The Sizewell C Project

6.3 Volume 2 Main Development Site

Chapter 11 Noise and Vibration

Appendix 11E Sound Level Assessment of the Proposed Sports Facilities

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Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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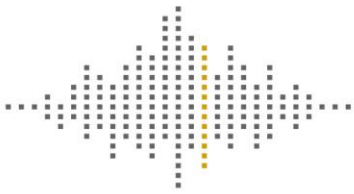

Report

Sizewell C Project

Environmental Statement Volume 2, Chapter 11, Appendix 11E -

Sound level assessment of the proposed sports facilities

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Appendices

1.0 Introduction

1.1 Sharps Redmore has been appointed by SZC Co. with respect to proposed additional sports facilities within the Alde Valley School grounds, in Leiston.

1.2 The proposed facilities consist of a single 3G artificial full size football pitch, two Multi Use Games Areas (MUGAs) and two grass pitches, with anticipated use between 8am and 10pm on any day of the week.

1.3 In order to undertake an assessment of sound levels associated with the proposed facilities, Sharps Redmore has conducted surveys on and around the Alde Valley School grounds. Unattended, continuous 24 hour measurements of current sound levels within the school grounds have been obtained as well as an attended evening survey from a nearby bridleway and receptors.

1.4 The construction works to create the additional sports facilities would be relatively minor including top soil removal (where needed), ground levelling, installation of surfaces, floodlights, and perimeter fencing.

1.5 The works to install the proposed facilities would take place during the daytime and be of short duration. Disturbance during works to neighbouring receptors is expected to be minimal and therefore has not been further assessed.

1.6 The purpose of this assessment is to consider the potential impact of the use of additional sports facilities on the adjacent noise sensitive receptors.

2.0 Assessment Methodology and Criteria

2.1 As described in **Volume 1, Chapter 6**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts, and value/sensitivity of resources/receptors, that could be affected in order to classify effects.

2.2 A detailed description of the assessment methodology used to assess the potential effects on noise and vibration arising from the proposed development is provided in **Volume 1, Appendix 6G**. The effect of noise and vibration on a receptor or community is dependent on the magnitude of the impact, the sensitivity of the receptor and may also depend on other factors such as the existing acoustic environment.

2.3 A summary of the assessment criteria used in this assessment is presented in the following sub-sections.

Sensitivity

2.4 The assessment of assigning the levels of sensitivity to receptors is set out in **Table 1**.

Table 1 Assessment of the value or sensitivity of receptors for noise and vibration.

Sensitivity	Description
High	Receptors that are highly sensitive to noise or vibration such as theatres, auditoria, recording studios, concert halls and highly vibration sensitive structures or uses such as certain laboratories medical facilities or industrial processes.
Medium	Noise and vibration sensitive receptors such permanent residential buildings, hospitals and other buildings in health/community use, buildings in educational use, hotels and hostels.
Low	Receptors with limited sensitivity to noise and vibration such as offices, libraries buildings in religious use, and other workplaces with a degree of sensitivity due to the need to concentrate.
Very Low.	Receptors of very low sensitivity to noise and vibration such as industrial or commercial buildings and transient or mobile receptors.

Magnitude

2.5 The approach taken to evaluate noise effects for all construction work associated with the project on occupiers of dwellings and other permanent residential accommodation is that outlined in Part 1 of BS 5228. This recommends that, for dwellings, significant effects may occur when the site noise level, rounded to the nearest decibel, exceeds the value listed in **Table 5**. The table is used as follows: for the appropriate period (daytime, evening, night-time, weekends), the pre-construction ambient noise level is determined and rounded to the nearest 5dB. This rounded value is compared to the Category A criteria in **Table 2** and depending on whether the rounded values are below, equal to, or above the Category A values, the Category A, B or C criteria will apply to the construction works as an indicator of significant impacts.

Table 2: Thresholds of potential significant effect at dwellings, from Part 1 of BS 5228

Period	Assessment Category		
	A	B	C
Day: Weekdays, 0700-1900, Saturday, 0700-1300	65dB $L_{Aeq,T}$	70dB $L_{Aeq,T}$	75dB $L_{Aeq,T}$
Evenings and weekends: Weekdays 1900-2300, Saturdays 1300-2300 Sundays 0700 - 2300	55dB $L_{Aeq,T}$	60dB $L_{Aeq,T}$	65dB $L_{Aeq,T}$
Every day 2300 - 0700	45dB $L_{Aeq,T}$	50dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$

Notes:

Assessment Category A: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5dB) are less than these values;

Assessment Category B: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5dB) are the same as category A values; and

Assessment Category C: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5dB) are higher than category A values.

If the ambient sound level exceeds the Assessment Category C threshold values given in the table (i.e. the ambient sound level is higher than the above values), then an impact is deemed to occur if the total $L_{Aeq,T}$ sound level for the period increases by more than 3dB due to construction activity.

2.6 A significant effect is deemed to occur where the relevant criterion is exceeded for the following periods of time:

1) 10 or more days or nights in any 15 consecutive days or nights; or

2) a total number of days or nights exceeding 40 in any 6 consecutive months.

2.7 Where an assessment conclusion identifies a significant effect, it is on the basis that the effect is assumed to meet both the noise level criteria and the duration criteria, unless otherwise stated. Where there is uncertainty as to whether the duration criteria will be met, a precautionary approach has been adopted and it is assumed that the works will continue for a sufficient period to meet the duration criteria.

2.8 The values to be used to assess the magnitude of impact for construction work from all construction work, other than the main development site are as shown in **Table 3**.

