AIRO

Report No. DLW/7350/A

for
Borough Council of Wellingborough
Swanspool House
Doddington Road
Wellingborough
NN8 1BP

Dated: 30 May 2023

ENVIRONMENTAL SOUND ASSESSMENT

PROPOSED

SKATE AND MINI-WHEEL PARK

AT

RECREATION GROUND AT

BASSETT'S CLOSE

WELLINGBOROUGH

Report Author: Eur Ing D L Watts BEng CEng FIOA

ACOUSTICAL INVESTIGATION & RESEARCH ORGANISATION LTD

Duxons Turn
Maylands Avenue
Hemel Hempstead
Hertfordshire
HP2 4SB

Telephone: +44(0)1442 247146
E-mail: airo@airo.co.uk
Web: https://www.airo.co.uk/

ENVIRONMENTAL SOUND ASSESSMENT

PROPOSED

SKATE AND MINI-WHEEL PARK

AT

RECREATION GROUND AT

BASSETT'S CLOSE

WELLINGBOROUGH

1. INTRODUCTION

AIRO has been instructed by Borough Council of Wellingborough to undertake an environmental sound assessment of a proposed skate and mini-wheel park at the recreation ground at Bassetts's Close, Wellingborough.

This report presents the Environmental Sound Assessment based on sound level measurements of the pre-existing sound environment made over the period 30 April to 4 May 2021 and measurements of sound levels from various similar facilities.

2. DESCRIPTION

The skatepark is to be formed of smooth concrete with typical ramps and similar features, integrated into the existing landscape with grassed earth mounding and bunding.

The skatepark is to be located within an existing recreation ground with residential properties to the north east and south west, the closest being approximately 56 metres from the skatepark. Freeman's Endowed, Church of England Junior Academy is about 50 metres away on the other side of Westfield Road.

3. MEASUREMENT UNITS

3.1 A-Weighted Equivalent Continuous Sound Level - $L_{Aeq,T}$

Noise levels quoted in this report are, in the main, A-weighted Equivalent Continuous Sound Levels or $L_{Aeq,T}$ in dB.

The $L_{Aeq,T}$ is a measure of the acoustic energy of a fluctuating noise climate over a given period, T, expressed as the single continuous noise level having the same energy as the time varying signal. The 'A' within the descriptor means A-weighted, an internationally agreed frequency response generally similar to that of the human ear so that A-weighted sound levels in dB correspond reasonably well with what is heard.

For assessment purposes, the day is typically divided into a 16-hour daytime period (07:00 to 23:00) and an 8-hour night-time period (23:00 to 07:00). The period values may be derived from the logarithmic average of the relevant hourly values.

3.2 Maximum Noise Level - L_{AFmax}, L_{ASmax}

In some circumstances it is useful to quantify the maximum level of fluctuating noise and a commonly used descriptor is L_{Amax}. The L_{Amax} represents the maximum reading given by a sound level meter for a given event or period of time and is usually qualified by F for 'Fast' or S for 'Slow' according to the response time setting of the meter.

3.3 A-Weighted Percentile Noise Levels - L_{An}

Percentile noise levels are a statistical representation of the time varying level. The value is the noise level L exceeded for n% of the period T.

4. BASELINE SOUND LEVEL MEASUREMENTS

Baseline pre-existing sound levels in the vicinity of the proposals were measured at the location shown in Figure 1 and in the photograph in Figure 2 over the period commencing at 13:00 on Friday 30 April 2021 and ending at 09:00 on the following Tuesday 4 May 2021.

Sound levels were measured using a data logging sound level meter which measured and stored sound levels, every 4 seconds, over the whole period.

The microphone was at a height of approximately 1.5 metres above local ground level and well away from acoustically reflective structures (other than the ground) so as to be in free-field conditions.

The instrumentation used and weather conditions can be found at Appendix A. Hourly sound levels for the whole period are in Table A3 in Appendix A. Table 1 sets out daytime, evening and night-time period sound levels at the measurement position.

Potential locations for baseline sound level measurements were discussed with the client prior to the survey and AIRO indicated that the ideal location would be in the garden of the closest property to the proposed skatepark location. However, AIRO was advised that access permissions would not be possible and there were no safe and secure alternative locations within the park. Therefore, permission was obtained for the position shown. In the analysis later in this report, the data are corrected for the further distance from the main road to the closest garden compared with the measurement position, to account for the probable lower baseline sound levels in the closest garden to the proposed site.

