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**PROPOSED WHEELED SPORTS PARK
CHURCH CROOKHAM**

NOISE IMPACT ASSESSMENT

Technical Report: R5884-1 Rev 1

Date: 15th September 2015

For: Church Crookham Parish Council
Church Crookham Community Centre
Boyce Road,
Crookham Park
Church Crookham
GU52 8AQ

24 Acoustics Document Control Sheet

Project Title: Proposed Wheeled Sports Park, Church Crookham – Noise Impact Assessment

Report Ref: R5884-1 Rev 1

Date: 15th September 2015

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Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved For Issue	Neil McLeod	Stephen Gosling
1	Minor amendment	Neil McLeod	Stephen Gosling

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1.0 INTRODUCTION

- 1.1 Church Crookham Parish Council is seeking to construct a new wheeled sports park at the Council's playing fields.
- 1.2 The local planning authority, Hart District Council, has requested a noise impact assessment to accompany the planning application (ref. 15/01754/FUL). Accordingly, 24 Acoustics Ltd has been appointed to provide an assessment of the likely noise levels at nearby sensitive receptors.
- 1.3 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 μ Pa.

2.0 SITE DESCRIPTION

- 2.1 The proposed site is approximately 150 metres east of Church Crookham Community Centre, with residential properties on Gurung Way, approximately 70 metres to the south. North and east of the site are the Parish Council's playing fields and an area of woodland, see Figure 1.
- 2.2 The nearest affected properties to the proposed wheel park are those on Gurung Way, which are at a distance of approximately 70 metres.
- 2.3 Noise conditions outside the nearest properties on Gurung Way are determined by traffic on the local road network and wildlife. Noise associated with the Council's playing fields, once they are complete, would be expected to contribute to the overall conditions at the nearest residential properties.
- 2.4 The proposed wheel park will be of a solid concrete design, which is typically sunken slightly into the ground. Since the park will not be floodlit, the hours of use would likely be limited to between approximately 08:00 hours and 22:00 hours during peak summer.
- 2.5 Residential properties will benefit from line of site acoustic screening from the proposed wheel park by the sunken ramps and provision of an earth bund on the ramps nearest Gurung Way.

3.0 CRITERIA

National Planning Policy Framework (NPPF)

3.1 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government in 2012. For noise the NPPF policy states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

- 3.4 The Planning Practice Guidance (PPG) [Reference 2] is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.
- 3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.
- 3.6 The NPPF and NPSE and PPG documents do not refer to specific noise criteria and there is no applicable standard for the assessment of noise from sports and recreation sites. Generic guidance on planning matters related to sport and recreational facilities is given in the former PPG 17, Sport and Recreation [Reference 3], though specific guidance on noise is not given.
- 3.7 For noise from recreational and sporting activities, the local planning authority must take account of how frequently the noise will be generated, the level of disturbance and balance the enjoyment of the participants against the risk of causing nuisance to other people. It is also considered that, depending upon local circumstances, it may be reasonable to permit higher noise levels than (for example) from industrial developments, if there are limited hours of use and control of noise emission during anti-social hours.

Guidance for Impulsive Noise Sources

- 3.8 "Clay Target Shooting: Guidance on the Control of Noise", published by the Chartered Institute of Environmental Health, [Reference 4], provides a methodology for the measurement and assessment of noise from clay target shooting. This methodology is considered an appropriate guide for assessing noise from the proposed development because shooting noise is impulsive in nature and therefore comparable with noise produced by skateboards impacting concrete. It is, however, deemed inappropriate to use this methodology for other types of noise associated with the use of the development such as talking or shouting. 24 Acoustics can confirm that in the absence of other published guidance, this standard has been used to assess a wide range of impulsive recreational sources other than shooting noise.

- 3.9 The guidance suggests that there is no fixed shooting noise level (SNL) at which annoyance starts to occur, however, annoyance is less likely to occur at a mean SNL below 55 dBA, and highly likely to occur at a mean SNL above 65 dBA. It is recognised that the likelihood of annoyance at levels within this range will depend upon local circumstances.