Table 1 Values to assess the magnitude of noise impact from construction

Sensitivity of Receptor	Period	Magnitude of Impact				Parameter
		Very Low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium and low	Day			ABC[(1) (2)]	ABC[(1) (2)] + 10	$L_{Aeq,\ 12h}$, dB
	Evening					$L_{Aeq,\ 4h}$, dB

	Night	Below baseline values	Baseline noise levels			$L_{Aeq, 8h}$, dB
Very low	Any	Bespoke assessment method to be used				

Notes:

(1) ABC indicates the significance threshold from **Table 2** above, based on the "ABC method" from BS 5228-1

(2) Where levels are predicted as free field values, the ABC criteria are reduced by 3dB, to account for the difference between free field and façade levels

2.9 For the assessment of magnitude of construction vibration, **Table 4** will be used.

Table 4 Vibration – magnitude of impact (all construction sources) for human receptors (day or night)

Sensitivity of receptor	Magnitude of impact				Parameter
	Very low	Low	Medium	High	
High	Bespoke assessment method to be used				
Medium and low	<0.3	0.3	1	>10	PPV mm/s
Very low	No assessment normally required				

2.10 Construction vibration shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

1) 10 or more days or nights in any 15 consecutive days or nights; or

2) a total number of days or nights exceeding 40 in any 6 consecutive months.

2.11 As with the assessment of construction noise, where an assessment conclusion identifies a significant effect, it is on the basis that the effect is assumed to meet both the vibration level criteria and the duration criteria, unless otherwise stated. Where there is uncertainty as to whether the duration criteria will be met, a precautionary approach has been adopted and it is assumed that the works will continue for a sufficient period to meet the duration criteria.

Sport England – Artificial Grass Pitch (AGP) Acoustics – Planning Implications: 2015

2.12 The Sport England guidance provides specific advice in relation to AGPs and provides guidance on assessment methodology and criteria that might be set for proposals adjacent to residential properties.

2.13 The guidance recommends that external noise levels from use of AGPs should not exceed 50dB $L_{Aeq,1hr}$. In addition regard should also be given to the change in noise level and that slight impact is considered to be an increase in ambient noise levels of less than 3dB.

2.14 Whilst not an approved document, the guidance does provide advice on sporting activity and is consistent with the advice given within the WHO guidelines.

2.15 AGP Acoustics – Planning Implications will be used within this assessment to sound level values that will arise from the proposed sports facilities.

3.0 Site and Neighbourhood Description

3.1 The proposed site layout for the new facilities is shown in **Chapter 2, Figure 2.12** of this volume.

3.2 It is proposed that a floodlit full size 3G artificial grass pitch would be located in the north-west of the site and close to the existing school buildings, with two Multi Use Games Areas located below it towards the south-west of the site. Two grass pitches are then proposed to fill in the remaining space to the east.

3.3 The existing school field, outlined in red, currently consists of open, flat, grassy land that is used by Alde Valley School for sports and recreational use during the school day. The northern half of the field is currently used as a football field and the southern half is used as a rugby pitch. The western, southern and eastern sides of the field are enclosed by a metal mesh fence, with one gate in the southern side, and another in the eastern side.

3.4 During a week day, outdoor school activity is typically the dominant sound source in the area. Sounds here typically include raised voices, as well as impact sounds from sports activities. Other sounds in the area include occasional road traffic noise from nearby roads, as well as sound from users of Grimsey's Lane which is a public bridleway.

Figure 1: Highlighted Site Area and Nearby Receptors, as well as further field containing sports facilities.

3.5 **Figure 1** shows the development site area highlighted in red, and surrounding receptors, highlighted in blue, which will be considered as part of this assessment.

3.6 The nearest residential receptors are located to the east of the site, off Grimsey's lane. These will be referred to as the eastern receptors. There are four separate dwellings, all of which are bungalows. The southernmost dwelling has a dormer window suggesting the use of the attic as a habitable room in the property; this will be considered as part of the assessment.

3.7 The nearest individual eastern receptor is approximately 23m from the boundary of the proposed south-east grass pitch. The boundary between the Alde Valley School school field and these dwellings off Grimsey's Lane consists of a hedge. This will not be considered to provide any form of acoustic screening in this assessment.

3.8 The school field is approximately 1 metre higher than the level of the ground that the eastern dwellings are built on. An image showing this can be seen in Appendix A.

3.9 Residents located to the west of the site along Quakers Way will also be considered as part of this assessment. These will be referred to as the western receptors. These consist of several two-storey dwellings. Those most likely to be affected are those to the north that are unscreened by the Leiston Leisure Centre complex. These are at a distance of approximately 85m from the proposed full size floodlit 3G pitch boundary at the closest point.

3.10 There is a 2m high wooden fence that runs along the east of Leiston Leisure Centre car park, along the site boundary. There is also a 2m high wooden fence that runs along the eastern side of the receptors' properties. Images of both of these fences can be seen in Appendix A.

3.11 The labelled "southern receptors" in Figure 1 are currently two-storey dwellings under construction. They lie approximately 70m from the proposed MUGA pitches at their closest point.

3.12 At present there are several sets of football goal posts in the field to the east of the eastern receptors. This field is highlighted yellow in Figure 1, and forms a boundary with the gardens of the eastern receptors. A photograph of this field is shown in Appendix A. Sizewell Sports and Social Club resides approximately 350m to the north-east of the eastern receptors.

3.13 It is anticipated that the school would use the facilities intermittently between 08:00-16:00. Following this, it would be used by Sizewell C workers and the local community into the evening, approximately from 16:00-22:00 hours. It has been advised that there is likely to be some weekend use however weekday evenings are likely to be more popular.

