.
Sports pitch	WHO, BS 8233, Sport England, WYPCG, LPGNV	Desirable ≤ 50 dB L _{Aeq,1hr} and ≤ 55 dB L _{AFmax} between 19:00 and 07:00 hrs	Noise from sports pitches is not considered as a continuous noise source. Therefore, the desired (higher requirement) noise level of 50 dB L _{Aeq,1hr} in external amenity areas as described in BS 8233 is used. As the sports pitch is proposed to be in use up to 21:00 hrs, maximum noise level limit of 55 dB L _{AFmax} between 19:00 and 07:00 hrs as described in LPGNV is used as a more appropriate noise event criteria than the L _{Aeq,1min} .

Table 2: Proposed noise impact assessment criteria and the associated noise impact implications

6 External noise intrusion to proposed school buildings

- 6.1 WYPCG section 4.10 Schools identifies that the sound insulation criteria for schools formulated for the prevention of noise break-in set out in Building Bulletin 93, Acoustic Design of Schools, Performance Standards should be adhered to.
- 6.2 BB 93 Table 1 identifies upper limits for the indoor ambient noise level (IANL) for new build spaces according to the room use and noise sensitivity.
- 6.3 The BB 93 Table 1 IANL performance parameter identifies upper limits for the combination of external noise sources (not related to the school’s own activities) and building services noise.
- 6.4 Internal ambient noise level upper limits
- 6.5 The upper IANL limits for a selection of typical room classifications described in BB 93 are shown in Table 3.

BB 93 room description	Indoor ambient noise upper limit / LAeq,30 min
Secondary school classroom	35
Science Laboratory	40
6 th Form Social Space / Study Area (Open plan Resource / Breakout area)	40

Table 3: IANL upper limits

- 6.6 Upper IANL requirements for different ventilation strategies
- 6.7 IANL tolerances are defined in BB 93 Table 2 depending on the ventilation system and the operating condition, these tolerances are summarised in Table 4.
- 6.8 The upper noise limits in classrooms for different ventilation conditions are shown in Table 4 noting that a 5dB increase on BB 93 Table 1 IANL criteria due to natural or hybrid ventilation strategies is allowable.

Condition	Ventilation system	Upper noise level limit / LAeq,30 min dB	
		Secondary school classroom	Science laboratory / 6 th Form Social Space
Normal - ventilation for normal teaching and learning activities	Mechanical	35	40
	Natural or Hybrid	40	45
Summertime - ventilation under local control of teacher to prevent overheating – allowable during the hottest 200 hrs of the year	Mechanical	40	45
	Natural or Hybrid	55	55
Intermittent boost – ventilation under local control of teacher for dilution of fumes during practical activities as in practical spaces for science, art, food technology and design and technology	Mechanical	40	45
	Natural	55	55

Table 4: Summary of ventilation conditions and internal ambient noise level tolerances

- 6.9 See BB 93 for definitions of conditions.

7 Existing sound environment & proposed plant noise limits

Hepworth Acoustics noise impact assessment report dated September 2020

- 7.1 The Hepworth Acoustics Noise Impact Assessment Report (NIA), Reference 11 provided by the Client (the DfE) in the information to inform the design and specification of the scheme has been reviewed with regards to the design development. The report was prepared by a Corporate Member of the Institute of Acoustics (MIOA) and checked by a Fellow of the Institute of Acoustics (FIOA). A copy of the full report is available on request.
- 7.2 Noise survey measurements reported by Hepworth Acoustics are for a continuous 24-hour period between Tuesday, 8th and Wednesday, 9th September 2020.
- 7.3 An extract from the Noise Survey Report showing noise survey locations is provided below in Figure 2, (noting that the yellow area relates to outdated development proposals).
- 7.4 Whilst the development proposals have evolved since the Hepworth Acoustics Noise Survey, see Site Layout Plan in Appendix E, from a review of the Hepworth NIA report, the survey data is believed to still be relevant to informing environmental noise levels at the site and the representative background noise levels at nearby noise sensitive receptors, as a worst case approach, given that the noise measurement position is more distant from Greenhead Road and Park Avenue than residential dwellings and that the noise climate during the survey period being within the 2020 Covid-19 affected time, had potential to be of a lower level than an otherwise typically representative noise climate.



Figure 2: Extract from the noise survey report showing measurement location 'X'

- 7.5 The noise levels measured during the surveys are summarised in the Noise Survey Report as shown in the extract from the report in Figure 3:

Period	L _{Aeq,15 mins}	L _{A90,15 mins}
Daytime (07:00 – 23:00 hours)	44 – 55	38 – 51
College hours (08:00 – 16:45 hours)	49 – 55	45 – 51
Night-time (23:00 – 07:00 hours)	41 – 53	35 – 44

Figure 3: Extract from the Hepworth Acoustics noise survey report showing noise measurement summary

- 7.6 The provided NIA Report includes an assessment based on the measured noise levels and BS 4142 guidance of representative background noise levels, L_{A90}, at nearby residential properties to inform plant noise impact limits.
- 7.7 Where relevant, subject to any additional requirements for the proposed scheme imposed by the Local Authority, the identified representative background noise levels are proposed to be used to inform control of the building services plant equipment noise emission levels for the scheme with noise rating level due to plant to be no higher than existing representative background noise

levels, as shown in Figure 4. Results of the statistical analysis of background noise levels following the guidance within BS 4142 are shown in Figure 9 and Figure 10 in Appendix B.