British Standard 8233: 2014

- 3.10 BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings' [Reference 5] provides design guidance for dwelling houses, flats and rooms in residential use. The document recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16\text{ hour}}$ in living rooms and bedrooms during the day and 40 dB $L_{Aeq,16\text{ hour}}$ in dining rooms during the day.
- 3.11 It should be noted that the noise levels specified are for anonymous sources, such as road traffic or continuously running plant for which occupants may tolerate higher noise levels. Noise levels and appropriate time assessment periods are not given for other types of noise.

BS 4142: 2014

- 3.12 BS 4142:2014 [Reference 6] provides a method for rating the effects of industrial and commercial sound on residential areas.
- 3.13 The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.
- 3.14 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

Summary

3.15 Based upon the review of standards described above, noise from the proposed wheel park has been assessed in accordance with the following methodologies:

- Guidance for impulsive noise sources using the clay target shooting SNL;
- BS 8233: 2014 for internal noise levels (on the basis of an upper level of 35 dB L_{Aeq} for internal noise levels in living rooms);
- BS 4142: 2014 for external levels relative to the background noise level (in the context of the adjacent playing fields, a level difference of up to +10 dB is considered acceptable).

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

Environmental Noise Measurements

4.1 Noise monitoring has been undertaken to assess prevailing noise levels in the vicinity of the nearest residential properties. Continuous measurements were obtained at Location 1, shown in Figure 1, between Tuesday 18th and Monday 24th August 2015. All measurements were undertaken in free-field conditions at a height approximately 1.5 metres above ground level.

4.2 Environmental noise levels were measured using the following instrumentation:

Rion precision sound level meter	Type NL 32
Brüel and Kjær acoustic calibrator	Type 4231

4.3 The calibration of the instrumentation was verified before and after the measurements and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards.

4.4 The instrumentation was configured to continuously measure and store overall A-weighted statistical parameters such as L_{Aeq} and L_{A90} (all measured on fast response) in 5 minute intervals. Measurements were made with reference to BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use [Reference 6].

4.5 The weather during the site visits was generally dry with winds not exceeding 5 m/s. There were periods of precipitation during the survey period, which have been removed from the analysis.

Environmental Noise Levels

4.6 During the survey construction activity in close proximity to the monitoring equipment. The following periods have been excluded from the assessment to obtain the prevailing noise levels without contribution from the known hours of construction activity:

- Weekdays 08:00 hours to 18:00 hours;
- Saturdays 08:00 to 13:00 hours.

4.7 The results of the environmental noise survey are described graphically in Appendix B. Table 1 summarises the continuous measurements undertaken during the assumed hours of use (08:00 to 22:00 hours), excluding construction activity.

Date (August 2015)	Average Ambient Noise Level dB L_{Aeq, 5min}	Typical Maximum Noise Level dB L_{Amax, f}	Typical Background Noise Level dB L_{A90, 5min}
Tuesday 18th	45	59	35
Wednesday 19th	47	57	39
Thursday 20th	47	60	36
Friday 21st	43	58	32
Saturday 22nd	46	67	34
Sunday 23rd	49	74	35

Table 1 - Summary of Environmental Noise Measurements (Location 1)

4.8 Excluding periods of construction noise, the prevailing ambient noise levels at the measurement location are affected by the local road network, general public and wildlife.

4.9 Based on the maximum anticipated hours of use (08:00 to 22:00 hours), a background noise level of 35 dB L_{A90, 5min} has been derived as the level against which noise impact will be assessed at each of the most affected residential properties (those on Gurung Way, see Figure 1).

4.10 From the measurements described above, typical ambient noise levels outside the nearest residential properties are in the region of 46 dB L_{Aeq, 5min}, with maximum noise levels in the region of 62 dB L_{Amax, f}.

