

Technical Note

Prepared by: **Dr Paul Cockcroft** Date: **21 October 2013**
Project **Swalcliffe Park Equestrian Events** Ref: **4214**
For: **Partway House, Elm Farm, Swalcliffe House Residents** Page: **1 of 8**
Subject: **Noise Levels Observed During Visits on Sunday 22 & 29 September 2013**

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 Sunday 29 September 2013. Details of noise units are presented in Appendix 1 of this Technical Note.

Summary

WBM received instructions on 17 September 2013 to attend a site meeting 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.

The strict timetable is a result of the need to produce representations in the week commencing 30 September 2013 for submission to Cherwell District Council, within 21 days of a letter of neighbour notification dated 12 September 2013 for a planning application.

A visit was undertaken on Sunday 22 September 2013 between about 10:00 and 13:00 and attended sample measurements were undertaken at six locations between about 11:00 and 13:00. The weather during the survey period was dry, overcast, 18°C, with a light wind of 1 m/s or less at the noise measurement locations and estimated to be from the WSW.

A visit was undertaken on Sunday 29 September 2013 between about 07:45 and 10:45 and attended sample measurements were undertaken at eight locations, including the six where measurements were made on 22 September 2013. The weather during the survey period was dry, moderate cloud, 12 to 14°C, with a wind speed of about 1 to 3 m/s at the noise measurement locations and estimated to be from the ENE.

The overall impression from the attended measurements on Sunday 22 September 2013 was of a quiet rural area with a few local road vehicles, with birdsong and slight wind movement in trees contributing to the noise climate. The measured background noise levels were below 35 dB $L_{A90, T}$.

The overall impression from the attended measurements on Sunday 29 September 2013 was of elevated background noise levels due to moderate wind movement in trees, which masked other noise. However, it was possible to make certain observations about maximum noise levels from the ODE Equestrian Event particularly at Elm Farm.

It is readily apparent from the low background noise levels measured on Sunday 22 September 2013 and discussions with the residents at Partway House, Elm Farm and Swalcliffe House that the equestrian events and associated traffic have the capacity to cause disturbance in this area.

Sunday 22 September 2013 Measured Noise Levels and Observations

Instrumentation and calibration details are presented in Appendix 2 of this Technical Note. The noise survey results from Sunday 22 September 2013 are summarised below.

Measurement Location	Time	dB L _{Aeq, T}	dB L _{Amax, F}	dB L _{A10, T}	dB L _{A90, T}	Observations / Comments
Pos 1 - Partway House by pool	10:58-11:13	37	54	40	32	Distant road traffic, birdsong, slight wind movement in trees, distant farm animals, distant aircraft
Pos 2 - Partway House by road	11:16-11:31	47	67	47	34	Few local vehicles, cars on B4035, bird calls / birdsong, slight wind movement in trees
Pos 3 - Elm Farm front lawn	11:40-11:55	46	65	44	28	Few local cars, distant aircraft, slight wind movement in trees
Pos 4 - Elm Farm rear of garage	11:59-12:14	38	55	39	31	Few cars on local road, distant road traffic, slight wind movement in trees
Pos 5 - Swalcliffe House by court	12:25-12:40	44	58	48	32	Birdsong dominant, slight wind movement in trees, few local cars, distant aircraft and traffic
Pos 6 - Swalcliffe House on patio	12:43-12:58	39	55	42	31	Slight wind movement in trees, light aircraft, distant traffic, birdsong, voices in field

The overall impression from the attended measurements on Sunday 22 September 2013 was of a quiet rural area with a few local road vehicles, with birdsong and slight wind movement in trees contributing to the noise climate. The measured background noise levels were below 35 dB L_{A90, T}. Whilst there was slight wind movement in the trees, this was not significant and distant activity was noticeable.

Sunday 29 September 2013 Measured Noise Levels and Observations

The noise measurement locations are described and shown on a plan in Appendix 3. The noise survey results from Sunday 29 September 2013 are summarised below.

Measurement Location	Time	dB L _{Aeq, T}	dB L _{Amax, F}	dB L _{A10, T}	dB L _{A90, T}	Observations / Comments
Pos 7 Swalcliffe Village	07:55-08:10	60	81	59	37	Road traffic, including horse lorries and horse boxes. Birdsong, church bells, wind movement in trees
Pos 5 Swalcliffe House by court	08:20-08:35	49	58	52	45	Wind movement in trees significant / constant, birdsong, voices in field
Pos 6 Swalcliffe House by patio	08:37-08:52	48	66	49	43	Wind movement dominant, distant large aircraft.
Pos 3 Elm Farm front lawn	09:00-09:15	46	68	47	39	Vehicles on lane, distant large aircraft, wind movement in trees, vehicle movements, voices & horses across lane

Pos 4 Elm Farm rear of garage	09:20-09:35	47	58	50	42	Wind movement in trees dominant, church bells just audible, distant large aircraft, cars on lane, horses audible.
Pos 8 Elm Farm bedroom (window open)	09:40-09:43	38	59	41	30	Voices, activity at horse boxes, distant tannoy
Pos 8 Elm Farm bedroom (window open)	09:44-09:50	45	71	44	28	Voices, activity, horses, cars on lane
Pos 8 Elm Farm bedroom (window closed)	09:51-09:56	30	45	34	21	Slight wind movement in trees, two cars on lane, voices just audible, horses
Pos 2 Partway House by road	10:07-10:22	49	69	50	41	Wind movement in trees, vehicles on lane, birdsong, light aircraft, traffic on B4035, tannoy just audible
Pos 1 Partway House by pool	10:24-10:40	48	60	51	44	Wind movement in trees dominant, distant traffic, tannoy just audible

The overall impression from the attended measurements on Sunday 29 September 2013 was of elevated background noise levels due to moderate wind movement in trees, which masked other noise. However, it was possible to make certain observations about maximum noise levels from the ODE Equestrian Event particularly at Elm Farm.