Table 5: Plant Noise Limits (dB)	
Daytime (07:00-23:00)	Night (23:00-07:00)
46	35

Figure 4: Extract from the noise survey report showing representative background noise levels

Apex Acoustics noise measurements

- 7.8 Apex Acoustics have also visited site to carry out supplementary noise measurements in the vicinity of the proposed new teaching block in the existing College car park on the south-east of the site adjacent to Greenhead Road and Park Avenue.
- 7.9 Apex Acoustics carried out noise measurements on Monday, 15th March 2021 at a number of positions between approximately 12:30 and 17:00 hrs.
- 7.10 At the time of Apex' survey, the College site had just reopened after several weeks of Covid-19 related lockdown restrictions and hence the local roads, car park and area was generally busy with staff and students
- 7.11 Based on an analysis of the measured noise levels, incident noise levels at southern and eastern facades proposed for the new teaching block due to road traffic on Greenhead Road and Park Avenue are predicted to be 50 – 55 dB $L_{Aeq,T}$.
- 7.12 Based on a review of existing residential facades on Greenhead Road and Park Avenue identifying that they are at a similar distance from the roadside as the proposed new teaching block, it can be expected that ambient noise levels at residential facades are of a similar level as predicted for the new teaching block façade overlooking the adjacent roads.

8 Proposed plant noise limits

Proposed plant noise limits at residential facades

- 8.1 Representative background and ambient sound levels have been identified from the supplied NIA report to inform fixed plant noise limit requirements in accordance with WYPCG criteria, as shown in Table 5.

Assessment period, T	Sound level limit based on Baseline representative background L_{A90} (at least 0 – 5 dB below existing background (see below))	Sound level limit based on Baseline representative ambient L_{Aeq} (at least 10 dB below existing ambient (see note below))	Maximum noise levels (L_{AFmax}) shall not exceed
Daytime 07:00 – 23:00	≤ 46 dB L_{A90}	≤ 45 dB L_{Aeq}	-
Night- time 23:00 – 07:00	≤ 35 dB L_{A90}	≤ 35 dB L_{Aeq}	-
19:00 – 07:00	-	-	≤ 60 dB L_{AFmax}

Table 5: Representative sound level at residential noise sensitive receptors in accordance with WYPCG criteria

- 8.2 Based on the proposed development being at an existing college type location, and; types of plant equipment being to provide building conditioning services including ventilation, heating and fume extract and similar, and; the context of residential receptors being adjacent to through roads, with a mix of non-residential uses included within the area, it is proposed that use of a plant noise limit for plant of no higher than '0 dB' below the existing background noise level is appropriate to inform plant noise control and assessment for the proposed scheme.
- 8.3 Baseline representative ambient noise levels have been based on review of the provided NIA report supplemented by Apex Acoustics noise survey measurements.
- 8.4 These limits are proposed to be applied at the nearest and most exposed residential properties to the new plant equipment installed in the scheme on Greenhead Road to the south and Park Avenue to the east. Other residential properties, such as those to the west of the site for example, are more distant / less exposed to proposed new plant equipment installations than those directly to the south and north east of the scheme.
- 8.5 This is considered a robust assessment of noise level limits based on previously cited noise survey conditions.

Proposed plant noise limits at college facades

- 8.6 To meet BB 93 internal noise criteria, noise limits due to external plant outside of a ventilation opening during college hours are included within Table 6.

Assessment period, T	Sound level limit at untreated ventilation opening to occupied space dB L _{Aeq,30 mins}
Daytime 09:00 – 16:00	≥ 15 dB + BB 93 IANL criteria

Table 6: Representative sound level at college noise sensitive facade in accordance with WYPCG and BB 93 criteria

9 Noise sources

Proposed plant and associated noise levels

- 9.1 The details of proposed building services plant including operating mode and noise data are subject to detailed design and were not confirmed at the time of writing. Further assessment will be undertaken when these details are confirmed.

Proposed car park

- 9.2 It is understood that the proposed car park would be available up to 21:15 hrs on weekdays and up to 18:15 hours on weekends.
- 9.3 The noise from the car parking area has been modelled following the German guidance RLS 90, Reference 10. This guidance describes the calculation method of the noise emitting from car parking based on:
- the type of the parking area, i.e. for car parking;
 - number of vehicle movements at daytime or night-time;
 - number of parking spaces; and
 - ground absorption and barrier shielding effect.
- 9.4 The parameters used in the model are shown in Table 13 and in Table 14 in Appendix C.
- 9.5 The calculated noise level of a single parking space at 25 m as given in RLS 90 is shown in Table 7.

Parking type	Time	Sound level used at 25 m for 1 no. parking space
Car park	06:00 to 22:00 hrs	30 dB L _{Aeq,1hr}

Table 7: Sound level used for a single car parking space

Proposed all weather pitch (08:00 to 21:00 hrs, weekdays; 09:00 – 18:00 weekends)

- 9.6 The noise levels from sports pitches vary dependent on the activities on the pitch.
- 9.7 Based on noise measurement of sports pitches including football, hockey and rugby and participation by men, women and children, the majority of the noise levels measured at 10 m are between 56 dB and 58 dB L_{Aeq,T}, Reference 12.
- 9.8 The Sport England recommended noise level limit from use of artificial grass pitches is 58 dB L_{Aeq,T} at 10 m, (Reference 6). The study in Reference 12 and Sport England are consistent.
- 9.9 The source noise levels from the proposed pitches are shown in Table 8. The noise levels used in this report are considered to be prudent as in most of the cases, experience has shown that the noise from the AGP is below the levels used in this assessment.

Table 8: Source noise levels of the sports pitches

Event	Maximum sound power level
Stick hitting hockey ball	105 dB $L_{Amax,F}$
Shouting	102 dB $L_{Amax,F}$
Whistle blowing	102 dB $L_{Amax,F}$

10 Noise transmission and initial assessment

10.1 Noise transmission and propagation is modelled to the NSR based on the noise source data detailed, using proprietary software, CadnaA, Reference 14.