Wheel Park Noise Measurements

- 4.11 Noise monitoring has been undertaken at a concrete wheel park (similar to that proposed) in Victoria Park, Newbury to assess typical noise levels anticipated from the proposed wheel park. Measurements were obtained on Tuesday 14th January 2014 while the park was being used by three to five skateboarders and one person riding a BMX bike.
- 4.12 The distance between the measurement location and the skaters varied between 2 and 10 metres with a typical distance of approximately 5 metres.
- 4.13 Environmental noise levels were measured using the following instrumentation:
- | | |
|------------------------------------|------------|
| Rion precision sound level meter | Type NA 27 |
| Brüel and Kjær acoustic calibrator | Type 4231 |
- 4.14 The calibration of the instrumentation was verified before and after the measurements and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards.
- 4.15 The instrumentation was configured to continuously measure and store overall A-weighted statistical parameters such as L_{Aeq} and L_{A90} (all measured on fast response) in 1 minute intervals. Measurements were made with reference to BS 7445: 1991 [Reference 7].
- 4.16 The weather was dry during the measurements and the wind speed lower than 5 m/s.

Skating Noise Levels

- 4.17 The results of the noise survey undertaken at the wheel park in Newbury are described in Appendix B and summarised in Table 5.

Dominant Noise Source	Average Ambient Level dB $L_{Aeq, 1min}$	Average Highest 25 Events dB $L_{AMax, f}$
Skating Activity	70	88

Table 2 - Summary of Wheel Park Noise Measurements

4.18 The following peak activity source noise levels for skating activity have been determined from the above measurements:

- 70 dB $L_{Aeq, 1min}$ at 5 metres
- 88 dB $L_{Amax, f}$ at 5 metres

5.0 NOISE IMPACT ASSESSMENT

5.1 The proposed location for the wheel park is approximately 70 metres from nearby residences and acoustic screening will be provided by the proposed topography.

Impulsive Noise Levels

5.2 The mean Shooting Noise Level (SNL) would normally be determined from the logarithmic average of the 25 highest noise levels measured over a 30 minute period from the instantaneous A-weighted (fast time-weighted) sound pressure level. With reference to the measurement exercise described above, a value of 88 dB L_{Amax} at 5 metres has been used as the input value for impulsive noise calculations.

5.3 The noise level from impulsive noise events has been calculated to the most affected residential properties (free-field location at a height of 1.5 metres) as shown in Table 4.

Receptor	Predicted SNL
Nearest property on Gurung Way (approximately 70 metres from the centre of the wheel park with line of sight screening)	60 dBA

Table 3 - Predicted Impulsive Noise Levels

5.4 The predicted SNL is below the upper threshold for impulsive events (65 dBA). The impulsive noise level is also in the region of the typical maximum noise levels at the measurement location (typically 62 dB $L_{Amax, f}$), which is representative of the nearest residential properties in Gurung Way.

5.5 The predicted impulsive noise level is considered high and presents a risk of disturbance. In the spirit of the National Planning Policy Guidance, mitigation measures should be considered to reduce noise from impulsive events.

BS 8233: 2014

- 5.6 Calculations have been based on the assumption that the wheel park is used continuously over any given hour, which results in an expected worst-case source level of 70 dB $L_{Aeq, 1hour}$ at 5 metres. This level has been corrected for propagation (distance and ground absorption) to each receptor and line of sight screening from the existing landscaping.
- 5.7 A resultant noise level of 42 dB $L_{Aeq, 1hour}$ has been calculated outside the most affected properties on Gurung Way.
- 5.8 The resultant noise levels within the properties would be subject to a reduction from inside to outside of between 13 to 15 dBA. Hence, the resultant internal noise levels would be between 27 and 29 dB $L_{Aeq, 5min}$.
- 5.9 With predicted external noise levels from the proposed Wheel Park lower than the prevailing ambient noise levels and predicted internal noise levels lower than 30 dB $L_{Aeq,r}$, the proposal is considered acceptable for habitable rooms, with reference to BS 8233.

BS 4142: 2014

- 5.10 The predicted external levels (as derived above) and rating levels, calculated in accordance BS 4142 (with a correction of +3 dB for character of the noise as assessed over 1 hour), are compared to the typical background noise levels in Table 5.

