

Our Ref: Janet Dixon Billington

Date: 27th December 2009

Report on the noise aspects of the
use of a site at Whalley Road
Billington for new dwellings.

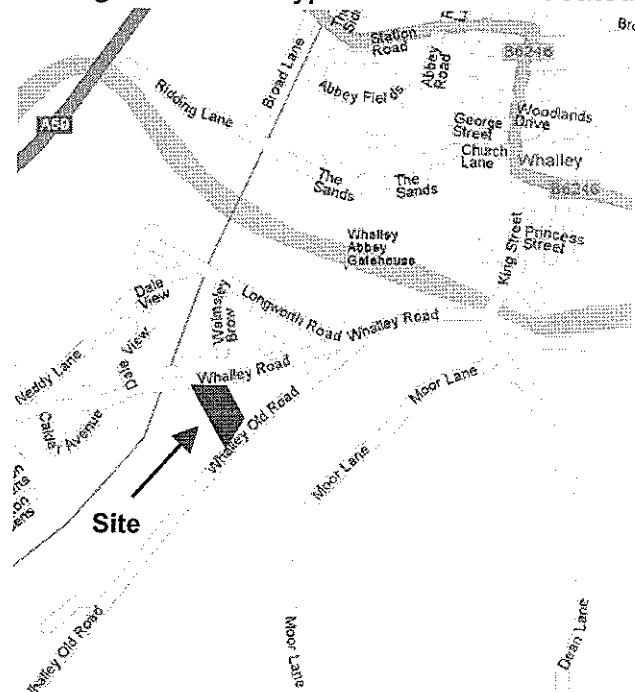
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Introduction

There is a proposed development of land between Whalley Road and Whalley Old Road at Billington to provide residential dwellings of various types. The site is located on farm land adjacent to a small coachworks and near the railway line from Blackburn to Clitheroe (see map inset right). Whalley Road is a feeder road to the A59 and Blackburn from Whalley centre. The Ribble Valley Borough Council require, as a condition in the determination of Planning Permission, that an assessment of the traffic noise affecting the site be carried out in order to assess the suitability of the development.



Therefore, discussions were held with Norman Pedley of Ribble Valley Borough Council Environmental Services Department to determine the detailed noise survey requirements. Norman requested a traffic noise assessment in accordance with Planning Policy Guidance note PPG24. Details of the exact protocol for this survey are explained in the Assessment Method section on Page 2 of this report. The period chosen for the tests was the daytime of Tuesday 1st December 2009. The weather was cool with partial sun and with very light variable winds. The roads remained dry for all the measurement periods.

Assessment Method

1. The requirement of the Ribble Valley Borough Council Environmental Services was to see a representative assessment in accordance with Planning Policy Guideline PPG24. Ideally, PPG24 requires noise measurements to be taken over the periods 07:00 to 23:00 for daytime and 23:00 to 07:00 for night. The overall figures for the LAeq are to be provided. These figures are then compared with a set of Noise Exposure Categories (NECs), which are based on World Health Organisation guidance, to determine any planning conditions.
2. Norman Pedley considered that noise affecting the daytime quiet relaxation of any future residents in rooms facing Whalley Road was likely to be the most significant problem since the busy traffic periods on the road did not extend from before 07:00 in the early morning and after 23:00 at night. He believed that there was still a possibility of night traffic noise affecting bedrooms but that this would be dealt with by any remedial measures needed for daytime noise levels.
3. In some situations, the night time traffic figures are less than the daytime figures and this can permit a lower specification for windows of bedrooms. However, in the case of feeder roads like this there tends to be little difference until the very late hours of the night. The general background noise from other sources will be less at night and early morning but this is numerically of little consequence in the overall average when there are repetitive high levels. Therefore, it is considered prudent to use the window specification calculated for daytime figures for the bedrooms. This will give a useful margin of safety in protecting future residents from noise.
4. It has been found by experiment that a good PPG24 value can be obtained by an alternative method of daytime averaging. (Ref: Department of Transport - Welsh Office: Estimating Road Traffic Noise). The method involves measuring the LA10 of the traffic noise between 10am and 5pm in three separate 1-hour periods. From this data an estimate can be made of both the 18-hour LA10 and then the 16-hour LAeq. The method is very useful to combat variable weather conditions since consistent conditions for 16 hours are fairly rare in the UK.

The formulae are:

$$LA10_{(18hr)} = \Sigma 3 \times LA10_{(1hr)} / 3 - 1dB.$$

$$PPG24 LAeq_{(16hr)} = LA10_{(18hr)} - 2$$

This method has been shown to be accurate to within a dB or two and was used in this survey after agreement with Norman Pedley.