Figure 1 – Extract Location Plan Showing Sound Measurement Position

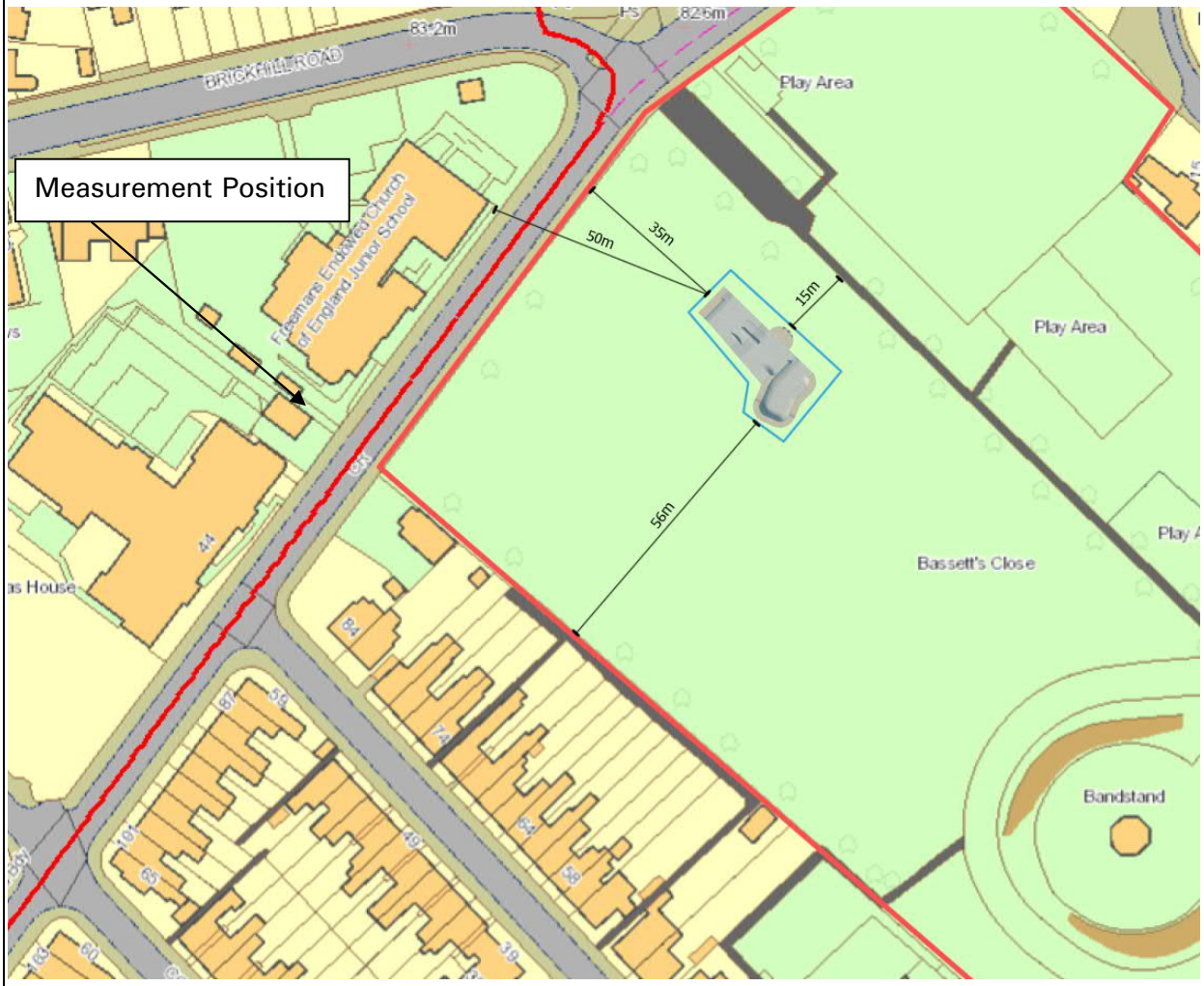


Figure 2 – Photograph of Measurement Position

Table 1 - Summary of Period Sound Levels at Measurement Position			
Date	Free-Field Sound Levels (dB)		
	Daytime	Evening	Night-time
Friday 30 April 2021	63 dB L_{Aeq} 44 to 52 dB $L_{A90,1h}$ 92 dB L_{AFmax}	61 dB L_{Aeq} 38 to 43 dB $L_{A90,1h}$ 78 L_{AFmax}	55 dB L_{Aeq} 28 to 39 dB $L_{A90,1h}$ 80 L_{AFmax}
Saturday 1 May 2021	63 dB L_{Aeq} 35 to 44 dB $L_{A90,1h}$ 82 dB L_{AFmax}	61 dB L_{Aeq} 35 to 44 dB $L_{A90,1h}$ 82 dB L_{AFmax}	54 dB L_{Aeq} 27 to 35 dB $L_{A90,1h}$ 80 L_{AFmax}
Sunday 2 May 2021	61 dB L_{Aeq} 31 to 44 dB $L_{A90,1h}$ 87 dB L_{AFmax}	60 dB L_{Aeq} 32 to 40 dB $L_{A90,1h}$ 88 L_{AFmax}	54 dB L_{Aeq} 30 to 38 dB $L_{A90,1h}$ 79 L_{AFmax}
Monday 3 May 2021	64 L_{Aeq} 37 to 54 dB $L_{A90,1h}$ 91 L_{AFmax}	63 dB L_{Aeq} 44 to 53 dB $L_{A90,1h}$ 79 L_{AFmax}	58 dB L_{Aeq} 38 to 49 dB $L_{A90,1h}$ 80 L_{AFmax}

5. SKATEPARK SOUND LEVELS

AIRO has measured skatepark sound levels at various existing facilities as set out below.

AIRO considers that the existing skatepark at The White Horse Leisure and Tennis Centre, Audlet Drive, Abingdon is of similar design to that proposed.

Sound level measurements at the Abingdon skatepark were made during the morning of 18 September 2020.

There were 5 users of the skatepark. Micro scooters were used by 4 users and a BMX style bike by the 5th user.

The sound levels are summarised in Table 2.

Table 2 – Sound Level Measurements at Abingdon (18 September 2020)			
Description	Period	Sound Level (dB)	
		L_{Aeq}	L_{AFmax}
10 m from edge of skatepark with 5 users	11:10 to 11:20	57	76

AIRO has also measured sound levels at a skatepark at Aston Clinton in Buckinghamshire and at Baldwins Lane, Croxley Green, Hertfordshire.

The skatepark at Aston Clinton featured a concrete half pipe with other ramps in timber. The full report of the measurements at the Aston Clinton Skatepark has been provided to Environmental Protection at North Northamptonshire Council together with a sample audio recording taken at the time. The measured activity included skateboarders, in particular there were 2 skateboarders noted as using the concrete half-pipe during the 12:04 to 12:11 period.