Description	Noise Level, dB (Gurung Way)
Specific Level from wheel park	42
+ 3 dB for character of noise (impulsive characteristic audible and receptor)	+3
Rating Noise Level, dB L_{Aeq}	45
Background Noise Level, dB L_{A90}	35
Excess over background	+10

Table 4 - BS 4142 Assessment

- 5.11 When taken in context, the difference between the source level and background noise level is an indication of an adverse impact in accordance with BS 4142. In the spirit of the National Planning Policy Guidance, mitigation measures should be considered. .

Discussion and Mitigation Measures

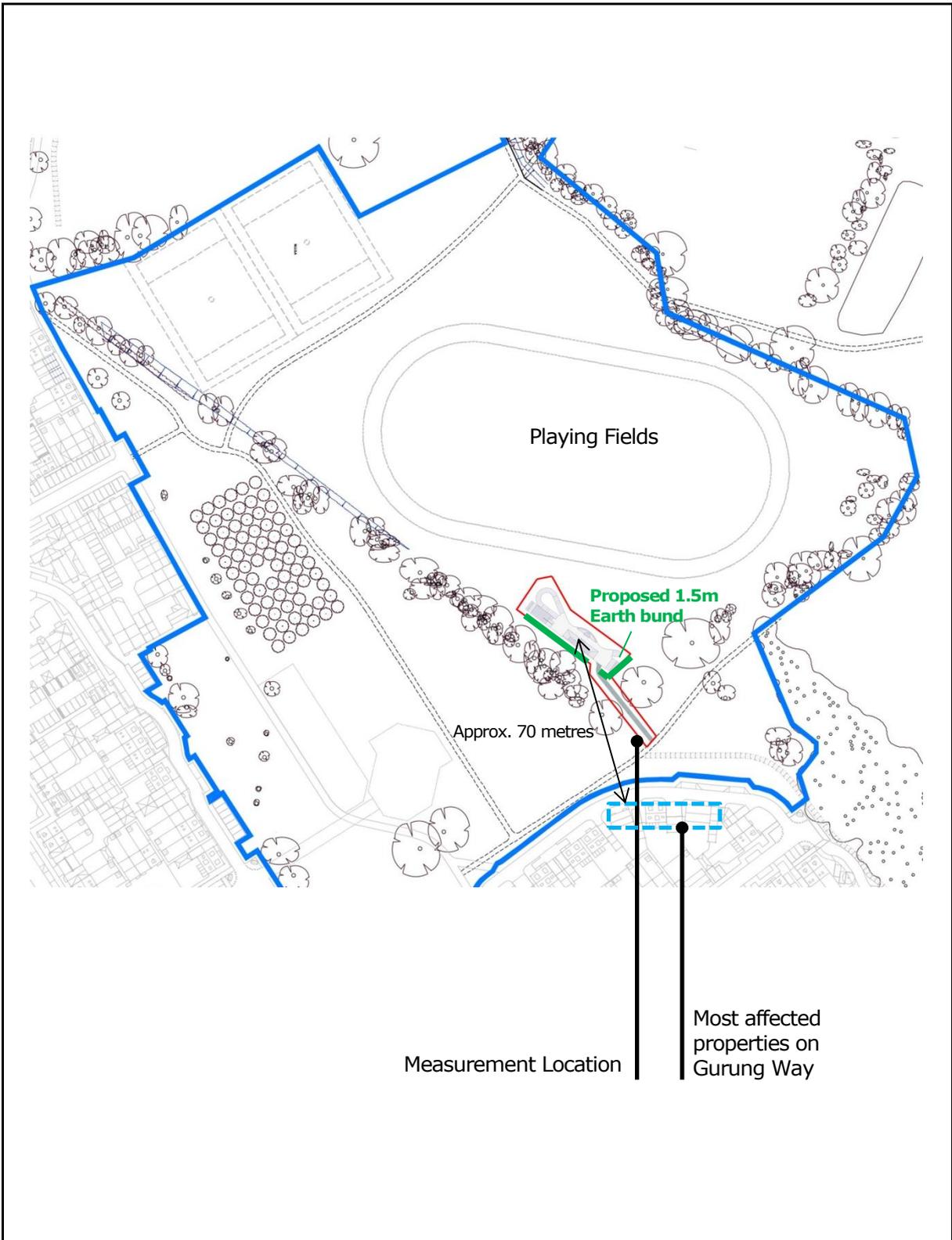
- 5.12 With consideration to the local topography and major noise sources (grind rail and bottom of ramps) it is recommended to extend the earth bund to a height of 1.5 metres above ground level and to wrap around the park as described in Figure 1. Calculations indicate that acoustic screening provided by the bund would result in approximately 5 dBA reduction in noise levels at the residential properties.
- 5.13 While the mitigation measures cannot remove the risk of adverse impact, the proposed earth bund would serve to minimise the potential noise impact on residents as far as practicable, which is in the spirit of the NPPF, NPSE and PPG. The resulting impulsive noise levels (SNL) would be expected to be in the region of the lower threshold limit (55 dBA), which is considered acceptable. The predicted internal noise levels would reduce by 5 dBA and when assessed in accordance with BS 4142, the excess over background would be approximately +5 dBA, which is considered acceptable.

