

## Technical Note

Prepared by: **Matthew Sweet** Date: **14 August 2014**  
Project **Swalcliffe Park Equestrian Events** Ref: **4214**  
For: **Partway House, Elm Farm, Swalcliffe House Residents** Page: **1 of 13**  
Subject: **Noise Levels Observed During Visits on 22 September 2013 and 1 August 2014**

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This Technical Note details the findings of measured noise levels and observations during visits to the area around Swalcliffe Park on Sunday 22 September 2013 and Friday 01 August 2014. Details of noise units are presented in Appendix 1 of this Technical Note.

### Summary

In September 2013, WBM received instructions to visit the site on Sunday 22 September 2013, to obtain noise measurements at positions near to selected dwellings and to return on Sunday 29 September 2013 to measure noise levels during an equestrian event. Following these visits a Technical Note was prepared (reference 4214, dated 21 October 2013) setting out the findings of these noise surveys.

WBM was approached in July 2014 and requested by Mrs Vandamme of Partway House to undertake a repeat noise survey on Friday 01 August 2014 at the start of the National Riding School 3 Day Event taking place at Swalcliffe Equestrian Centre.

A visit was undertaken on Friday 01 August 2014 between about 07:00 and 12:00 hours and attended sample measurements were undertaken at 6 positions. The measurement positions used were identical or similar to those used for the survey on 22 September 2013. The weather during the survey period was dry, cloudy, 15 to 18°C, with a wind speed of about 1 to 2 m/s at the noise measurement positions and estimated to be from the SW.

The overall impression from the attended measurements on Friday 01 August 2014 was that noise levels due to the activity at Swalcliffe Equestrian Park were increasingly evident throughout the survey. In particular, the use of a site wide tannoy system was clearly audible and intelligible at all of the three dwellings close to the event site.

The noise of the equestrian event was noted as significant at all the dwellings surveyed, especially with regard to the tannoy announcements. The observations and comments taken during the event are notably different to those observations made when no event was taking place. With regard to the measured noise levels, by comparing the levels measured when the equestrian event was occurring with those taken without an event was occurring, it can be seen that for the majority of the measurements the noise levels during the event were higher. In particular the  $L_{Aeq,T}$  levels for every measurement with the equestrian event occurring increased by between 1 and 8 dB(A) and the background ( $L_{A90,T}$ ) for every measurement increased by up to 10 dBA over the measured level when there was no event activity.

## Friday 01 August 2014 Measured Noise Levels and Observations

The noise survey details are presented in Appendix 2 and the complete results and comments are presented in Appendix 3. The measurement positions are described and shown on plans in Appendix 4. The noise survey results from Friday 01 August 2014 are summarised below.

The measurement positions used for the survey work in September 2013 were adopted for the survey on 01 August 2014, although positions 2 and 8 were moved for the recent survey and these are indicated as 2a and 8a, and no measurements were taken at position 7. For 8a the selected measurement position was in a first floor sitting room rather than in the second floor bedroom. For 2a the selected position was in the rear garden of Partway House close to the dressage activity in the adjacent field, rather than at the front of the house close to the road.

The observations / comments presented below are the noted activity associated with the National Riding School 3 Day Event. Shown in brackets in the table are the levels measured at the appropriate positions for the noise survey on Sunday 22 September 2013 when no equestrian event was taking place.

