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PROPOSED WHEELED SPORT ARENA
MAKINS RECREATION GROUND, HENLEY

NOISE IMPACT ASSESSMENT

Technical Report: R5192-1 Rev 0

Date: 30th April 2014

For: Henley on Thames Town Council
Town Hall
Market Place
Henley-on-Thames
Oxfordshire
RG9 2AQ

24 Acoustics Document Control Sheet

Project Title: Proposed Wheeled Sport Arena, Makins Recreation Ground, Henley – Noise Impact Assessment

Report Ref: R5192-1 Rev 0

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Document Status and Approval Schedule

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1.0 INTRODUCTION

1.1 Planning permission is being sought to construct a new wheeled sport arena (skate park) at Makins Recreation Ground, Greys Road, Henley as a replacement for the existing skate park facility.

1.2 The local planning authority, South Oxfordshire District Council, has requested a noise impact assessment to accompany the application to determine the potential impact on existing local residents. Accordingly, 24 Acoustics Ltd has been appointed to provide an assessment of the likely noise impact based on the proposed layout and future use.

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 μPa.

2.0 SITE DESCRIPTION

2.1 The land of the proposed development is north of Greys Road, at Makins Recreation Ground, see Figure 1.

2.2 The land comprises an existing metal-framed skate park in a large open recreation field which will be replaced with a new landscaped arena. The proposed new wheeled sport arena will be constructed from a solid concrete design which will be landscaped and partially sunk into the ground.

2.3 The nearest properties are located on Greys Road opposite the site at a distance of approximately 50 metres from the closest arena boundary.

2.4 The proposed wheeled sport arena includes earth bunds which will provide visual and acoustic screening to properties in the surround area. It is understood that lighting will not be provided at the proposed arena and that it will therefore only be used during day light hours which are considered to be between 08:00 to 22:00 hours for the purposes of this assessment.

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 There is no applicable standard for the assessment of noise from skate parks or sports arenas. 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.

3.5 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

3.6 "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 the character of noise produced by skate park activities. 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 in the past.

3.7 The guidance makes use of the shooting noise level (SNL) to assess impulsive noise sources which is calculated from the logarithmic average of the 25 highest shot levels over a 30min period from the instantaneous A-weighted (fast time-weighted) sound pressure level. The SNL is calculated at nearby sensitive receptors correcting for distance, topography and environmental conditions to determine the impulsive noise impact. 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 4142: 1997

3.8 Guidance on the assessment of industrial noise in a mixed industrial and residential area is given in BS 4142: 1997, 'Method for rating industrial noise affecting mixed residential and industrial areas' [Reference 7]. The Standard provides a method for rating noise of an industrial nature and to determine the likelihood of complaints from occupants of nearby residential properties.

3.9 The method is based on the difference between the background noise level (L_{A90}) without the source and the specific noise level ($L_{Aeq,\ 1hour}$ during the day) of the source at the receiver location. The noise level from the source (known as the specific noise level) should weighted by 5 dB if it is considered that an identifiable character (eg tonality, impulsiveness) exists at the receptor location. The background noise level is then subtracted from the rating level (the specific noise level plus any weighting for character) and the difference used to assess the likelihood of complaints, as shown in Table 1.

Difference	Assessment
Around +10 dB or more	Complaints likely
Around +5 dB	Of marginal significance
-10 dB or more	Positive indication that complaints are unlikely

Table 1 - BS 4142 Assessment Outcomes

3.10 It is relevant to note that BS 4142 is not directly applicable for the assessment of noise from recreational activities but can be used to provide an outline indication of possible complaints.

Summary

3.11 Based upon the review of standards described above, noise from the proposed new wheeled sport arena has been assessed in accordance with the following methodologies:

- Guidance for impulsive noise sources using the clay target shooting SNL;
- BS 4142: 1997 for external levels relative to the background noise level.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

Environmental Noise Measurements

4.1 Noise monitoring has been undertaken to determine the ambient and background noise levels in the vicinity of the nearest residential properties to the proposed site. Measurements were obtained between 14th and 24th April 2014. The instrumentation was located in the garden area of a nearby residential property (Waterworks Cottage, 5 Deanfield Avenue) in free field conditions as shown in Figure 1. This location was selected due to the lower background noise levels away from road traffic noise sources. It is therefore considered that the background noise measurement location provides a worst case assessment to determine the noise impact from the proposed development.