6.0 CONCLUSIONS

- 6.1 24 Acoustics Ltd has reviewed the noise levels associated with the proposed new wheel park at the Council's playing fields, Church Crookham.
- 6.2 An environmental noise survey has been undertaken to determine the prevailing ambient and background noise levels at the nearest affected properties. A source noise survey has been undertaken at a similar park in Newbury to determine suitable activity noise levels. As there is no directly applicable standard for the assessment of noise from such facilities, a number of different assessments have been undertaken.
- 6.3 With the recommended mitigation measures, noise levels associated with the proposed wheel park, when taken in context with the adjacent playing fields, are considered unlikely to cause unreasonable disturbance to occupiers of the nearest residential properties.

REFERENCES

1. National Planning Policy Framework (2012).
2. Noise Policy Statement for England (2010)
3. Planning Policy Guidance 17: Planning for Open space, Sport and Recreation (2002).
4. Clay Target Shooting: Guidance on the Control of Noise (2003).
5. British Standards Institution British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014
6. British Standards Institution. British Standard 4142: Methods for rating and assessing industrial and commercial sound, 2014.
7. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use (1991).



Project: Proposed Wheel park, Church Crookham	Title: Site plan and measurement location		
DWG No: Figure 1	Scale: N.T.S.	Rev: 1	
Date: September 2015	Drawn By: NM	Job No: 5884	

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise Levels

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [2] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

APPENDIX B: NOISE MEASUREMENT RESULTS

Environmental Noise Measurements Wheel Park, Church Crookham - 18th to 24th August 2015