Measurement Position	Time	dB L <sub>Aeq,T</sub>	dB L <sub>Amax,F</sub>	dB L <sub>A10,T</sub>	dB L <sub>A90,T</sub>	Observations / Comments Abbreviated from Appendix 3
Position 8a - Elm Farm 1st floor (inside)	07:14 – 07:29	41	59	44	30	Horse boxes arriving. Horse noises. Vehicle movements in field. Brief tannoy system test.
Position 3 - Elm Farm Front Garden	07:37 – 07:52	47 (46)	71 (65)	50 (44)	37 (28)	Horsebox movements. Voices in field. Horse noises. Dog barks. Some activity from horse-shoeing business next door.
Position 5 - Swalcliffe House by courts	08:49 – 09:04	49 (44)	69 (58)	47 (48)	35 (32)	Horse noises. Voices in field. Generator noise in distance.
Position 2a - Partway House in garden	09:22 – 09:37	45	60	48	41	Dressage in field. Voices. Distant tannoy. Horse noises. Applause. Occasional bell or car horn.
Position 5 - Swalcliffe House by courts	09:51 – 10:06	46 (44)	68 (58)	48 (48)	37 (32)	Horse noises. Activity and voices. Tannoy for show-jumping with tone sounding.
Position 6 - Swalcliffe House by patio	10:08 – 10:23	44 (39)	67 (55)	45 (42)	35 (31)	Tannoy clearly audible with voice and tone every 2 minutes. Horse noises. Voices in field.
Position 8a - Elm Farm 1st floor (inside)	10:36 – 10:44	47	64	48	36	Wide area tannoy clearly audible inside dwelling. Announcements for show-jumping.
Position 3 - Elm Farm Front Garden	10:46 – 11:01	47 (46)	64 (65)	50 (44)	38 (28)	Wide area tannoy system loud and clearly distinguishable. Show-jumping announcements. Horse noises. Horse boxes arriving.
Position 1 - Partway House by pool	11:07 – 11:20	45 (37)	58 (54)	48 (40)	39 (32)	Wide area for cross-country racing. Show-jumping announcements. Car horn from dressage arena. Whistles used by cross country judges.
Position 6 - Swalcliffe House by patio	11:37 – 11:52	46 (39)	67 (55)	49 (42)	37 (31)	Commentary for cross country broadcast on site wide tannoy.

By comparing the levels measured on 01 August 2014 when the equestrian event was occurring with those taken on 22 September 2013 when no event was occurring, it can be seen that for the majority of the measurements the noise levels during the event were higher. In particular the  $L_{Aeq,T}$  levels for every measurement with the equestrian event occurring increased by between 1 and 8 dB(A) and the background ( $L_{A90,T}$ ) for every measurement increased by up to 10 dBA over the measured level when there was no event activity.

The following table is taken from WBM Technical Note dated 21 October 2013 and sets out the observations and comments made during the survey on Sunday 22 September 2013 when no activity was occurring at the Equestrian Park.

Measurement Location	Time	Observations / Comments
Position 1 - Partway House by pool	10:58-11:13	Distant road traffic, birdsong, slight wind movement in trees, distant farm animals, distant aircraft
Position 2 - Partway House by road	11:16-11:31	Few local vehicles, cars on B4035, bird calls / birdsong, slight wind movement in trees
Position 3 - Elm Farm front lawn	11:40-11:55	Few local cars, distant aircraft, slight wind movement in trees
Position 4 - Elm Farm rear of garage	11:59-12:14	Few cars on local road, distant road traffic, slight wind movement in trees
Position 5 - Swalcliffe House by court	12:25-12:40	Birdsong dominant, slight wind movement in trees, few local cars, distant aircraft and traffic
Position 6 - Swalcliffe House on patio	12:43-12:58	Slight wind movement in trees, light aircraft, distant traffic, birdsong, voices in field

The comments are indicative of the rural nature of the environment, with no significant noise sources noted other than occasional local vehicle movements on the roads. In contrast, the observations made during the equestrian event on Friday 01 August 2014 highlight the added noise sources that the event introduced into the local environment, such as vehicles on the event ground, voices and horse noises, bells and car horns, and announcements and commentary with the site wide tannoy system.

The overall impression from the attended measurements on Friday 01 August 2014 was that noise due to the activity at Swalcliffe Equestrian Park was increasingly evident throughout the survey.