10.3 The model parameters and assumptions are summarised in Appendix C.



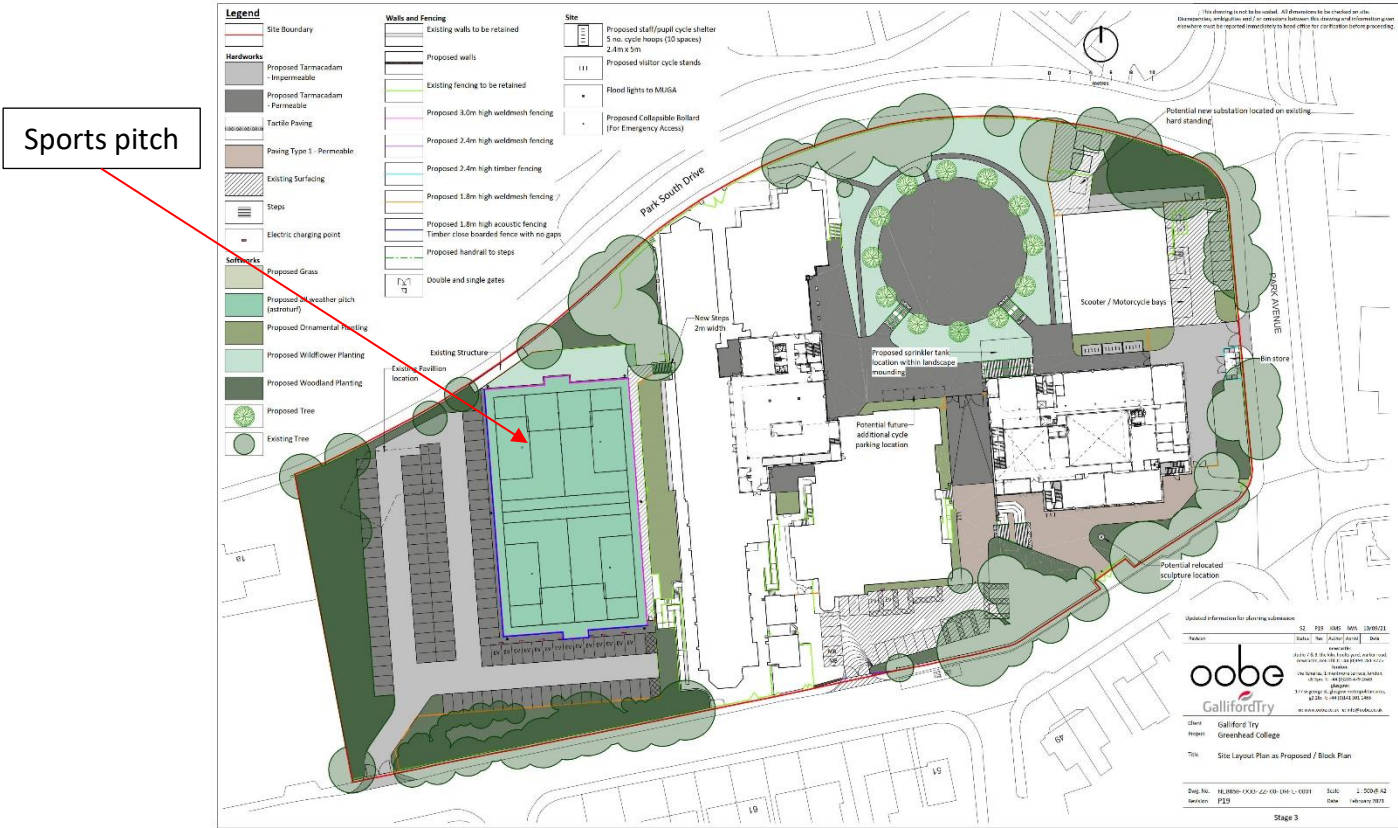


Figure 6: Acoustic model for sports pitch – plan view

Initial calculation and assessment

10.4 Without any additional mitigation measures, the calculated noise levels at the noise sensitive receptors (NSR) are shown in Table 10.

Noise source	Calculated noise level at NSR	Assessment criteria	Additional mitigation suggestion
Fixed plant	N/A	Rating level is at least 0-5 dB below the background sound level L_{A90} and at least 10 dB below the ambient sound level L_{Aeq} and between 19:00 and 07:00 maximum noise levels shall not exceed 60 dB L_{AFmax} at facades of residential properties	N/A
Car parking area	54 dB $L_{Aeq,1hr}$	≤ 55 dB $L_{Aeq,1hr}$	-
Sports pitch	52 dB $L_{Aeq,1hr}$; 61 dB L_{AFmax}	Desirable ≤ 50 dB $L_{Aeq,1hr}$; and ≤ 55 dB L_{AFmax} between 19:00 and 07:00 hrs	Noise barrier to the west and south of the sports pitch are required. Details are shown in Figure 8

Table 10: Calculated noise levels and assessment without additional mitigation measures

11 Noise mitigation measures

Fixed plant

- 11.1 As the plant details are not confirmed at this stage, plant design and selections shall be informed by the noise limits proposed within this report and where appropriate, consider what additional mitigation may be necessary.
- 11.2 The potential mitigation measures should ensure the rating level of the fixed plant at 1 m outside of habitable room windows of the nearest residential property is no higher than identified sound level limits based on the identified plant noise impact assessment criteria.
- 11.3 Based on an understanding of proposed fixed plant available at the time of writing and noise control requirements for limiting of noise ingress at new and existing school facades to meet BB 93 IANL criteria within teaching spaces, identified noise limits for residential receptors are likely to be met with the same mitigation measures as required for the college – ie where relevant, appropriately specified in line attenuation, enclosures and or barriers.
- 11.4 **Preliminary assessment for BB 93 requirements**
- 11.5 *New teaching block roof plant*
- 11.6 Preliminary assessment indicates that additional mitigation measures are required for the new teaching block rooftop area to mitigate noise impact at the classroom roof turrets. A 2.4 high solid screen between the main plant and the natural ventilation roof turrets is recommended. The barrier location is shown in Figure 7.
- 11.7 To be effective in practice, the barrier should have no cracks or gaps, be continuous to the ground, and have a surface density $\geq 12 \text{ kg/m}^2$.