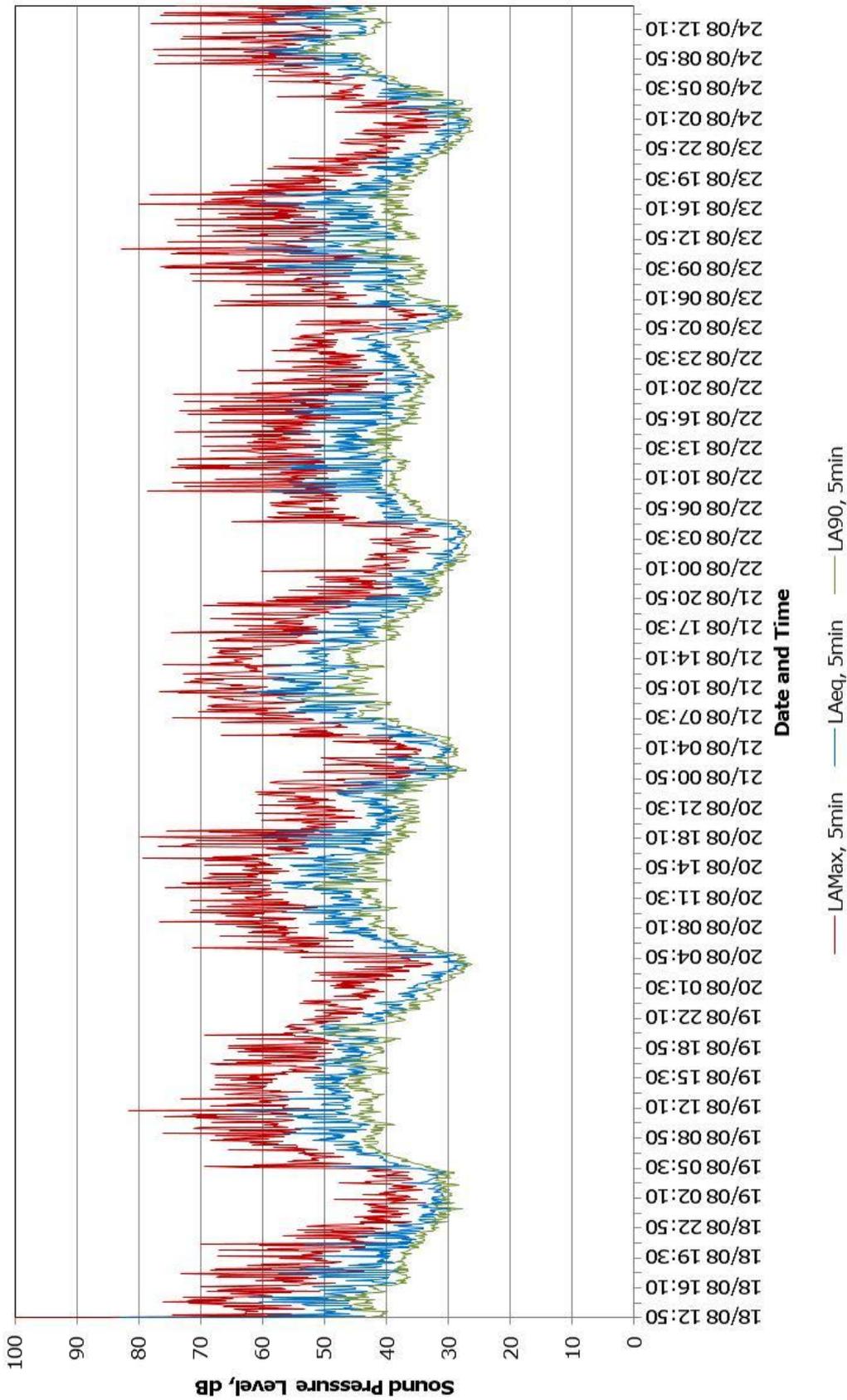


Table B – Newbury Wheel park, Tuesday 14th January 2014 (Skating Activity)

Start Time	L _{Aeq, 1min}	L _{AMax, f}	L _{A90, 1min}
13:39	60	65	58
13:40	59	62	58
13:41	65	79	59
13:42	69	82	66
13:43	70	84	67
13:44	70	84	65
13:45	69	80	66
13:46	70	79	65
13:47	71	93	67
13:48	72	93	68
13:49	69	85	66
13:50	69	85	67
13:51	70	88	66
13:52	69	79	66
13:53	69	84	62
13:54	69	87	65
13:55	69	80	66
13:56	69	81	67
13:57	69	84	66
13:58	70	82	66
13:59	70	81	66
14:00	71	85	67
14:01	70	80	66
14:02	71	88	65
14:03	70	86	66
14:04	71	87	68
14:05	70	80	66
14:06	69	82	63
14:07	70	78	66
14:08	69	78	64
14:09	69	78	67
14:10	69	85	65
14:11	70	83	67
14:12	69	78	67
14:13	68	74	65
14:14	68	82	66
14:15	68	71	62
14:16	69	80	67
14:17	69	75	67
14:18	68	77	64
14:19	69	73	67
14:20	68	77	64
14:21	70	79	67
14:22	71	89	66
14:23	72	90	66
14:24	71	87	66
14:25	71	88	67
14:26	70	87	66
14:27	69	78	66
14:28	69	79	67
14:29	70	80	68
14:30	70	83	67
14:31	72	88	67
14:32	71	83	68
14:33	73	93	68
14:34	71	83	68
14:35	72	87	68
14:36	72	87	67