Tables 3 and 4 summarize these measurements.

Table 3 – Sound Level Measurements at Aston Clinton Park			
Description	Period	Sound Level (dB)	
		L_{Aeq}	L_{AFmax}
10 m from concrete half pipe with about 3 using the half pipe and about 7 the remaining ramps	12:04 to 12:11	58	69
	12:12 to 12:16	56	68
10 m from edge of skatepark centre of long side with about 8 users	11:41 to 11:51	58	70

Table 4 - Sound Level Measurements at Baldwins Lane				
Distance from Skatepark	Number of Users	Sound Level (dB)		
		L_{AFmax}	L_{Aeq}	L_{A90}
13 metres	25	81.1	60.0	52.6

It should be noted that the majority of the ramps/apparatus at the Baldwins Lane skatepark were constructed of timber decking within steel frames but some of the ramp features were solid concrete. The proposed skatepark is to be of solid concrete construction throughout and therefore the sound levels that might be experienced may be slightly different compared with those quoted above for the same level of usage. The sound levels shown in Table 4 are for a 15-minute measurement.

It is widely asserted that solid concrete ramps have the potential to produce lower sound levels than those formed from timber. However, there is a lack of properly designed comparison studies to support such assertions. The observations made by AIRO at the Baldwins Lane skatepark in 2001 and earlier in 1999 were that the highest sound levels (and the most noticeable sound) were due to the impact of boards clattering on the ground.

It was observed that the sound of skateboards rolling on timber ramps was audible whereas on concrete ramps it was not, but the contribution to the overall skatepark sound level from rolling sound compared with boards clattering was negligible. Accordingly, it would be expected that there would be negligible difference in the overall skatepark sound impact at residential properties with either concrete or timber ramps.