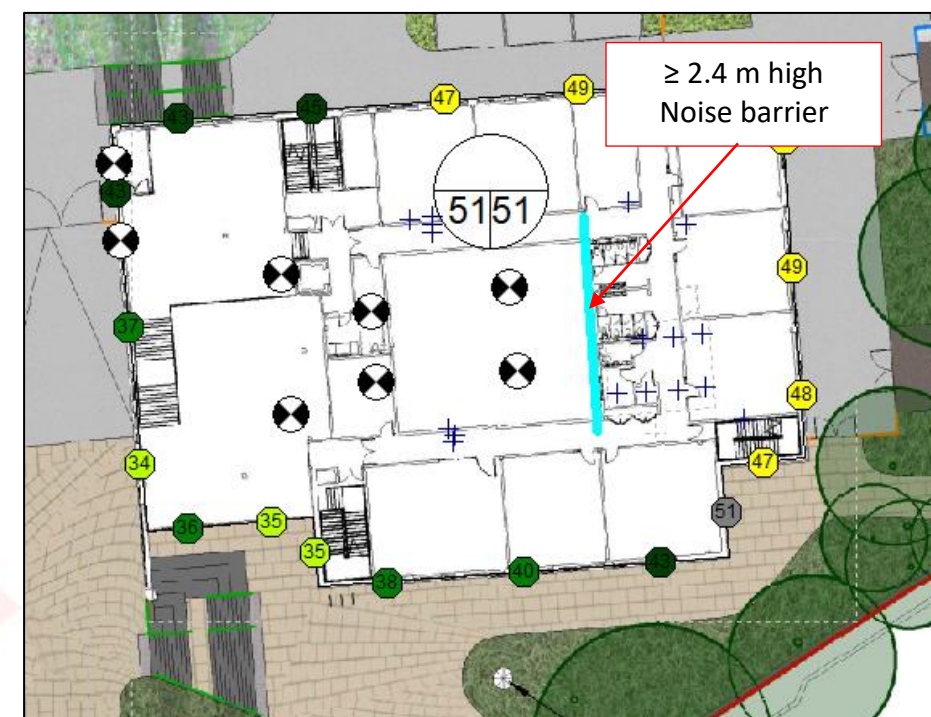


Figure 7: Noise barrier to the roof level plant area west elevation

Courtyard infill roof plant

- 11.8 For the courtyard infill, to mitigate noise impact due to new units at the existing college windows, to meet plant noise limits at an open window overlooking an ASHP type unit, use of additional acoustic treatments may be required to plant units, where identified noise limits at college façade ventilation openings would otherwise be exceeded.

Car park

- 11.9 Based on Apex noise modelling results no additional mitigation measures are required for the car park to meet the identified criteria.

Sports pitch

- 11.10 1.8 m high noise barriers to the west and south of the sports pitch are proposed. The barrier locations are shown in Figure 8.
- 11.11 To be effective in practice, the barrier should have no cracks or gaps, be continuous to the ground, and have a surface density $\geq 12 \text{ kg/m}^2$ such as a close boarded timber fence.