3.14 It is likely that the new facilities will be used for a range of different sports by the school and community, and by people of all ages.

4.0 Sound Survey Details

4.1 Sharps Redmore performed unattended sound measurements from the 24th-28th May 2019. These were taken using a Norsonic 118 Class 1 integrating sound level meter, fitted with an environmental microphone kit. The measurement location is shown in **Figure 2**, and lies just to the north of the proposed site location. The weather over this period was dry and cloudy with typical wind speeds of 10mph. The meter was field-calibrated before and after the survey with no significant measurement drift being noted. An image of the meter setup is provided in **Appendix A**.

Figure 2: Measurement Locations around Alde Valley School

4.2 The position of the unattended sound meter was such that the levels measured were representative of typical levels heard at all receptors from the school field. Monday 27th and Tuesday 28th of May were both during school holidays (including bank holiday on 27th May) meaning that levels measured between 08:00-16:00 were likely to have been lower than those that could be expected on a typical week day when school students would be using the field.

4.3 An attended sound measurement was conducted on Tuesday 28th May 2019, between 19:00-22:00 hours. The location of this is shown in **Figure 3**. These measurements were taken using a Cirrus Optimus Class 1 integrating sound level meter. The weather during this survey was sunny and cloudless, with very little breeze.

4.4 At both measurement locations, the microphone with windshield was placed approximately 1.5 metres above ground in free-field conditions.

4.5 In both the attended and unattended surveys, the meters were set up to measure separate 15 minute periods. The meters recorded various parameters including ambient $L_{Aeq,15mins}$ which will be the key parameter used in this assessment. To be comparable with the guidance levels set out in WHO CNG, these $L_{Aeq,15\ mins}$ values will be combined into $L_{Aeq,1hr}$ values.

4.6 **Table 5** summarises the typical levels measured during the unattended survey. The levels are split into times when the facilities will be used by the school and when they will be used by SZC Co. and the wider community. As the proposed facilities are only expected to be used during daytime hours, night time levels have been excluded from the table.

Table 5 Typical Ambient Levels Measured during the Unattended Survey

08:00-16:00 $L_{Aeq,1hr}$	16:00-22:00 $L_{Aeq,1hr}$
42dB	39dB

4.7 These sound levels are derived from typical levels measured over the course of the entire survey. Levels measured on 25th, 26th and 28th May have been omitted as building work on Leiston Leisure Centre was being carried out on these days which raised sound levels above that considered typical of the area. Data from 27th May was the primary data used to derive these values as it was the day where measurements were taken with no building work occurring.

4.8 The full survey results are shown in graphical form in Appendix B, tabulated results are available on request.

4.9 The attended survey was carried out between 19:00-22:00 hours. Due to its more isolated position, levels at this location would be expected to be quieter. **Table 6** shows the $L_{Aeq,1hr}$ values measured during the survey.

Table 6 Ambient Levels Measured during the Attended Survey

Time	$L_{Aeq,1hr}$
19:00	43dB
20:00	37dB
21:00	43dB

4.10 As shown in **Table 6**, ambient sound levels measured in the evening are similar to those measured during the unattended survey, thus giving confidence in the existing ambient level of 39dB, shown in **Table 5.**

4.11 Sounds heard during the attended survey included some natural sounds such as bird song, but primarily consisted of manmade sounds including distance road traffic noise, aircraft, and walkers, cyclists and dogs using Grimsey's Lane throughout the evening.

4.12 The aforementioned sports facilities to the east of the eastern receptors was in use between 19:00-20:30 hours by five children, who were the primary sound source in the area, generating sports related sound. Distance noises could be heard from Sizewell Sports and Social Club throughout the survey.

4.13 Generally, the sound climate of the area is characterised by sports and leisure related noise into the evening.

5.0 Sound Level Assessment

Construction Noise and Vibration

5.1 Two new areas would be created; one for a full-size 3G facility and one for a pair of MUGA (mixed-use games area) pitches side-by-side. The two new areas would be provided with surfaces requiring prior ground works. The groundworks would include excavation, drainage installation and aggregate base layer formation.

5.2 It is assumed that all construction works would take place between 07:00 and 19:00 hours on a Monday to Friday or between 07:00 and 13:00 hours on a Saturday.

5.3 Groundworks plant would likely include an excavator, dumper truck, small dozer (for spreading and levelling of materials) and a roller. Given the small scale of the groundworks, a twin-drum 'ride-on' roller would be more practicable than a full-size/large roller. The total sound output of these key plant units would equate to 70dB, LAeq, 12h free field at a reference distance of 40 metres. In terms of vibration, a small twin-drum roller would typically generate an amplitude in the ground of 1.4mm/s ppv at a reference of 10m. This would be the main source of vibration.

5.4 The Leiston School sports field has residential receptors on its east boundary; School buildings to the north and Leiston Leisure Centre to the west. Open agricultural land lies to the south, beyond Grimsey's Lane. Of these, the School and the Leisure Centre buildings are in the closest proximity of the pitches requiring groundworks. Typically, the pitch centres are 40m and 20m respectively, to the facades.

5.5 The construction plant would operate across the full area of each set of new pitches but only briefly and in a phased manner at the fringe areas. As a guide to the average level of sound and vibration likely to arise, it is adequate to 'model' the plant as all operating simultaneously in the central area of each pitch. By so doing, the level of noise at the nearest façade line of the School and of the Leisure Centre would be 76dB $L_{Aeq,(t)}$ and 70dB, $L_{Aeq,(t)}$ free-field respectively. The level of vibration entering the building foundations would be approximately 0.3mm/s ppv so there would be a low magnitude of vibration during operation of the small vibratory roller at the closest point to the boundary.