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 Noise survey instrumentation used conforms to the Class 1 accuracy standard of IEC 61672. 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 microphone was fitted with an environmental windshield at a height of approximately 2.5m above ground level. 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 8].

4.5 The weather conditions throughout the survey period were mostly fine and dry. Daytime ambient temperatures ranged between 4 and 16 degrees C.

Environmental Noise Levels

4.6 The results of the environmental noise surveys are detailed in Appendix B. Table 2 summarises the measurements undertaken between 08:00 and 22:00 hours (hours of daylight when the development could be used) during the survey period.

Date	Ambient Noise Level dB $L_{Aeq, 1hour}$	Background Noise Level dB $L_{A90, 1hour}$
Monday 14th April 2014	49	39
Tuesday 15th April 2014	52	40
Wednesday 16th April 2014	50	39
Thursday 17th April 2014	48	39
Friday 18th April 2014	52	40
Saturday 19th April 2014	53	41
Sunday 20th April 2014	53	42
Monday 21st April 2014	53	41
Tuesday 22nd April 2014	52	38
Wednesday 23rd April 2014	51	40
Thursday 24th April 2014	52	40

Table 2 - Summary of Environmental Noise Measurements (08:00 to 22:00 hours)

4.7 The average background noise level of 40 dB $L_{A90, 1hour}$ has been selected as the level against which noise impact has been assessed at each of the nearest residential properties.

Skating Noise Measurements – Existing Skate Park

4.8 Noise monitoring has been undertaken at a metal framed skatepark in Romsey, Hampshire to assess typical noise levels from the existing skatepark. Short term measurements were obtained on Thursday 3rd October 2013 while the park was being used by one skateboarder.

4.9 It was necessary to measure in close proximity to the skatepark activity due to noise from nearby road traffic. The distance between the measurement location and the skaters was approximately 3 metres.

4.10 Environmental noise levels were measured using the following instrumentation:

Norsonic precision sound level meter	Type 118
Brüel and Kjær acoustic calibrator	Type 4231

4.11 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.

4.12 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 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.

4.13 The weather was dry during the measurements and the wind speed typically below 5 m/s.

4.14 The following peak activity average source noise levels for skating activity at a metal framed skate park have been determined from the survey measurements:

- 70 dB $L_{Aeq, 1min}$ at 3 metres;
- 87 dB $L_{Amax, f}$ at 3 metres.

Skating Noise Measurements – Proposed Skate Park

4.15 Noise monitoring has been undertaken at a concrete skatepark in Victoria Park, Newbury to assess typical noise levels anticipated from the proposed skatepark. 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.

4.16 It was necessary to measure in close proximity to the skatepark due to noise from road traffic on the A339 dual carriageway. The distance between the measurement location and the skaters varied between 2 and 10 metres with a typical distance of approximately 5 metres.

4.17 Environmental noise levels were measured using the following instrumentation:

Rion precision sound level meter	Type NA 27
Brüel and Kjær acoustic calibrator	Type 4231

4.18 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.

4.19 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 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.

4.20 The weather was dry during the measurements and the wind speed typically below 5 m/s.

4.21 The following peak activity average source noise levels for skating activity in a concrete skate park have been determined from the survey measurements:

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

5.0 NOISE IMPACT ASSESSMENT

Proposed Development – Predicted Noise Levels

5.1 Noise levels from the existing and proposed development have been calculated at the nearest residential properties to determine the noise impact and changes in noise level. Four receptor locations have been selected which represent the nearest residential properties surrounding the proposed site. These receptor locations are shown in Figure 1 and described below.

- Receptor 1: 151 Greys Road, south east of the proposed site;
- Receptor 2: 84 Greys Road, north east of the proposed site;
- Receptor 3: Waterworks Cottage, 5 Deanfield Avenue, north east of proposed site;
- Receptor 4: 11 St Anne's Close, north of the proposed site.

5.2 An acoustic model of the site has been generated to determine the typical noise level from the existing skate park and proposed wheeled sport arena site. Measured noise levels from equivalent metal framed and concrete skate parks as described in Section 4 have been used to populate an acoustic model of the site using IMMI v2011 noise-mapping software. This has used the propagation methodology of ISO 9613 [Reference 9] taking into account the effects of geometric divergence, atmospheric and ground absorption and acoustic screening. The following parameters were used in the model:

- Ambient temperature: 10 degrees centigrade;
- Relative humidity: 70%;
- Ground effects: G=0.5 (partially absorption, 50% 'hard' ground);
- Light downwind propagation conditions.