Attended measurements were made inside a bedroom at second floor level at Elm Farm, with a view over the field where vehicles and horse boxes were located. For two of the measurements inside the bedroom, the sash window was a quarter open and for the third measurement the window was closed. With the window partially open, maximum noise levels from cars on Main Street were noted at about 52 and 57 dB $L_{Amax, F}$ inside the bedroom. Activity in the field, including vehicle movements, voices and horses was generally at noise levels below 50 dB $L_{Amax, F}$ inside the bedroom but with occasional noise from horses up to about 55 dB $L_{Amax, F}$ inside the bedroom with the window partially open. With the window closed, occasional noise from horses was up to about 45 dB $L_{Amax, F}$ inside the bedroom with car movements on Main Street noted as 40 to 45 dB $L_{Amax, F}$ inside the bedroom with the window closed.

Discussion and Conclusions

It is readily apparent from the low background noise levels measured on Sunday 22 September 2013 and discussions with the residents at Partway House, Elm Farm and Swalcliffe House that the equestrian events and associated traffic have the capacity to cause disturbance in this area.

On Sunday 29 September 2013 the wind direction was estimated to be from the ENE and this would have taken noise arising from the equestrian event away from Partway House and Elm Farm. Partway House and Elm Farm are at elevated locations with respect to the site and under conditions of a light wind from the application site towards these dwellings, the noise impact is likely to be significant.

For the event on 29 September 2013 there were 180 numbered riders and horses. It is understood that at some equestrian events there could be nearly four times that number of riders and horses with the consequential increase in road traffic and activity.

On Sunday 29 September 2013 a 15-minute noise measurement was made in Swalcliffe village at a distance of about 4 metres to the edge of the B4035. Two large horse lorries were observed, with maximum measured noise levels of 80 dB $L_{Amax, fast}$. A motorbike was observed with a maximum measured noise level of 80 dB $L_{Amax, fast}$. Cars were observed with maximum measured noise levels of around 70 to 74 dB $L_{Amax, fast}$. Smaller horse boxes gave rise to maximum measured noise levels above those for cars and below those for the large horse lorries.

Traffic counts have been undertaken at four locations on the surrounding road network between Friday 27 September 2013 and Sunday 06 October 2013. During the traffic count period there was an event on Sunday 29 September 2013 and no event on Sunday 06 October 2013 which allows a comparison of traffic to be made for Sundays. During the same period there was no event on Saturday 28 September 2013 and an event on Saturday 05 October 2013 which allows a comparison of traffic to be made for Saturdays.

The traffic counts have been examined for the location on Main Street near to Partway House, between the junction of Main Street with the B4035 and the gated entrance to the "28 Day Area Field". The detail of the traffic counts has allowed the number of "HGV + Artic / Bus" to be separated out and expressed as a percentage of the overall traffic flow for the particular day. For this assessment, the 18 hour period between 06:00 and midnight has been examined.

For the Saturdays, the overall traffic flow was 10% greater with an event and the percentage of "HGV + Artic / Bus" increased from 2% for no event to 7% with an event. For the Sundays, the overall traffic flow was 50% greater with an event and the percentage of "HGV + Artic / Bus" increased from 1% for no event to 18% with an event.

The type of vehicle that correspond to "HGV + Artic / Bus" are the large horse lorries and these represent the highest maximum noise levels measured in Swalcliffe village. The addition of those vehicles with the highest maximum noise levels onto Main Street near to Partway House will be clearly noticeable at the dwellings adjacent to Main Street, namely Partway House and Elm Farm.

It is strongly recommended that the applicants are required to prepare a detailed noise assessment taking into account the low background noise levels and the busier events that can occur with more traffic and associated activity on site.

Dr Paul Cockcroft
Senior Partner

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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 (2×10^{-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 A (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 Locations of Survey

Sunday 22 September 2013 and Sunday 29 September 2013.

Vicinity of Swalcliffe Park

The external noise survey locations are shown in Appendix 3 and were all free field.

Surveys carried out by

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Weather Conditions

Sunday 22 September 2013 Dry, overcast, 18°C, wind < 1 m/s ~ WSW.

Sunday 29 September 2013 Dry, moderate cloud, 12 to 14°C, wind 1 to 3 m/s, ~ ENE

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
Sunday 22 September 2013	113.9 dB(A)	113.9dB(A)
Sunday 29 September 2013	113.9 dB(A)	114.0 dB(A)

The meter and calibrator are tested monthly against a Bruel and Kjaer 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 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 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

N.B. Plan shows approximate positions of noise survey locations (Pos 8 not shown)