5.6 The closest building of the Leisure Centre is a sports hall, with a fully clad elevation and an absence of windows on the gable end to face the new MUGA pitches. Accordingly, the level of sound break-in would be less than that of a windowed façade. Such a facility is ordinarily considered of low sensitivity to construction noise and vibration. The predicted level externally of 76dB, $L_{Aeq,12hr}$, free-field is a high magnitude. Leiston School has buildings to the north of the proposed works. The predicted level of 70dB, $L_{Aeq,12hr}$, free-field during the noisiest construction works would also be a high magnitude.

5.7 However, the creation of the MUGA pitches is not expected to last beyond 40 days and so the noise and vibration effects at these receptors would not be significant.

5.8 However, if the School has classrooms at this location which are reliant on openable windows for ventilation, and particularly given a south-facing orientation of that elevation, noise levels may be disruptive to lessons at times. It is therefore

recommended that the noisier construction works for the sports pitches is scheduled to take place outside of school teaching times and/or during holidays.

Operational Noise

5.9 The proposal is for five separate sports facilities, one floodlit full-size artificial 3G pitch, two multi use games areas and two grass pitches, all of which are expected to be used up to 22:00 each weekday evening. Sound occurring between 08:00-16:00 hours is not expected to differ in character and level to what is already present due to the facility being built on school grounds. For this reason, the most sensitive period of the day for the surrounding residential receptors is considered to be between 16:00 and 22:00 hours. This period specifically will be assessed as it assumes the worst case scenario due to the sensitivity.

5.10 Based on the Sports England Guidance on AGP's as discussed in section 2.0, it is recommended that noise from use of the sports pitches should not exceed 50dB $L_{Aeq,1hr}$ free field within the gardens of adjacent noise sensitive properties.

5.11 To determine the impact of noise from use of the pitches, Sharps Redmore has considered the noise source levels with the Sport England Guide.

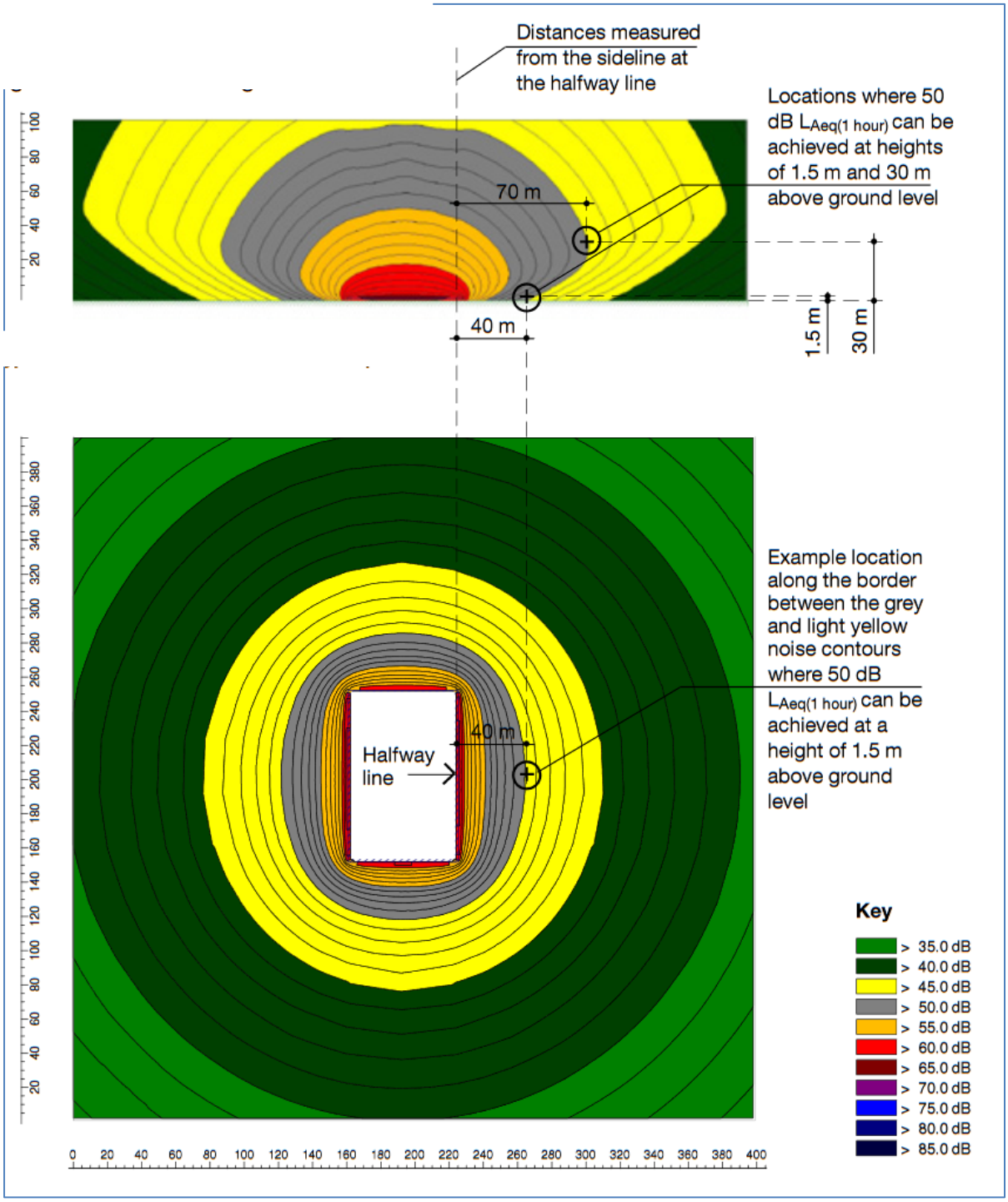
5.12 Figure 4 is extracted from AGP - Planning Implications: 2015 and shows sound levels typically experienced from an artificial grass pitch at different distances. It is assumed that levels which emanate from both a grass and a MUGA pitch will be the same as those indicated in the figure, as the activities being carried out on them will be very similar to those on an AGP. The noise levels within Figure 4 are similar to those measured by Sharps Redmore at other sporting facilities.