5.3 The model has assumed that 10 people are using the facility at any one time in each instance. Results from the noise model are shown graphically in Appendix C (for 1.5m relative height above ground level). Results from the acoustic model are summarised below in Table 3 (externally to each receptor location).

Receptor Location	Noise Level - Existing Skate Park, L_{Aeq} (dB)	Noise Level - Proposed Development, L_{Aeq} (dB)
1	40	34
2	38	34
3	33	26
4	36	28

Table 3: Summary of Acoustic Model Results

5.4 The model indicates that noise levels emitted from the new development will be significantly lower than the existing by virtue of its change in construction materials.

Assessment - Impulsive Noise Levels

5.5 An assessment has been undertaken using the Clay Pigeon shooting noise guidance to determine impulsive noise impact from the existing and proposed site. 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. Measured maximum $L_{Amax,f}$ values for the existing and proposed site, as described in Section 4, have used within the impulsive noise calculations.

5.6 Results from the impulsive noise calculations at receptor locations are shown in Table 4.

Receptor Location	Existing site, Calculated SNL (dBA)	Proposed site, Predicted SNL (dBA)
1	47	45
2	48	45
3	41	37
4	42	40

Table 4 - Predicted Impulsive Noise Levels

5.7 The calculated SNLs for the existing and proposed site fall below the recommended threshold of 55 dBA, below which annoyance is less likely to occur for all receptor locations. These calculations are considered worst case and assume a high peak level of activity at the site. These calculations do not take into account acoustic screening from garden fences and boundary foliage which will also reduce noise levels at the nearest residential properties. Impulsive noise levels are also considered acceptable when considering the historical use of the site as a skate-park.

Assessment - BS 4142: 1997

5.8 A BS4142 assessment has been undertaken which compares the predicted external noise levels (as shown in Table 3) to the typical background noise levels (as shown in Table 2). The noise rating level has included a +5 dB noise penalty for impulsive noise character. The assessment has considered the existing scenario and the proposed site for comparative purposes.

Description	**Noise Level, dB**			
	Receptor 1	**Receptor 2**	**Receptor 3**	**Receptor 4**
Specific Noise Level	40	38	33	36
+ 5 dB Noise Penalty	+5	+5	+5	+5
Rating Noise Level, dB L_{Aeq}	45	43	38	41
Background Noise Level, dB L_{A90}	40	40	40	40
Excess over background	+5	+3	-2	+1

Table 6 - BS 4142 Assessment, Existing Skate-Park Site

Description	**Noise Level, dB**			
	Receptor 1	**Receptor 2**	**Receptor 3**	**Receptor 4**
Specific Noise Level	34	34	26	28
+ 5 dB Noise Penalty	+5	+5	+5	+5
Rating Noise Level, dB L_{Aeq}	39	39	31	33
Background Noise Level, dB L_{A90}	40	40	40	40
Excess over background	-1	-1	-9	-7

Table 7 - BS 4142 Assessment, Proposed Wheeled Sport Arena Site

5.9 Noise impact for the proposed development is significantly lower than noise impact from the existing scheme. A comparison between the Rating Level and background noise level at each receptor for the proposed scheme indicates that noise impact levels will be significantly lower than 'marginal significance' when assessed in accordance with BS 4142. These calculations do not take into account acoustic screening from garden fences and boundary foliage which will also reduce noise levels at the nearest residential properties.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has reviewed the potential impact of noise associated with a new wheeled sport arena at Makins Recreation Ground, Greys Road, Henley on Thames.

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 skate-park in Newbury and Romsey 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 It is concluded that noise levels associated with the proposed scheme are unlikely to cause unreasonable disturbance to occupiers of the nearest residential properties and will provide a suitable reduction in noise levels from the existing scheme.

REFERENCES

1. Department for Communities and Local Government. The National Planning Policy Framework (NPPF), 2012.

2. Department of the Environment, Food and Rural Affairs. Noise Policy Statement for England (NPSE), 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. World Health Organisation. Guidelines for Community Noise, 2000.

7. BS 4142: 1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas (1997).

8. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use (1991).