The Abingdon skatepark is the closest in terms of design and construction to that proposed for the application site i.e. it is a Bendcrete Skatepark at Abingdon. The Aston Clinton and Baldwins Lane sites are not Bendcrete and are substantially different in scale and design. Even so, the Abingdon level of 57 dB L_{Aeq} is within a dB of the Aston Clinton results of 56 to 58 dB and the maximum level was significantly higher at 76 dB compared with 70 dB at Aston Clinton. The Baldwins Lane site had 25 users not 10. In energy terms this amounts to an additional 4 dB. Therefore, if the Baldwins Lane result is factored to 10 users the level would be 56 dB L_{Aeq} again showing good consistency. AIRO cannot know whether there will be 1 user, 10 users or 50 users of the application site on a consistent basis but based on our general experience of this scale of skatepark, we consider 10 users to be a fair assumption at busier times.

6. ENVIRONMENTAL SOUND ASSESSMENT CRITERIA

Sound arising from a skatepark that has the potential to cause effects and impacts on nearby noise sensitive receptors can include the voices of the users, rolling sound from skateboards or micro-scooters and the accidental or deliberate clatter of boards or scooters. In broad terms, such sounds are not unique to skateparks and can be a feature of other sports and leisure activities for example, football (especially 5-a-side type format in enclosed pitches), tennis and cricket.

The magnitude and significance of such sounds depends on the numbers of users at any one time, the times and durations that the skatepark is used, the propagation losses from the skatepark to the receptor (the greater the distance the more skatepark sound will be reduced and any existing or purpose built acoustic screens provide further reductions) and the extent to which the existing sound environment will mask skatepark sound.

Unfortunately, there is no single authoritative document that provides objective guidance on the assessment of environmental sound arising from skatepark activity.

The assessment of environmental sound in general involves consideration of one or both of the absolute sound level and the differences in sound level between the existing sound environment and the activities under investigation.

Such principles are described in Guidelines for Environmental Noise Impact Assessment by the Institute of Environmental Management and Assessment (ref 1).

The measured skatepark sound levels may be corrected for distance and/or numbers of users to relate the data to the application site.

Theoretically, in acoustic energy terms, a doubling of the number of users would increase the sound level by 3 dB. However, considering the data from existing sites, particularly Tables 2 and 3, similar values of L_{Aeq} (an energy average) were measured at the same distance for the 5 users at Abingdon, compared with the 8 to 10 users at Aston Clinton Park. The measurements at Baldwins Lane do show an increased sound level for the 25 users compared with 5 to 10 commensurate with the energy relationship.

Values of L_{AFmax} are unaffected by the number of users but the likelihood of more events such as a board clatter or shout increases the more users at one time that there are.

Table 5 summarizes the calculations of skatepark sound levels at the closest properties to the application site. The calculations are based on the Abingdon data which are considered representative for up to 10 users.

Sound levels at 72 St Barnabas Street and at Freemans Endowed School have been considered.

Table 5 – Calculated Sound Levels at Application Site		
	Freeman's Endowed School	72 St Barnabas Street
Skatepark Sound level at 10 m	57 dB L_{Aeq} 76 L_{AFmax}	57 dB L_{Aeq} 76 L_{AFmax}
Distance to property	50 m	56 m
Distance Attenuation	-11 dB	-15 dB
Resultant Sound Level	46 dB L_{Aeq} 65 dB L_{AFmax}	42 dB L_{Aeq} 61 dB L_{AFmax}

The skatepark sound levels may be compared with the pre-existing sound level environment. The sound levels measured at the school (See Table 2) may be compared with the skatepark sound directly.

At 72 St Barnabas Street, the existing sound levels are likely to be lower than measured as the property is further from Westfield Road which is the dominant sound source.

The measurement position was approximately 14 metres from the centreline of the road whereas 72 St Barnabas Street is about 57 metres from the centre of the road.

The correction for the general sound level from a road would be -6 dB for a distance of 57 metres compared with 14 metres. The maximum sound levels are likely to reduce by a greater amount of -12 dB.

The night-time period has not been considered. It is accepted that it is not proposed that the skatepark be or is capable of being locked at night. AIRO would consider the use of the skatepark at night to be highly unlikely. If the skatepark was to be used and cause disturbance at night, AIRO would consider this to amount to anti-social behaviour.

Any other activity giving rise to significant noise in a park at night, whether organized or not or related to a specific area or facility may be considered equally anti-social but parks are not generally secured in a way that would prevent the potential for such activity.