5.13 Using the noise source levels in Figure 4 the predicted noise levels ($L_{Aeq,1hr}$) at the residential receptors identified in **section 3.0** have been calculated. The calculations are based on the closest pitch to each receptor, not including any screening loss. The results are shown in **Table 7**.

Table 7 Predicted $L_{Aeq,1hr}$ values at receptors.

Receptor	Distance from Nearest Receptor to Nearest Proposed Facility	Predicted $L_{Aeq,1hr}$ at receptor.
Western	85m	44dB
Southern	70m	46dB
Eastern	23m	53dB

Figure 4: Map of typical noise contours for an AGP in an open area.



5.6 At both the western and southern receptors predicted noise levels are below the recommended criterion of 50dB $L_{Aeq,1hr.}$ In practice noise levels are likely to be lower than those predicted as no account has been taken of the screening provided by existing fences and the Leiston Leisure Centre Building.

5.15 Predicted noise levels at the eastern receptors would exceed the recommended criterion and therefore it is recommended an acoustic barrier is erected along the eastern side of the site boundary on the school field in order to mitigate noise from the grass pitches to the eastern receptors given the proposed long-term use of the facilities. As shown in Appendix C, a 2m high acoustic fence would reduce noise levels by 9dB. As shown in **Table 8** the resultant noise levels will be 44dB $L_{Aeq,1hr}$.

Table 8 Predicted $L_{Aeq,1hr}$ with and without a 2m barrier at the eastern receptors.

Initial Predicted $L_{Aeq,1hr}$ at the Eastern Receptors	53dB
Attenuation predicted by 2m barrier	-9dB
Predicted $L_{Aeq,1hr}$ at the Eastern Receptors	44dB

5.16 Following the recommended mitigation measures noise levels would be below the WHO daytime guidelines and also the criterion in the Sport England guidance to all residential receptors. It is therefore concluded that noise from use of the sports pitches would not cause a significant adverse impact to local residents in line with the policy aims of the NPPF.

5.17 Due to the orientation of the proposed grass pitches with respect to the barrier, it may be necessary to line the barrier in order to reduce the impact noise from balls kicked against it. This is generally done using netting or vegetation.

5.18 Whilst this assessment has been carried out with no seasonal usage changes accounted for, it is highly likely that noise from the proposed grass and MUGA pitches would be seasonal, as their use will be restricted by daylight. Therefore, use in the evening period (16:00-22:00), is likely to be restricted to the summer months. For the majority of the year they would only be used during the earlier hours of the evening when ambient sound levels in the area are typically higher, and residential noise sensitivity is lower.

5.19 The proposed full-size floodlit 3G pitch would be available for use throughout the year. However, as it is the furthest pitch in the scheme from any of the assessed receptors, this will not increase the impact on receptors.

5.20 Further measures that could be considered as part of the detailed design, to further reduce the impact on nearby receptors include:

i) Any entrance to a sports pitch should be placed on the side of the pitch furthest from nearby receptors, as these tend to be areas where people congregate before and after using the pitch.

ii) Spectators should be encouraged to stand on the side of the pitch furthest from the nearby receptors, such that noise from them is reduced at the receptors.

iii) Any lightweight shelters should be placed back from the side-lines of a pitch and not near a goal in order to reduce the chance of impact noise from a ball.

iv) Users of the facilities should be encouraged to leave the facility as quickly as possible once use has finished.

6.0 Conclusions

6.1 Sharps Redmore has undertaken an assessment of the operational noise predicted from the proposed additional sports facilities at Alde Valley School, Leiston.

6.2 The assessment has considered a worst case scenario, with the most sensitive period being assessed, as well as the shortest distance between proposed sports pitches and receptors. Seasonality is noted, but not considered in the assessment, which assumed all year round use of all proposed facilities.

6.3 The noise impact on nearby receptors due to the proposed facilities are deemed to be acceptable, providing that a 2m solid timber fence (or similar) is built along the eastern boundary of the site in order to acoustically screen nearby receptors given the proposed long-term use of the facilities.

6.4 The noise impact on nearby receptors could then be further reduced through a series of good practice noise control measures.

6.5 Whilst ambient sound levels arising from the new facilities are likely to be higher than experienced at present, the nature of these sounds is in keeping with the current sound climate of the area, and should therefore not cause adverse impact on nearby receptors.

APPENDIX A

IMAGES OF THE SITE AND AREA

A1: Raised school field with respect to the ground level of the eastern receptors.

A2: Leiston Leisure Centre car park fence.

A3: Fence running along the back of western receptor houses.