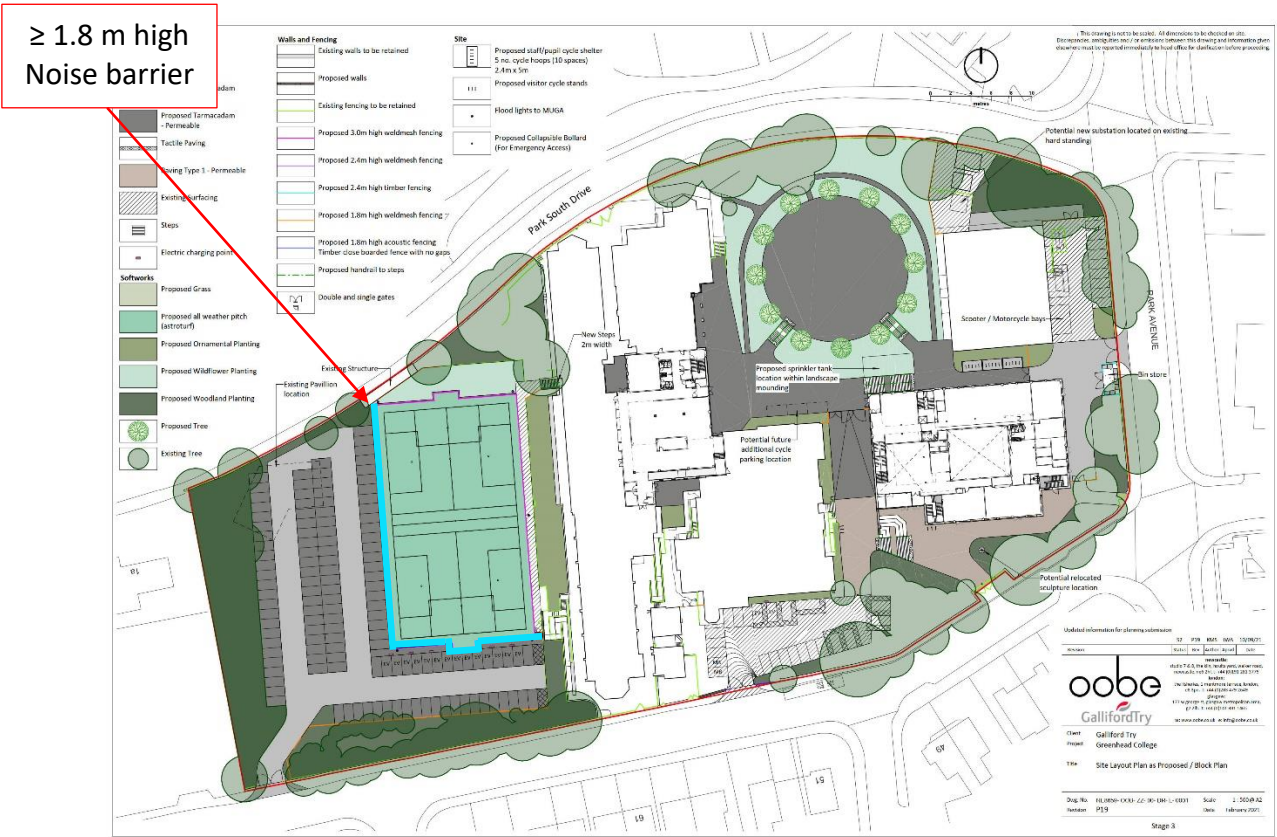


Figure 8: Noise barrier to the west and south of the sports pitch

12 Calculated noise levels and assessments

Calculated noise levels

12.1 With the additional noise mitigation measures described in Section 9, the calculated noise levels at the noise sensitive receptors (NSR) are shown in Table 11.

Noise source	Calculated noise level at NSR	Noise level contour	Assessment criteria	Criteria achieved?
Fixed plant	N/A	N/A	Rating level is at least 0-5 dB below the background sound level L_{A90} and at least 10 dB below the ambient sound level L_{Aeq} and between 19:00 and 07:00 maximum noise levels shall not exceed 60 dB L_{AFmax} at facades of residential properties	Yes. Based on appropriate selection and design of plant and mitigation to meet identified noise limits
Car park	54 dB $L_{Aeq,1hr}$	Figure 11	≤ 55 dB $L_{Aeq,1hr}$	Yes
Sports pitches	50 dB $L_{Aeq,1hr}$ 55 dB L_{AFmax}	Figure 12 and Figure 13	Desirable ≤ 50 dB $L_{Aeq,1hr}$ ≤ 55 dB L_{AFmax} between 19:00 and 07:00 hrs	Yes

Table 11: Calculated noise levels with the additional mitigation measures described in Section 9

Assessment

- 12.2 With the identified additional noise mitigation measures and where relevant, appropriate selection and design of plant equipment and mitigation, the highest calculated noise levels at the noise sensitive receptors are within the noise limits proposed.
- 12.3 The calculated noise levels indicate that the noise impact is likely to be around Lowest Observed Adverse Effect Level (LOAEL) according to the Noise Policy Statement for England.
- 12.4 On this basis, it is anticipated that Local Authority requirements shall be satisfied.

13 Conclusion

- 13.1 An assessment of the predicted noise impact due to the operation of the proposed site at Greenhead College, Huddersfield has been carried out in support of a planning application.
- 13.2 Calculations and assessment have been made of a range of potential noise sources that may be either introduced or increased in scale due to the development.
- 13.3 Based on typically applicable guidance and an understanding of Local Authority considerations in respect of noise, limits have been proposed for a range of noise generating activities
- 13.4 Based on the recommended mitigation measures detailed in Section 9, the calculated noise levels are below noise limits proposed to meet the identified requirements, and therefore comply with the aims of the NPPF and anticipated requirements of the Local Authority.

14 References

- 1 National Planning Policy Framework, Ministry of Housing, Communities & Local Government, July 2021.
- 2 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.
- 3 BS 4142:2014:A1+2019, Method for rating and assessing industrial and commercial sound.
- 4 World Health Organisation Guidelines for Community Noise, 1999
- 5 BS 8233:2014 Guidance on sound insulation and noise reduction in buildings.
- 6 Sport England: Artificial Grass Pitch (AGP) Acoustics – Planning Implications, New Guidance for 2015.
- 7 West Yorkshire Planning Consultation Guidance (Condensed Version), Noise & Vibration, May 2016.
- 8 Building bulletin 93 (BB93), Acoustic design of schools: performance standards, February 2015.
- 9 Leeds City Council Planning Consultation Guidance, Noise & Vibration, December 2019.
- 10 RLS, 1990. Richtlinien für den Lärmschutz an Strassen. BM für Verkehr, Bonn, 1990
- 11 Hepworth Acoustics report, reference no. P20-333-R01v1, Greenhead College, Huddersfield, Noise Impact Assessment, September 2020.
- 12 The assessment of noise from all-weather sports pitches, Charley Vaughan, IOA Acoustics Bulletin Vol 43 No 1 January/February 2018.
- 13 Apex Acoustics report, reference no. 8286.4A, Sale Sports Club, Maximum noise level calculations and assessment, February 2021.
- 14 CadnaA environmental noise modelling software, version 2017, Datakustik GmbH.
- 15 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.
- 16 Architects drawings: Site layout as proposed, drawing no. NE8659-OOB-ZZ-00-DR-L-0001, revision P19, dated 10/09/2021.