Figures 3 and 4 plot the calculated skatepark sound level against the hour by hour existing sound level for the School and 72 St Barnabas Street respectively. The existing sound levels are from Sunday, the measurement period with the lowest existing sound levels.

Figure 3 – Skatepark Sound Level against Existing Sound Level for Freemans Endowed School

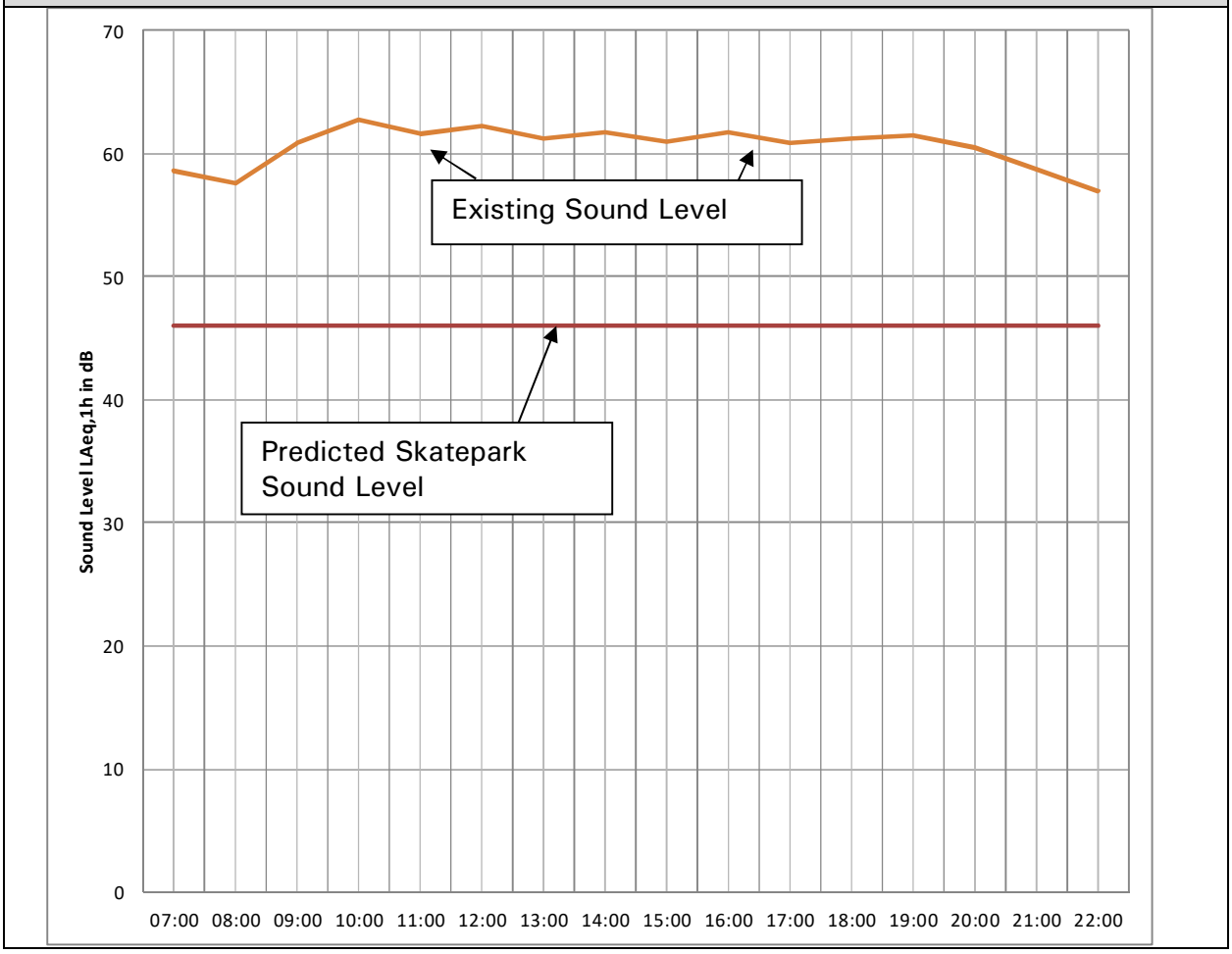
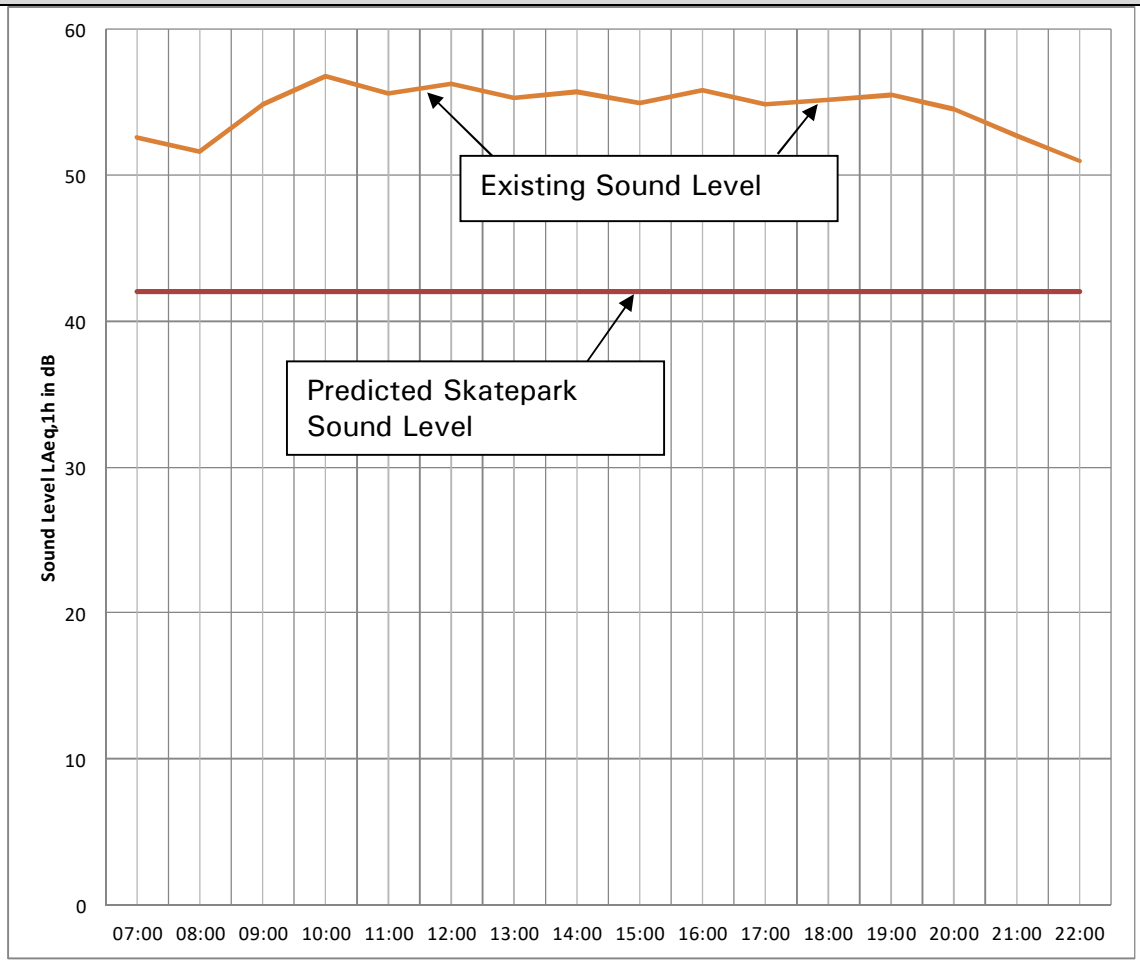