During the initial measurements at positions 8a and 3, the movement of horse boxes on Main Street, turning into the field used for the 3 day event, and parking up on the field were most notable. Attended measurements were made inside a sitting room at first floor level at Elm Farm, which had a view over the field where vehicles and horse boxes were located. For these measurements the window was open. During the sample measurements, passing cars and horse boxes were marked on a noise level verses time trace, which has not been presented in this report. For the first sample measurements carried out at 07:14 hours there were 7 horse boxes noted traveling on Main Street and entering the event site and the maximum noise levels from these horse boxes were noted at between 48 and 55 dB  $L_{Amax, F}$  inside the sitting room. During the same period there were 6 car movements on Main Street inside the sitting room were noted as between 43 to 56 dB  $L_{Amax, F}$ .

Activity and the associated noise in the field increased as contestants started the dressage, show-jumping and cross country events.

For the dressage event which occurred in the field closest to Partway House, bells and car horns were sounded regularly as part of the event. The show-jumping appeared to occur in the centre of the field and had an associated tannoy system to announce the next rider and sounded a distinctive tone to indicate the start of the round. The cross country appeared to take place to the south and southeast of Partway House. For this event a site wide tannoy system was used to announce the next rider starting the course and comment on the event. Also at Partway House whistles were noted as being used by the course judges. At Position 1, noise from the equestrian event was noted from the west, south and east of the position.

The site wide tannoy system was used after 10:30 hours and it was noted at all the dwellings that the announcements with the site wide tannoy were clear and intelligible. In particular the maximum noise levels at Swalcliffe House (positions 5 and 6) have increased notably and at this property noise from activity at the event site and the tannoy system were significant. It was noted during the survey that there were two sets of tannoy speakers on poles close to this property.

**Matthew Sweet**  
Consultant

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## Appendix 1

### Noise Units

The following section describes some of the parameters that are used to quantify noise.

#### **Decibels dB**

Noise levels are measured in decibels. The decibel is the logarithmic ratio of the sound pressure to a reference pressure ( $2 \times 10^{-5}$  Pascals). The decibel scale gives a reasonable approximation to the human perception of relative loudness. In terms of human hearing, audible sounds range from the threshold of hearing (0 dB) to the threshold of pain (140 dB).

#### **A-weighted Decibels dB(A)**

The 'A'-weighting filter emulates human hearing response for low levels of sound. The filter network is incorporated electronically into sound level meters. Sound pressure levels measured using an 'A'-weighting filter have units of dB(A) which is a single figure value to represent the overall noise level for the entire frequency range.

A change of 3 dB(A) is the smallest change in noise level that is perceptible under normal listening conditions. A change of 10 dB(A) corresponds to a doubling or halving of loudness of the sound. The background noise level in a quiet bedroom may be around 20 –30 dB(A); normal speech conversation around 60 dB(A) at 1 m; noise from a very busy road around 70-80 dB(A) at 10m; the level near a pneumatic drill around 100 dB(A).

#### **Façade Noise Level**

Façade noise measurements are those undertaken near to reflective surfaces such as walls, usually at a distance of 1m from the surface. Façade noise levels at 1m from a reflective surface are normally around 3 dB greater than those obtained under freefield conditions.

#### **Freefield Noise Level**

Freefield noise measurements are those undertaken away from any reflective surfaces other than the ground

#### **Frequency Hz**

The frequency of a noise is the number of pressure variations per second, and relates to the "pitch" of the sound. Hertz (Hz) is the unit of frequency and is the same as cycles per second. Normal, healthy human hearing can detect sounds from around 20 Hz to 20 kHz.

#### **Octave and Third-Octave Bands**

Two frequencies are said to be an octave apart if the frequency of one is twice the frequency of the other. The octave bandwidth increases as the centre frequency increases. Each bandwidth is 70% of the band centre frequency.

Two frequencies are said to be a third-octave apart if the frequency of one is 1.26 times the other. The third octave bandwidth is 23% of the band centre frequency.

There are recognised octave band and third octave band centre frequencies. The octave or third-octave band sound pressure level is determined from the energy of the sound which falls within the boundaries of that particular octave or third octave band.