Appendix A Noise exposure hierarchy

Planning Practice Guidance - Noise				<div><div><div></div><div>Significant adverse effect</div><div>+ 10 dB</div></div><div><div></div><div>Adverse effect</div><div>+ 5 dB</div></div><div><div></div><div>Low Impact</div><div>0 dB</div></div></div> <div>An initial estimate of the impact of the specific sound may be obtained by subtracting the measured background sound level from the rating level. Typically, the greater this difference, the greater the magnitude of impact</div>
Noise	Example of outcomes	Increasing effect level	Action	
Present and very distributive	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	
Present and distributive	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	
Significant Observed Adverse Effect Level (SOAEL)				
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	
Lowest Observed Adverse Effect Level (LOAEL)				
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	
No Observed Adverse Effect Level (NOAEL)				
Not present	No effect	No Observed Effect	No specific measures required	
No Observed Effect Level (NOEL)				

Table 12: PPG-N Noise Exposure Hierarchy and BS 4142 initial estimate of impact

Appendix B Noise measurements results

B.1 The statistical analysis of the typical background sound levels at the measurement position are shown in Figure 9 and Figure 10.

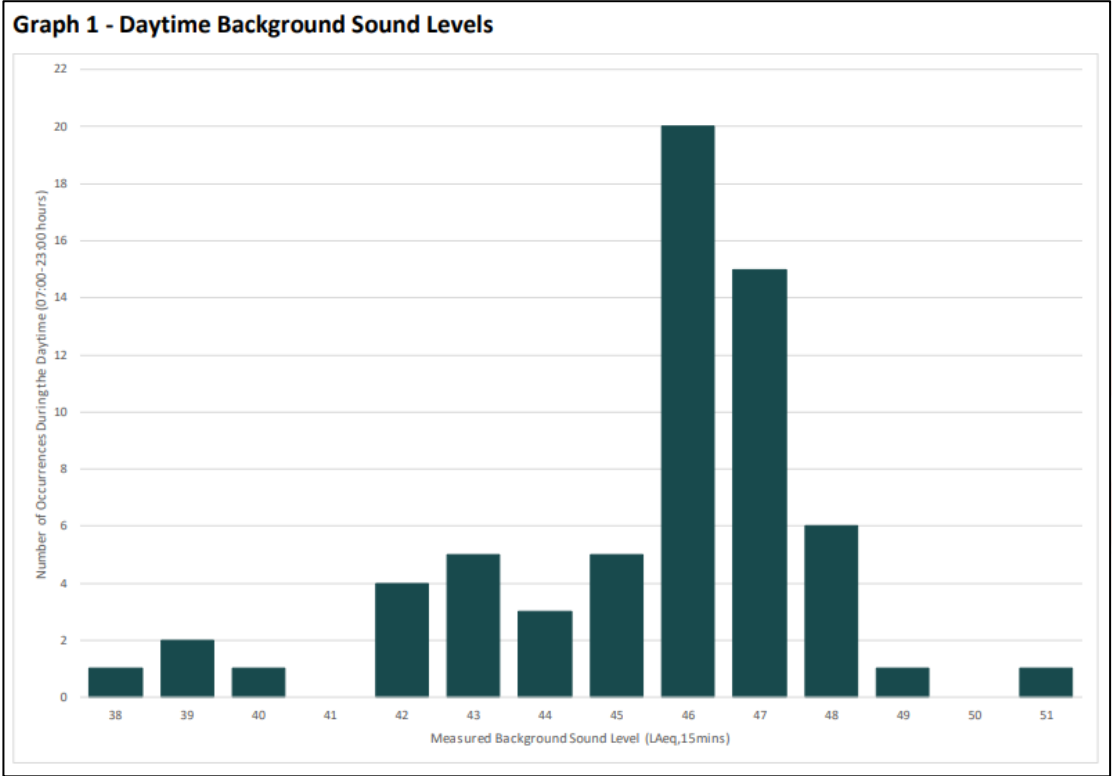


Figure 9: Statistical analysis of the background sound levels measured during daytime (07:00-23:00)