Figure 4 – Skatepark Sound Level against Existing Sound Level for 72 St Barnabas Street



It may be seen that the predicted skatepark sound level is below the existing sound level during the daytime and evening period.

Predicted maximum sound levels are also below existing maximum sound levels.

BS 8233:2014 (ref 2) provides guidance on desirable ambient noise level limits for dwellings and gardens. The indoor ambient noise levels for dwellings in BS 8233 are noted within the document as being based on existing guidelines issued by the World Health Organization. This is also the case for the criteria for external noise used for amenity space for dwellings described in BS 8233.

For gardens, BS 8233 says that *"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."*

The existing sound environment at the school already exceeds the BS 8233 criteria. No cumulative increase in sound levels at the school is predicted due to skatepark activity.

The existing daytime and evening period sound levels at 72 St Barnabas Street are calculated to be in the range 54 to 58 dB, above and below the 55 dB, BS 8233 guideline.

The predicted skatepark sound level of 42 dB L_{Aeq} does not cause any cumulative increase in the relevant daytime and evening periods.

Figures 3 and 4 show that the predicted level of skatepark noise at the receptors considered is 10 dB or so below the existing sound level. The degree to which the sound is reduced into a dwelling will be the same for both the existing sound and skatepark sound. Therefore the skatepark sound level will continue to be at least 10 dB below that due to the ingress of sound from other external sources.

If a modest 10 dB reduction for a partially open window is assumed, the level inside 72 Barnabas Street would be 32 dB for skatepark sound and about 41 dB or more due to other sources. The skatepark sound level meets the BS 8233 daytime limit of 35 dB whereas the sound level from other sources does not.

In AIRO's opinion, the skatepark sound levels do not warrant additional mitigation.

A standard which rates and assesses sound based on a comparison of sound level with and without the specific source being investigated is BS 4142. However, this standard relates to industrial and commercial sound and although historically it has been widely applied outside its scope, the latest edition says *"The standard is not intended to be applied to the rating and assessment of sound from:*

a) recreational activities, ..."

Consequently, a BS 4142 assessment is not applicable.

AIRO understands that in the case of some skateparks, part of the environmental noise assessments that have been made may have applied Guidance on the Control of Noise, Clay Target Shooting published by the Chartered Institute of Environmental Health in January 2003. AIRO is of the opinion that skateparks are not the same as clay target shooting and that CIEH Clay Target Shooting Guidance should not be used for Skateparks. It is notable that there has not been a progression of Clay Target Shooting Guidance to a document specifically for

skateparks from the CIEH or from similar organisation such as the Association of Noise Consultants or the Institute of Acoustics.

7. COVID-19

Measurement survey results at the application site may have been affected by changes in environmental noise as a result of changes in general activity due to the Covid-19 pandemic.

However, Government restrictions had eased considerably by the time of the survey.

It is more likely that any residual effects would cause the measured environmental sound levels to be lower than pre Covid-19 conditions. In this scenario, for a given level of skatepark activity, the effects and impact would be expected to reduce if general environmental sound levels rise as a consequence of increasing general activity.

8. CONCLUSIONS

The proposed skatepark at the recreation ground at Bassett's Close, Wellingborough has been assessed in relation to environmental sound.

The assessment has been based on sound level measurements of the existing situation and sound level measurements of existing facilities similar to the proposals.

Skatepark sound would be expected to be audible outside the nearest dwellings at the busiest times.

However, sound levels at the nearest residential property arising from the proposals during peak use are assessed to be less than existing daytime and evening period and maximum environmental noise levels.

Although for a given sound level, the character of skatepark sound may be perceived as more annoying than a more anonymous sound such as road traffic, equally it could be anticipated that there will be significant periods when the skatepark is little used such as during school time, during adverse weather and at night lessening the overall effects compared with continuous sound.

The skatepark sound levels at the comparison site were largely controlled by users voices rather than being due to the specific sounds of impacts or rolling and may therefore be considered similar to other recreational group activity.

Report Approved by: Report Author:

A J Jones D L Watts

A J Jones BSc PhD CPhys MInstP HonFIOA
Managing Director

Eur Ing D L Watts BEng CEng FIOA
Principal Consultant

REFERENCES

1. Guidelines for Environmental Noise Impact Assessment
Institute of Environmental Management and Assessment
Version 12, November 2014

2. British Standard BS 8233:2014
Guidance on sound insulation and noise reduction for buildings
British Standards Institution, 2014

APPENDIX A

Table A1 – Schedule of Sound Instrumentation		
Use	Type	Serial No.
Measuring System Microphone Calibrator	CRL 704B MK 224 CRL 511D	011182 891204 011970

AIRO is accredited by the United Kingdom Accreditation Service as a UKAS testing laboratory No. 0483 and although the measurements carried out for this survey are not listed on our schedule of accreditation, all of AIRO's measurement equipment is routinely calibrated as part of the calibration regime in our Quality Manual and these calibrations are traceable to National Standards.

In addition, the calibration level of the measuring equipment was checked at the start and the end of each survey period using the appropriate calibrator for the relevant meter.