5. PPG 24 advises that noise measurements should be taken "*on an open site at the position of the proposed dwellings, well away from any existing buildings, and 1.2m to 1.5m above the ground*" (Annex 1, paragraph 8). The sound level meter should be mounted in grazing incidence mode. The sound level meter was set up at the likely position of the closest proposed dwelling windows to the Whalley Road. The noise data was stored in short periods to provide greater analysis possibilities and was averaged using the Bruel & Kjaer Evaluator software to produce the PPG 24 figures.

Equipment:

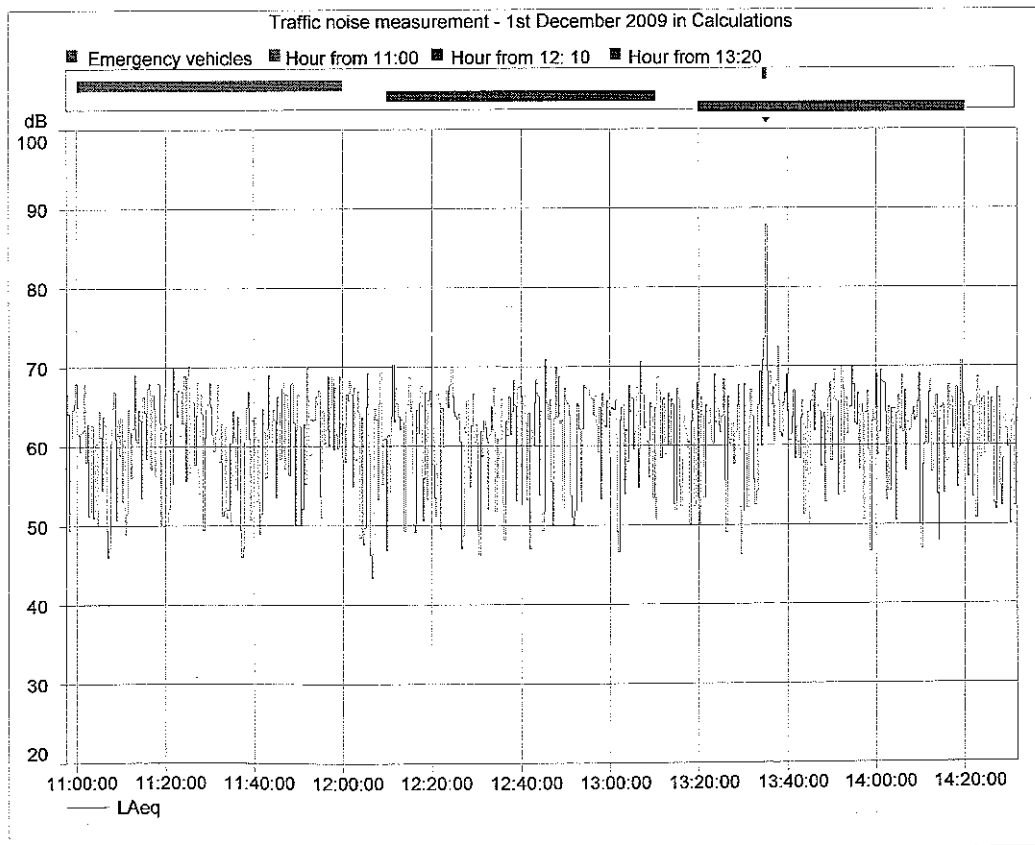
All measurements were taken using a Bruel & Kjaer Type 2260 >Investigator= Precision Sound Level Analyser. The equipment was calibrated before and after the tests using a Bruel & Kjaer Type 4231 Class 1 Acoustic Calibrator with no deviation recorded. The equipment accuracy is traceable to UKAS. The long-term PPG24 values were calculated using the B&K 7820 Evaluator software.

Results:

Subjective assessment: The noise affecting this site during the day is not too significant and is due entirely to the regular but not constant effect of vehicles passing. There was one short period of very high noise due to emergency vehicle sirens but this was electronically excluded from the calculations. Industrial noise was negligible and the occasional train passing – one per hour each way – cannot be distinguished from the road traffic noise.

Measured results: All the graphs and tables below are directly copied from the B&K 7820 Evaluator software. **Graph 1** below shows the logged the LAeq (1min) noise levels from the daytime measurements from around 11:00am and into the afternoon. The graph trace shows the variability expected from non-continuous traffic but also shows the repeatable nature of the traffic. Hourly periods have been marked on each graph for use in the average calculations. **Table 1** shows the calculated parameters for the marked periods. The consistency of the averaged values is excellent.