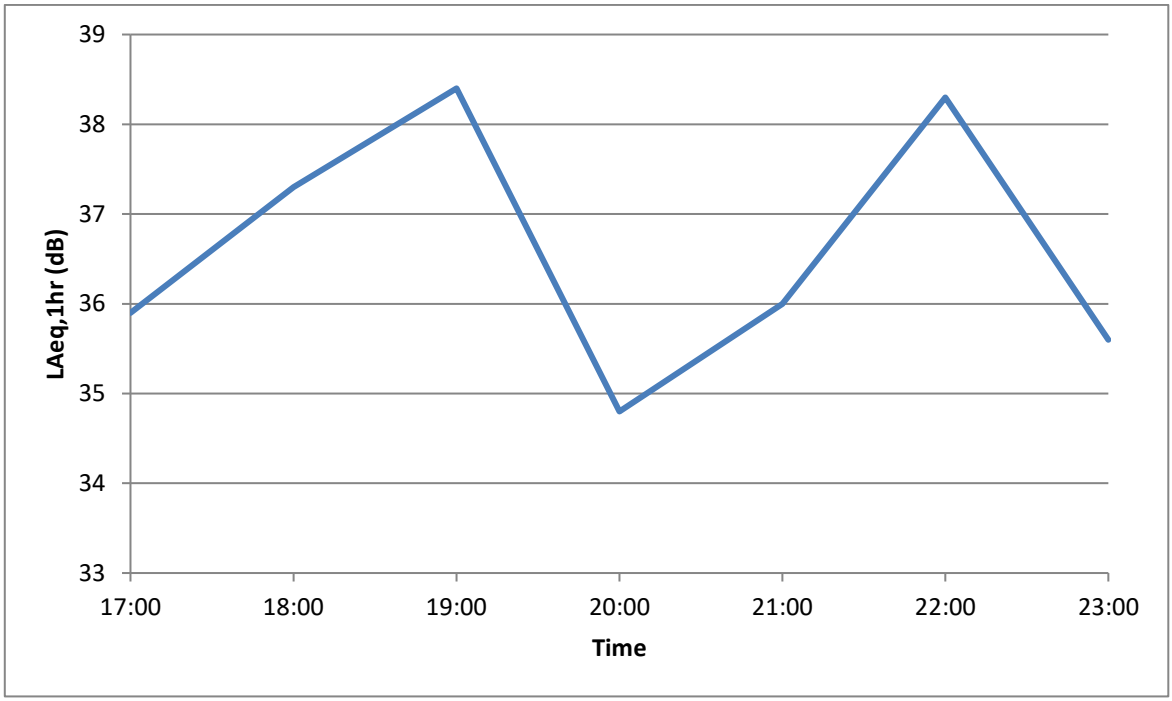
A4: Football goalposts in field beside eastern receptors.

A5: Unattended survey sound level meter setup with environmental kit.