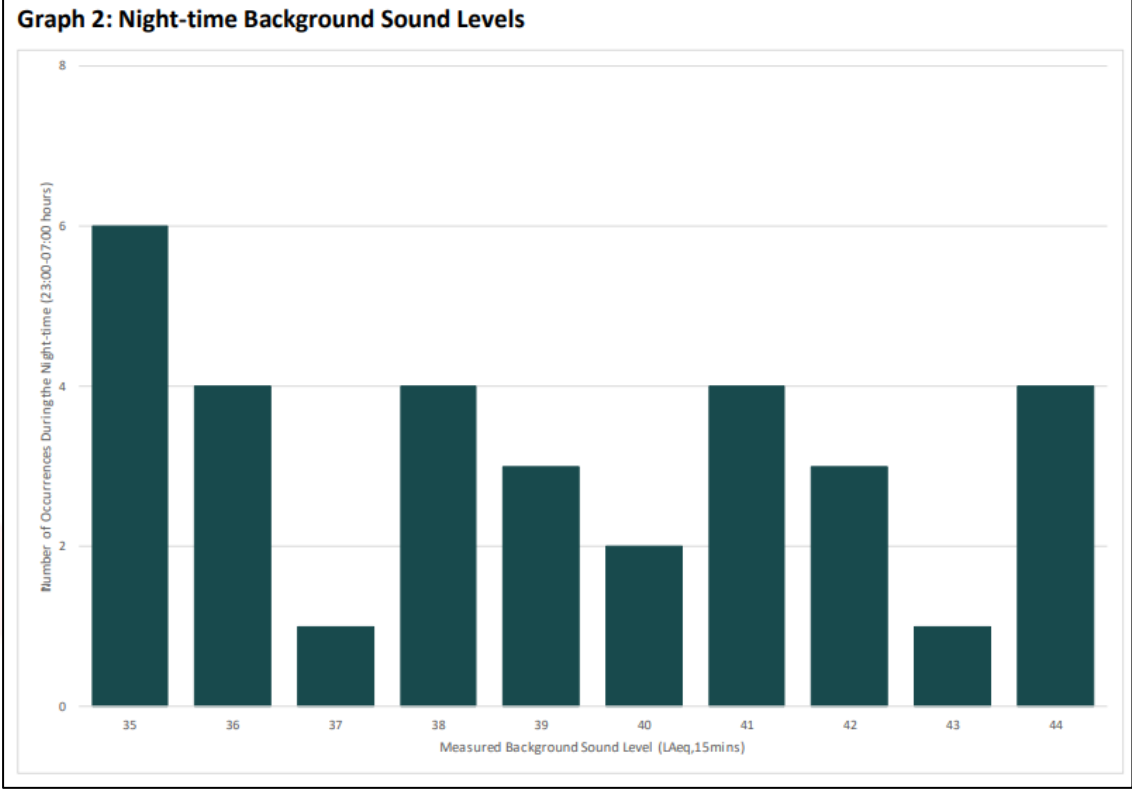


Figure 10: Statistical analysis of the background sound levels measured during night-time (23:00 – 07:00)

Appendix C Noise transmission and propagation

- C.1 Noise transmission and propagation is modelled using proprietary software, CadnaA.
- C.2 The noise propagation from car park is calculated following the guidance in RLS 90 and the noise propagation from sports pitches is calculated following the guidance in ISO 9613-2, Reference 15.
- C.3 The parameters used in modelling are shown in Table 13 and Table 14.

Parameter	Details
Model dimensions	British Transverse Mercator coordinates
Site location and layout	Architects' drawings, Reference 16
No. of vehicle movement	0.3 cars per car parking space per hour based on RLS 90 noise source levels for 06:00 to 22:00 hrs; 1 car per space per hour based on RLS 90 noise source levels for 22:00 to 06:00 for wedding event parking in area identified for 80 spaces
D _p , correction for different parking types	Car park: +0 dB
D _B , shielding	0 dB, no shielding
Source height	0.5 m

Table 13: Modelling parameters and assumptions – RLS 90

Parameter	Details
Model dimensions	British Transverse Mercator coordinates
Site location and layout	Architects' drawings, Reference 16
Topography	Topography included
Building heights – proposed buildings	Architects' drawings
Building heights – outside of site	6 m for residential dwellings
Building and barrier absorption coefficient	0.21 to represent a reflection loss of 1 dB
G, Ground factor	Hard ground, G = 0; Porous ground, G = 1 (Grass land around full weather pitches where relevant)
Source height	For sports pitches, 1.5 m to represent height of players' mouth, 0.5 m to represent height of a ball strike
Max. order of reflections	Three

Table 14: Modelling parameters and assumptions – ISO 9613-2

Appendix D Calculated noise contour levels



Figure 11: Noise level contour at 1.5 m above ground due to proposed car park (no mitigation required)

