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Technical Note

Prepared by:	**Matthew Sweet**	Date:	**04 August 2014**
Project	**Swalcliffe Park Equestrian Events**	Ref:	**4214**
For:	**Partway House, Elm Farm, Swalcliffe House Residents**	Page:	**1 of 10**
Subject:	**Noise Levels Observed During Visits on 22 September 2013 and 01 August 2014**		

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 locations 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 were 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 and attended sample measurements were undertaken at 6 locations, which were identical or similar to those made 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 locations 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.

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 locations are described and shown on a plan in Appendix 4. The noise survey results from Friday 01 August 2014 are summarised below. The measurement locations used for the survey work in September 2013 were used for the survey on 01 August 2014, although positions 2 and 8 were moved to more representative positions for the recent survey and these are indicated as positions 2a and 8a. For position 2a the selected measurement position was in a first floor sitting room and for position 8a the selected position was representative of the dressage activity in the rear garden of Partway House.

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 2014 when no equestrian event was taking place.

Measurement Position	Time	dB $L_{Aeq,T}$	dB $L_{Amax,F}$	dB $L_{A10,T}$	dB $L_{A90,T}$	Observations / Comments Abbreviated from Appendix 3
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.

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.

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 sound a 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 across the site to announce the next rider starting the course. Also at Partway House whistles were noted as being used by the course judges.

By comparing the results of the survey carried out Friday 01 August 2014 with the results for the survey on Sunday 22 September 2013 without an event occurring, it can be seen that in almost all cases the measured noise level has increased. 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 ($2x10^{-5}$ 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 of 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 gives 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 Locations of Survey

Friday 01 August 2014.

Vicinity of Swalcliffe Park

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

Surveys carried out by

Matthew Swseet

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 Location	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

Measurement Location	Time	dB $L_{Aeq, T}$	dB $L_{Amax, F}$	dB $L_{A10, T}$	dB $L_{A90, T}$	Observations / Comments
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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.
Pos 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)

Measurement Location	Time	dB $L_{Aeq, T}$	dB $L_{Amax, F}$	dB $L_{A10, T}$	dB $L_{A90, T}$	Observations / Comments
Pos 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
Pos 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.
Pos 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.
Pos 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 Measurement Locations

Ref	Position	Measurement Location Description
Pos 1	Partway House by pool	South west of pool, ~ 1 m to wooden gate into paddock, by hedges
Pos 2 *	Partway House by road	Front lawn, by driveway ~ 8 m to front façade of house ~ 15 m to edge of Main Street
Pos 2a	Partway House in garden	In rear garden~ 25 metres from house façade.
Pos 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
Pos 4 *	Elm Farm rear of garage	Rear of dwelling, near vegetable & flower growing plot, on grass area by edge of driveway, ~ 11 m to rear of garages
Pos 5	Swalcliffe House by tennis court	South east of dwelling, near northern corner of tennis court, ~ 12 m to edge of Grange Lane
Pos 6	Swalcliffe House on patio	Corner of patio area closest to Grange Lane, ~ 3.5 m to house façade
Pos 7 *	Swalcliffe Village	On grass verge ~ 4 m to edge of B4035, opposite entrance to “The Tythings”, across from Swalcliffe Barn
Pos 8*	Elm Farm bedroom	Second floor bedroom, looking over the garden wall and into the field where vehicles and horse boxes are situated
Pos 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

* Positions only used for survey carried out on 22 September 2013

NB. Plan shows approximate positions of noise survey locations (Pos 8 and 8a not shown)

Appendix 4 (continued)