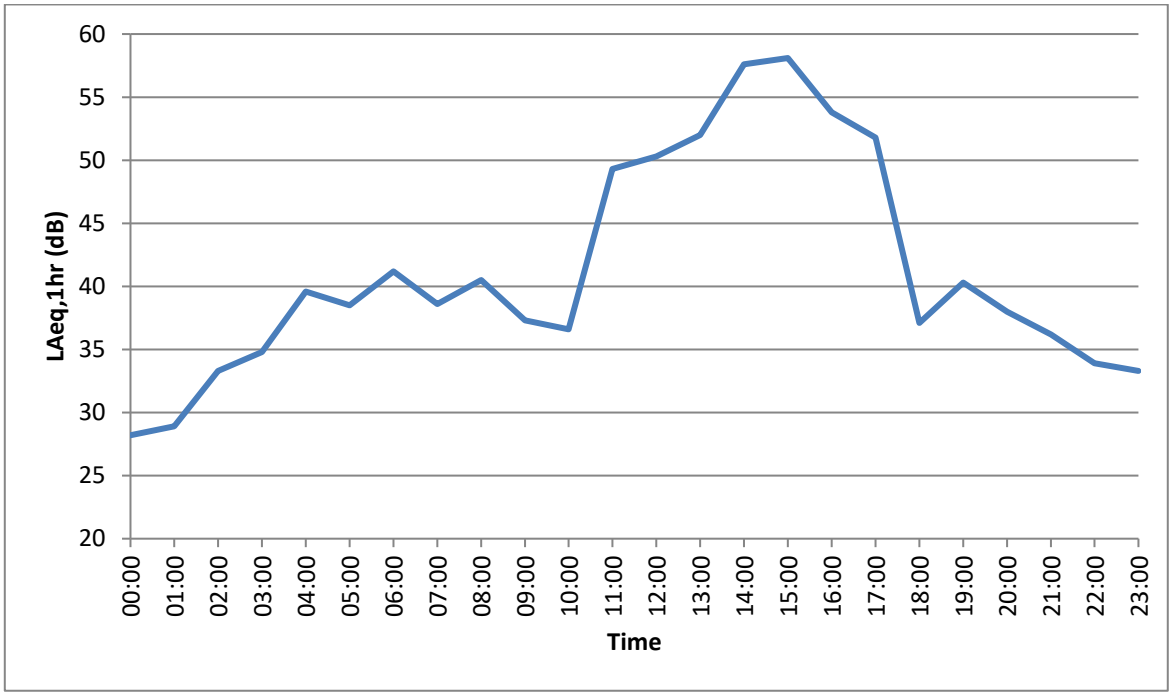
APPENDIX B

UNNATTENDED SOUND LEVEL MEASUREMENT FULL RESULTS

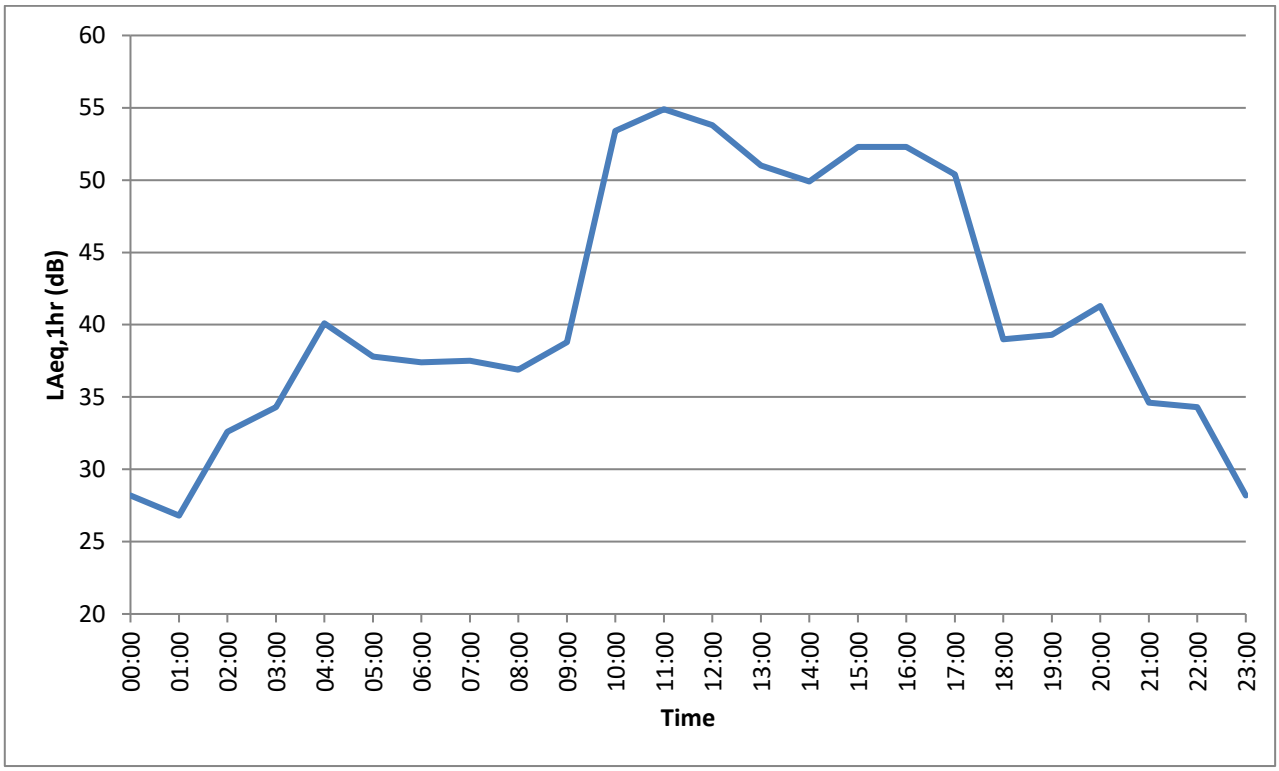
B1: 24th of May 2019 SLM Results



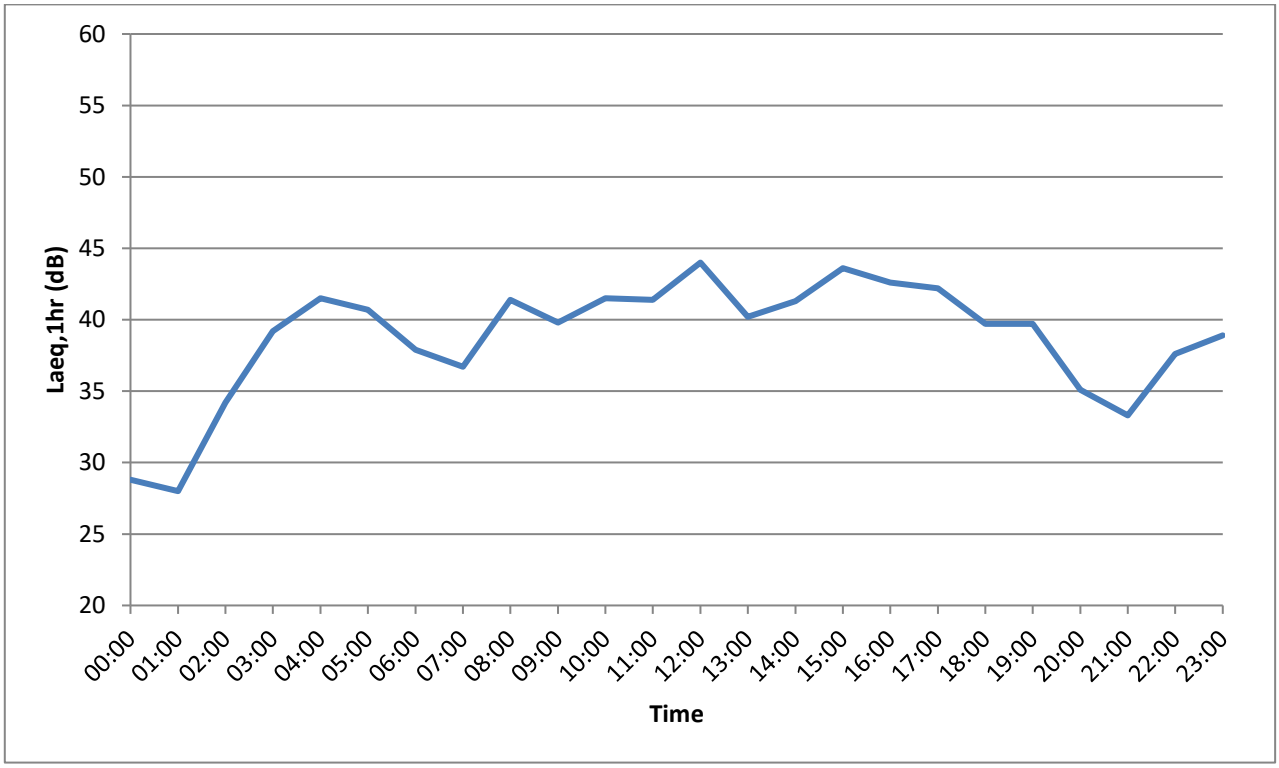
B2: 25th of May 2019 SLM Results



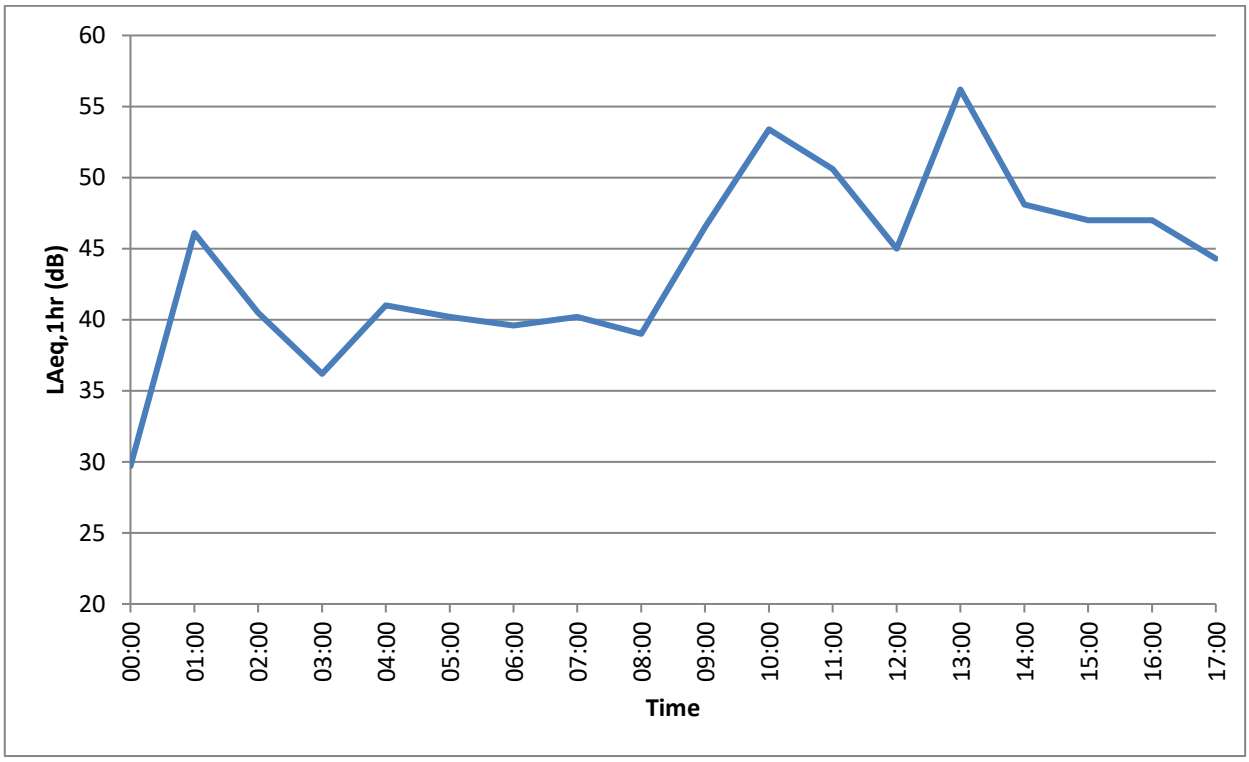
B3: 26th May 2019 SLM Results



B4: 27th May 2019 SLM Results



B5: 28th May 2019 SLM Results



APPENDIX C

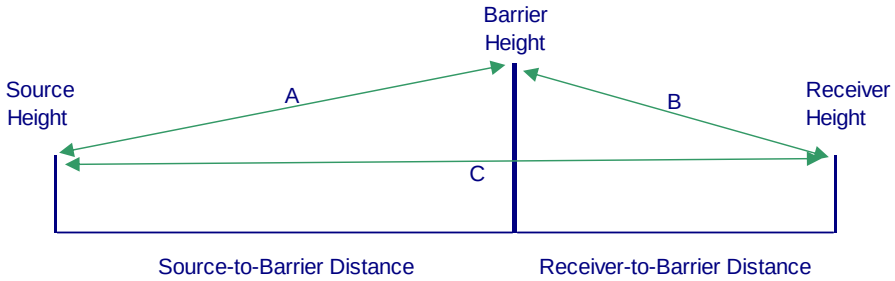
BARRIER CALCULATION DETAILS

C1: Simple barrier calculation for eastern boundary of site

BASIC BARRIER ATTENUATION

Date:	09/01/2020
Project:	**SZC - Alde Valley Academy Sports Pitches**
Project No:	**1212653**

User input these cells



Source-to-Barrier Distance	5.0 m
Receiver-to-Barrier Distance	18.0 m

Source Height	2.5 m
Receiver Height	1.5 m
Barrier Height	3.0 m

Path difference = 0.066 m
(a + b) - c

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	Attenuation
Attenuation - dB	**5**	**6**	**7**	**8**	**10**	**13**	**15**	**18**	**8.6 dBA**