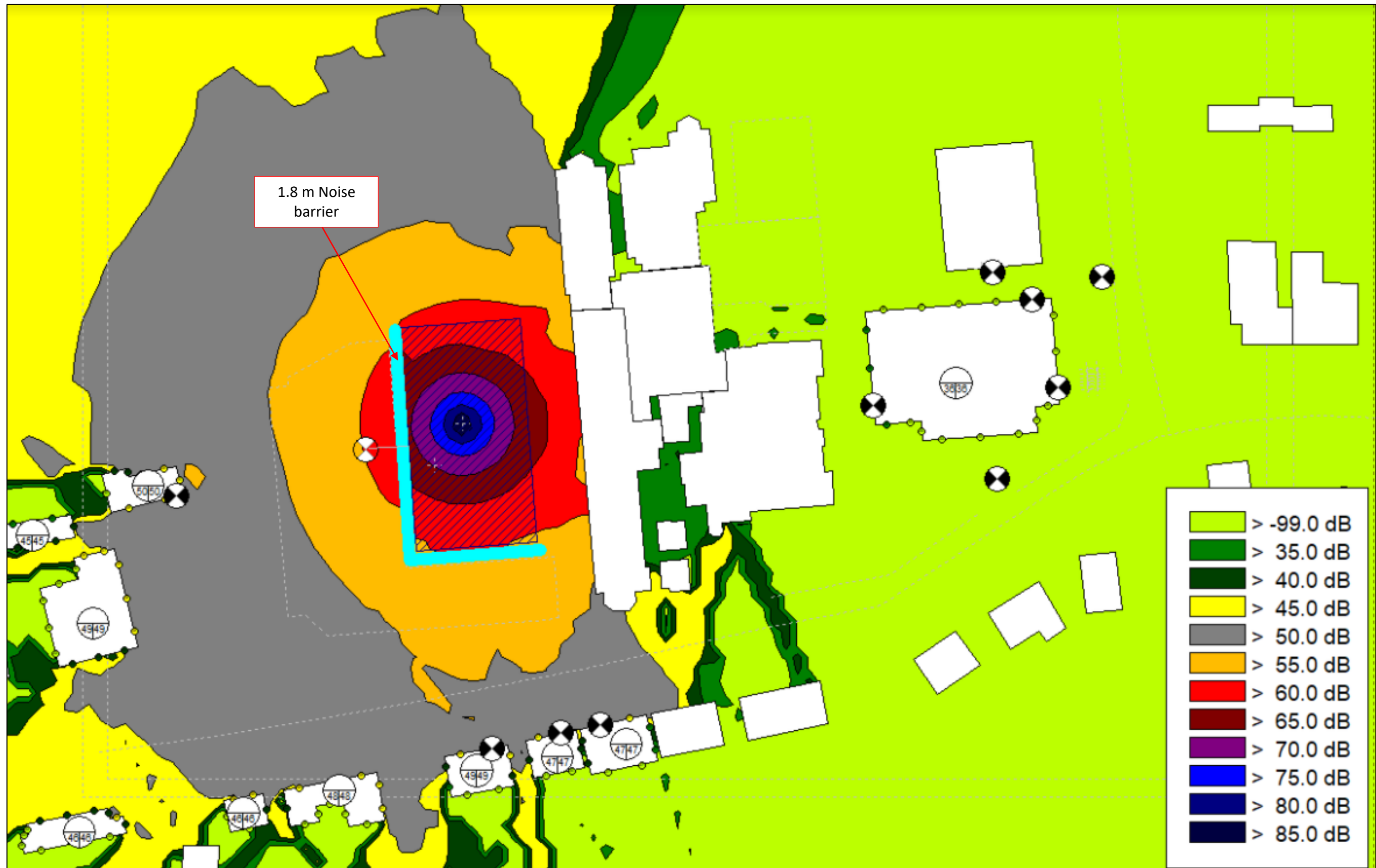


Figure 12: LAeq,1hr Noise level contour due to sports pitch at 1.5 m above ground (with mitigation)

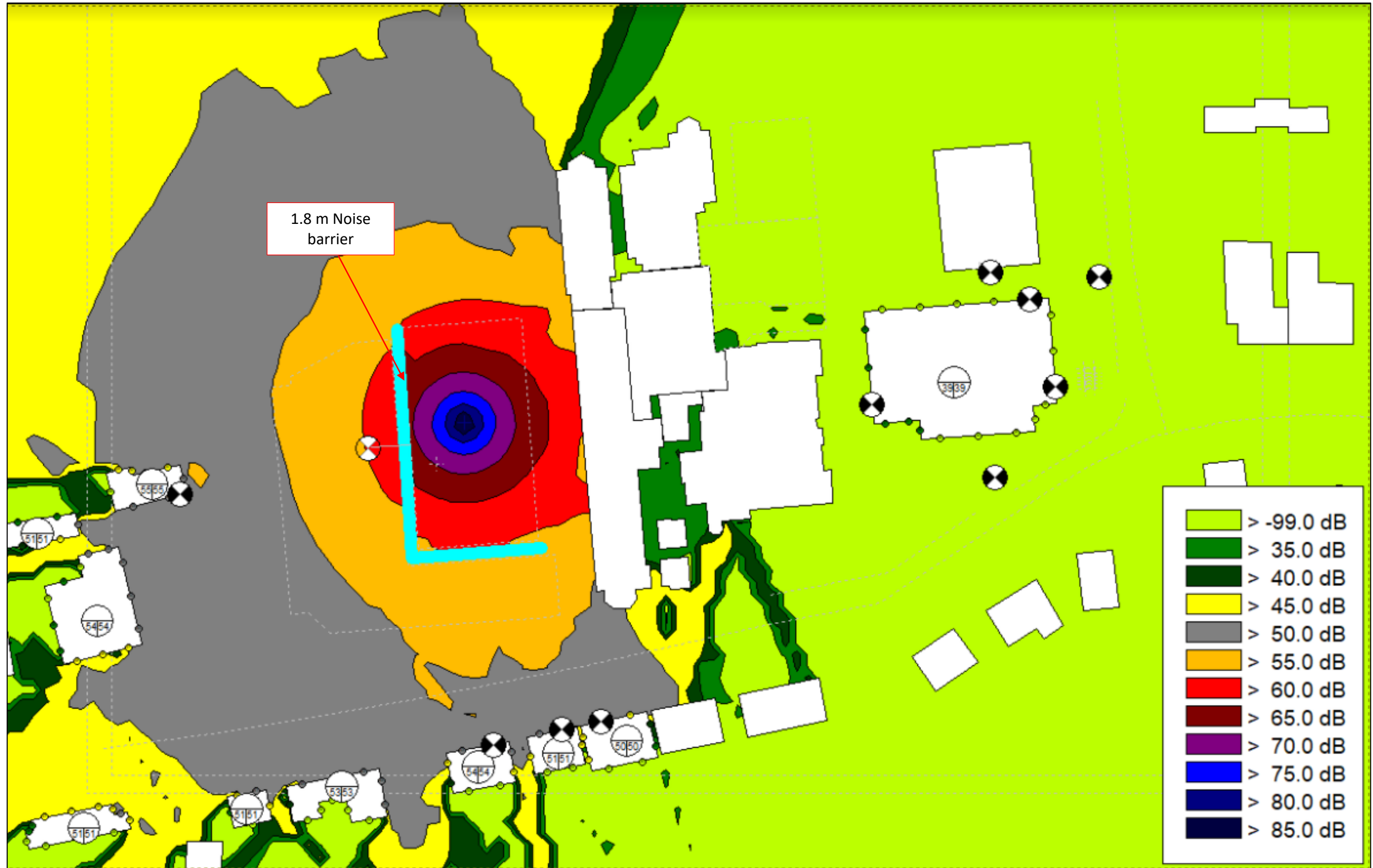


Figure 13: LAFmax Maximum noise level contour at 1.5 m above ground due to a hockey ball strike (worst case) on sports pitch (with mitigation)

Appendix E Site plan

A5-1 Landscape Architect Site Layout Plan, Reference 16 site plan used to inform noise control requirements for the proposed scheme.