## Appendix 1 (continued)

### Equivalent Continuous Sound Pressure Level $L_{Aeq,T}$

The 'A'-weighted equivalent continuous sound pressure level  $L_{Aeq,T}$ , is a notional steady level which has the same acoustic energy as the actual fluctuating noise over the same time period T. The  $L_{Aeq,T}$  unit is dominated by higher noise levels, for example, the  $L_{Aeq,T}$  average of two equal time periods at, for example, 70 dB(A) and 50 dB(A) is not 60 dB(A) but 67 dB(A).

The  $L_{Aeq,T}$  is the chosen unit of BS 7445-1:2003 "Description and Measurement of Environmental noise".

### Maximum Sound Pressure Level $L_{Amax}$

The  $L_{Amax}$  value describes the overall maximum 'A'-weighted sound pressure level over the measurement interval. Maximum levels are measured with either a fast or slow time weighted, denoted as  $L_{Amax,f}$  or  $L_{Amax,s}$  respectively.

### Sound Exposure Level $L_{AE}$ or SEL

The sound exposure level is a notional level which contains the same acoustic energy in 1 second as a varying 'A'-weighted noise level over a given period of time. It is normally used to quantify short duration noise events such as aircraft flyover or train passes.

### Statistical Parameters $L_N$

In order to cover the time variability aspects, noise can be analysed into various statistical parameters, i.e. the sound level which is exceeded for N% of the time. The most commonly used are the  $L_{A01,T}$ ,  $L_{A10,T}$  and the  $L_{A90,T}$ .

$L_{A01,T}$  is the 'A'-weighted level exceeded for 1% of the time interval T and is often used to give an indication of the upper maximum level of a fluctuating noise signal.

$L_{A10,T}$  is the 'A'-weighted level exceeded for 10% of the time interval T and is often used to describe road traffic noise. It gives an indication of the upper level of a fluctuating noise signal. For high volumes of continuous traffic, the  $L_{A10,T}$  unit is typically 2–3 dB(A) above the  $L_{Aeq,T}$  value over the same period.

$L_{A90,T}$  is the 'A'-weighted level exceeded for 90% of the time interval T, and is often used to describe the underlying background noise level. It is defined in British Standard 4142 as the background noise unit and is used for establishing the reference against which industrial noises are assessed.

## Appendix 2

### Instrumentation and Calibration

#### **Date and Positions of Survey**

Friday 01 August 2014.

Vicinity of Swalcliffe Park

The external noise survey positions are shown in Appendix 4 and were all free field.

#### **Surveys carried out by**

Matthew Sweet

#### **Weather Conditions**

Friday 01 August 2014 Dry, cloudy, 15 to 18°C, wind 1 to 2 m/s, SW

#### **Instrumentation used (Serial Number)**

Norsonic 140 Sound Level Meter (1403138)
Norsonic 1251 Calibrator (31991)

#### **Calibration**

The sensitivity of the meter was verified on site immediately before and after the survey. The measured calibration levels were as follows:

Survey Position	Start Cal	End Cal
Friday 01 August 2014	113.8 dB(A)	113.7 dB(A)

The meter and calibrator are tested monthly against a Brüel and Kjær Pistonphone, type 4220 (serial number 375806) and a Norsonic Calibrator, type 1253 (serial number 22906) with UKAS approved laboratory certificate of calibration.