Table A2 – Record of Weather Conditions – 30 April to 3 May 2021				
	30th April	1st May	2nd May	3rd May
Temperature (°C)	1 to 15	1 to 14	2 to 17	5 to 12
Relative Humidity (%)	24 to 94	35 to 95	22 to 95	58 to 94
Wind Speed (m/s)	0 to 4	0 to 6	0 to 4	0 to 8
Wind Direction	E	NE	SW	SSW

Table A3 - Hourly Sound Levels at Measurement Position			
Period Commencing	Free-Field Sound Levels (dB)		
	L_{Aeq}	L_{AFmax}	L_{A90}
30 April 2021			
13:00	64.3	90.5	50.7
14:00	62.7	80.2	48.6
15:00	62.6	88.2	51.6
16:00	63.1	80.4	46.5
17:00	63.4	76.1	46.7
18:00	64.0	92.4	44.0
19:00	62.9	77.6	43.3
20:00	61.9	76.8	40.5
21:00	60.3	76.0	39.5
22:00	58.4	75.4	37.7
23:00	56.4	76.5	33.5
1 May 2021			
00:00	54.7	74.5	29.2
01:00	53.2	79.8	28.1
02:00	51.0	75.5	29.5
03:00	51.9	74.8	30.5
04:00	52.0	72.6	33.5
05:00	56.6	77.0	36.4
06:00	59.0	77.9	39.1
07:00	61.2	78.5	39.2
08:00	62.1	79.3	39.1
09:00	62.8	80.9	42.5
10:00	62.2	76.9	43.0
11:00	62.8	78.4	44.1
12:00	65.3	90.0	45.5
13:00	63.3	84.6	45.0
14:00	63.1	79.2	43.7
15:00	62.4	78.0	43.5
16:00	62.5	78.2	43.6
17:00	62.4	81.0	42.6
18:00	62.2	82.0	42.4
19:00	62.7	75.7	43.7
20:00	60.7	82.0	38.4
21:00	59.4	76.0	36.4
22:00	58.0	75.8	35.3
23:00	56.5	77.6	32.1

Table A3 - Continued

Period Commencing	Free-Field Sound Levels (dB)		
	L_{Aeq}	L_{AFmax}	L_{A90}
2 May 2021			
00:00	54.7	75.8	29.4
01:00	53.9	79.8	28.5
02:00	51.5	73.0	27.1
03:00	51.5	75.2	27.5
04:00	52.1	75.5	31.6
05:00	54.9	78.4	35.4
06:00	55.9	77.7	33.0
07:00	58.6	77.1	34.0
08:00	57.6	79.8	31.3
09:00	60.9	85.7	37.2
10:00	62.8	85.5	40.5
11:00	61.6	78.0	43.6
12:00	62.3	82.5	41.7
13:00	61.3	74.9	42.6
14:00	61.7	76.2	43.0
15:00	61.0	80.9	41.2
16:00	61.8	86.6	41.3
17:00	60.9	75.6	38.9
18:00	61.2	77.8	41.0
19:00	61.5	87.5	39.8
20:00	60.5	75.3	38.5
21:00	58.7	75.6	34.7
22:00	57.0	78.6	32.3
23:00	55.8	75.8	31.6
3 May 2021			
00:00	51.4	73.8	30.8
01:00	52.1	75.6	30.1
02:00	49.3	73.0	30.1
03:00	51.7	79.2	30.2
04:00	54.0	75.1	31.5
05:00	57.4	77.3	37.5
06:00	57.1	78.6	37.0
07:00	60.0	90.8	36.7
08:00	59.1	76.7	37.7
09:00	60.8	76.2	42.7
10:00	61.8	80.1	46.5
11:00	61.5	78.0	47.2

Table A3 - Continued

Period Commencing	Free-Field Sound Levels (dB)		
	L_{Aeq}	L_{AFmax}	L_{A90}
3 May 2021			
12:00	63.9	76.6	49.0
13:00	64.7	78.7	49.8
14:00	65.0	77.9	50.5
15:00	64.9	83.4	51.4
16:00	64.6	78.0	51.6
17:00	65.1	77.7	52.7
18:00	65.2	82.5	54.0
19:00	64.2	77.1	52.9
20:00	62.7	78.8	51.4
21:00	62.8	78.6	51.5
22:00	58.7	77.6	43.5
23:00	53.9	75.1	41.2
4 May 2021			
00:00	53.6	74.7	43.8
01:00	53.7	78.6	40.7
02:00	51.3	71.2	41.2
03:00	56.0	76.1	42.4
04:00	54.8	75.7	38.3
05:00	61.4	77.4	46.2
06:00	63.0	79.5	49.4
07:00	64.6	77.9	51.7
08:00	65.0	77.0	56.0