9. International Standards Organisation. ISO 9613, Acoustics- Attenuation of Sound During Propagation Outdoors, 1993.

Project: Wheeled Sport Arena, Greys Road, Henley	**Title:** Existing Site Plan and Measurement Location	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A
Date: April 2014	**Drawn By:** JE	**Job No:** 5192-1

Project: Wheeled Sport Arena, Greys Road, Henley	**Title:** Proposed Site Plan	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** A
Date: April 2014	**Drawn By:** JE	**Job No:** 5192-1

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 important 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 internal, 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

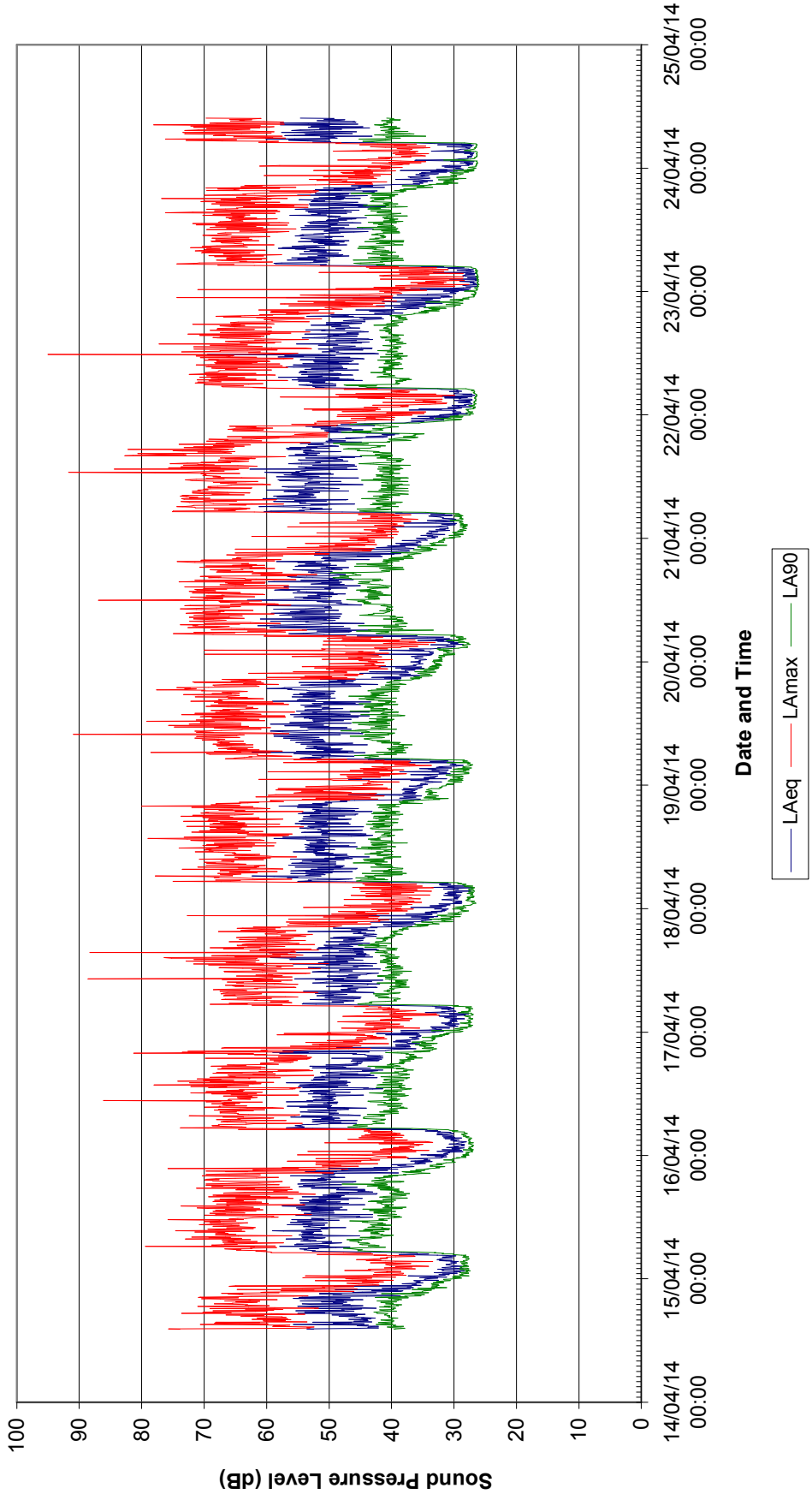
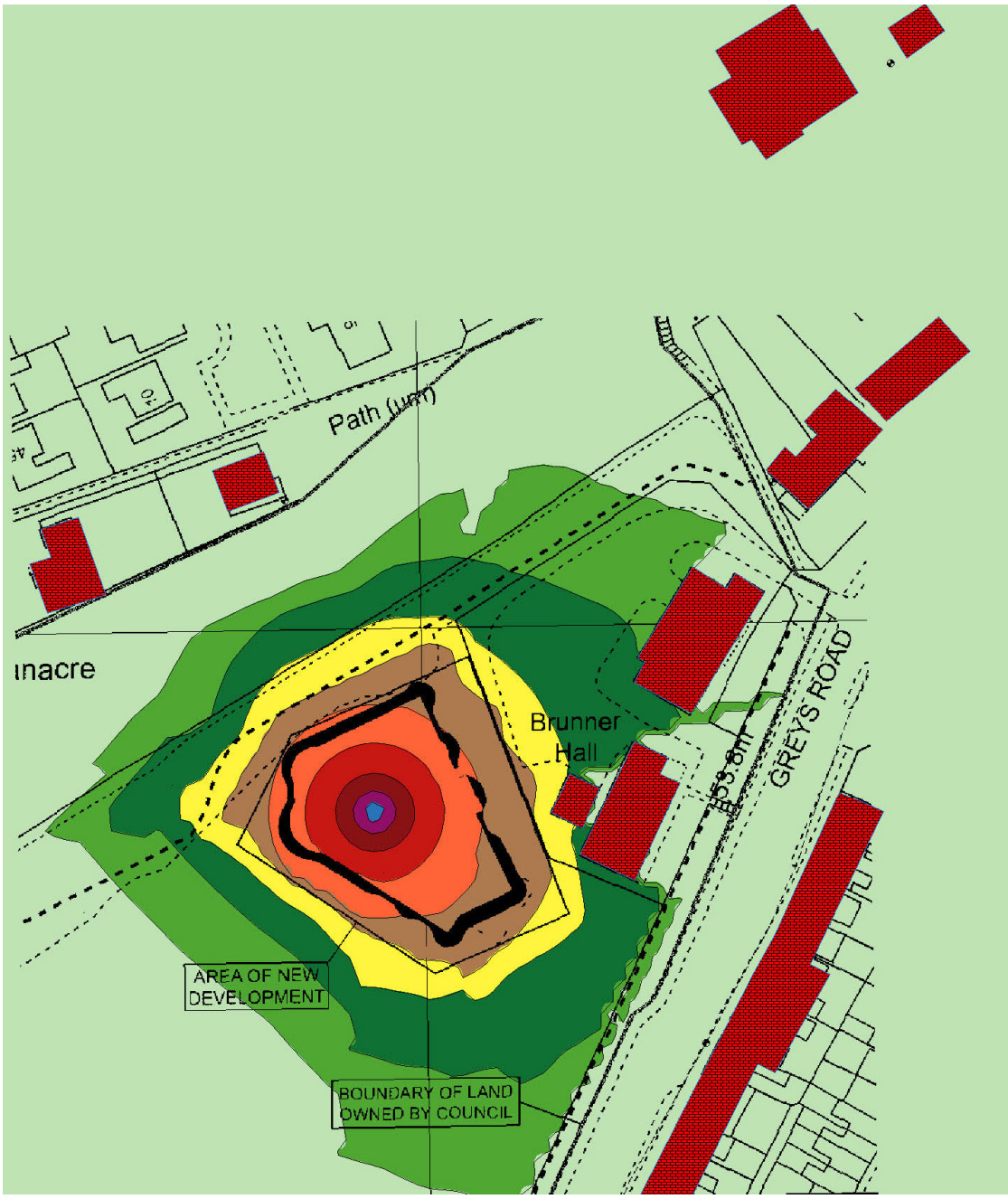


Figure B1: Henley Wheeled Sport Arena 14th to 24th April 2014

APPENDIX C: PREDICTED NOISE LEVELS – PROPOSED DEVELOPMENT SCHEME



Level
dB(A)

- >..-35
- >35-40
- >40-45
- >45-50
- >50-55
- >55-60
- >60-65
- >65-70
- >70-75
- >75-80
- >80-..