**Appendix 3**

**Noise Survey Results**

**Friday 01 August 2014**

<b>Measurement Position</b>	<b>Time</b>	<b>dB L<sub>Aeq, T</sub></b>	<b>dB L<sub>Amax, F</sub></b>	<b>dB L<sub>A10, T</sub></b>	<b>dB L<sub>A90, T</sub></b>	<b>Observations / Comments</b>
Position 8a - Elm Farm 1st floor	07:14 – 07:29	41	59	44	30	Horse boxes arriving and turning into field entrance to south. Horse noises. Vehicle movements and engine noise in field. Brief tannoy system test.
Position 3 - Elm Farm Front Garden	07:37 – 07:52	47	71	50	37	Horsebox movements on road and in field. Voices in field. Horse noises. Gentle breeze in trees. Occasional vehicle movement on street. One passing aircraft. Dog barks. Some activity from barns next door (horse-shoeing business), with car engine idling at end of sample.
Position 5 - Swalcliffe House by courts	08:49 – 09:04	49	69	47	35	Occasional vehicle movement on lane. Horse noises. Gentle breeze in trees. Aircraft. Voices in field. Constant generator noise in distance. Birdsong. Passing tractor.
Position 2a - Partway House in garden	09:22 – 09:37	45	60	48	41	Dressage in field to west of garden. Voices. Distant tannoy announcements. Horse noises. Applause. Occasional bell or car horn used by dressage judges. Wind in trees. Local vehicle traffic. Aircraft.
Position 5 - Swalcliffe House by courts	09:51 – 10:06	46	68	48	37	Horse noises. General activity and voices. Occasional vehicle on lane. Tractor in field. Tannoy announcements for show-jumping are audible but barely intelligible, a tone also sounded for each rider.
Position 5 - Swalcliffe House by patio	10:08 – 10:23	44	67	45	35	Tannoy announcements clearly audible with voice and tone noted every 2 minutes. Horse noises. Occasional passing car on lane. Voices in field. Aircraft. Birdsong. Breeze in trees.



**Appendix 3 (continued)**

<b>Measurement Position</b>	<b>Time</b>	<b>dB L<sub>Aeq, T</sub></b>	<b>dB L<sub>Amax, F</sub></b>	<b>dB L<sub>A10, T</sub></b>	<b>dB L<sub>A90, T</sub></b>	<b>Observations / Comments</b>
Position 8a - Elm Farm 1st floor	10:36 – 10:44	47	64	48	36	Announcement using site wide tannoy clearly audible inside dwelling. Announcements for show-jumping are audible but barely intelligible. Occasional passing cars
Position 3 - Elm Farm Front Garden	10:46 – 11:01	47	64	50	38	Announcement using site wide tannoy system loud and clearly distinguishable. Show-jumping announcements distinguishable and intelligible at times. Horse noises. Horse boxes turning into field entrance. Passing vehicles.
Position 1 - Partway House by pool	11:07 – 11:20	45	58	48	39	Wide area announcements for cross-country racing clearly audible to south and west of property. Also show-jumping announcements to west and occasional car horn sounding from dressage arena to west. Whistles used by cross country judges also noted to east. Aircraft. Breeze in trees.
Position 5 - Swalcliffe House by patio	11:37 – 11:52	46	67	49	37	Commentary for cross country broadcast on site wide tannoy system and clearly audible and intelligible at property. Occasional vehicle movement on lane.

## Appendix 4

### Noise Survey Positions used on 01 August 2014

<b>Ref</b>	<b>Position</b>	<b>Measurement Position Description</b>
Position 1	Partway House by pool	South west of pool, ~ 1 m to wooden gate into paddock, by hedges
Position 2a	Partway House in garden	In rear garden~ 25 metres from house façade.
Position 3	Elm Farm front lawn	On lawn, adjacent to patio, ~ 3.5 m to façade of house, ~ 2 m high wall along most of garden boundary
Position 5	Swalcliffe House by tennis court	South east of dwelling, near northern corner of tennis court, ~ 12 m to edge of Grange Lane
Position 6	Swalcliffe House on patio	Corner of patio area closest to Grange Lane, ~ 3.5 m to house façade
Position 8a	Elm Farm sitting room	In first floor sitting room, looking over the garden wall and into the field where vehicles and horse boxes are situated

N.B. Plans show the approximate positions of the noise survey positions

## Appendix 4 (continued)

### Measurement Positions Used for Survey on 01 August 2014



NB. Position 8a not shown

Appendix 4 (continued)

Measurement Positions for Partway House and Elm Farm



Appendix 4 (continued)

Measurement Positions for Swalcliffe House