Graph 1



Results: (continued)

Table 1

Traffic noise measurement - 1st December 2009 in Calculations					
	Name	LAeq [dB]	LAF90 [dB]	LAF10 [dB]	
1	Total	64.0	49.5	68.8	
2	Exclude	83.3	66.7	84.7	
3	Unmarked	63.7	48.9	68.5	
4					
5	(All) Emergency vehicles	83.3	66.7	84.7	
6	(All) Hour from 11:00	63.7	49.6	68.4	
7	(All) Hour from 12: 10	64.1	49.1	68.9	
8	(All) Hour from 13:20	64.5	50.3	69.3	

Calculations:

1. The Leq (16 hour) level for the whole daytime period can be calculated using the formula in the **Method** section above as 65.8dB(A), which is rounded in accordance with the Guidance to a PPG24 Rating level of **66dB(A)**.
2. These results place the edge of the site in PPG24 Daytime Noise Exposure Category (NEC) C, which has a daytime range of 63dB(A) to 72dB(A). The PPG24 document states that for this Category "..... conditions should be imposed to ensure a commensurate level of protection against noise."
3. These results apply to a position about 5m from the roadside. There is no suggested plan for dwelling positions available at this time. However, it would be expected that the noise would reduce by around 6dB for every doubling of the distance into the site. Therefore, most of the dwellings on the site would be in a lower Noise Exposure Category and would also be protected from traffic noise by other dwellings.

Conclusions and Recommendations:

1. The levels in PPG 24 were set with the intention of ensuring a level of 35dB(A) or less in a bedroom at night. This was based on World Health Organisation criteria, which suggested that this is the level required "to preserve the restorative process of sleep". The WHO recommendations have recently been updated to suggest a value of 35dB(A) in daytime living rooms for "acceptable" conditions and 30dB(A) in bedrooms (Ref: www.who.int/peh/noise). Local Authorities have already generally adopted these values, in advance of an updated version of PPG24.
2. Therefore, with an average hourly LAeq figure of 66dB(A), in order to meet the daytime average noise criteria, the noise insulation performance requirement for any dwelling windows facing the Whalley Road directly would be:

$$66 - 35 = 31\text{dB (or greater)}$$

4. Published figures from Pilkington Glass suggest that this level of insulation can be achieved with a standard thermal double glazed unit of 4/12/4mm specification. The relevant table from the Pilkington Bulletin is shown overleaf. These windows, when fitted in a solid surround, will *theoretically* provide an insulation level of 31dB Rw, which apparently should reduce the average internal levels to 35dB(A).
5. However, the noise is dominated by the low frequency content from the road traffic and it would be more correct to consider the Rtra parameter which reflects the resistance to traffic noise. Therefore, a more suitable choice would be for a specification of at least a 10/12/6mm system. These windows will *theoretically* provide an insulation level of 31dB Rtra,
6. The windows to the rear of the buildings facing away from the road would be significantly protected by the buildings themselves. A noise reduction by the building of at least 10dB would be expected, probably much more. Therefore, these windows would only require a basic thermal unit specification of 4/12/4mm.
7. The window specification suggested above should apply to the windows of any room in the houses closest to Whalley Road that is used for normal domestic purposes and is directly facing the road. Toilets, bathrooms, kitchens (unless dining kitchens) would not normally require to be treated. Any houses facing Whalley Road but at much greater distances should not require a similar specification although a constant approach across the site would simplify installation and may provide the economies of quantity purchase.

Conclusions and Recommendations (continued):

Extract from Pilkington Technical Bulletin - Glass and Noise Control

Table 2 - Pilkington Insulating Units

Thirdoctaveband Centre Frequency (Hz)	Sound Insulation (dB) for Glass Thickness (mm)					
	4/12/4	6/12/6	6/12/6.4 PVB	10/12/4	10/12/6	10/12/6.4 PVB
100	25	17	19	23	27	27
125	24 24	26 20	24 21	28 25	27 26	28 27
160	23	22	21	26	24	26
200	21	18	19	19	24	26
250	21 20	18 19	19 20	23 22	29 27	30 29
315	19	24	24	26	31	32
400	22	27	28	31	33	32
500	25 25	29 29	32 31	33 33	34 34	36 36
630	30	33	34	36	37	40
800	33	37	38	39	39	41
1000	36 35	39 38	40 39	41 40	41 40	42 41
1250	38	39	40	41	41	41
1600	40	39	39	41	39	41
2000	41 38	34 36	35 37	45 43	37 38	42 42
2500	35	37	39	45	40	44
3150	31	42	44	42	43	49
4000	40 35	47 45	49 47	44 44	47 45	53 52
R _{in} (dB)	29	30	31	34	34	36
R _{in} (dB)	31	33	34	36	38	40
R _{in} (dBA)	25	26	27	29	31	34

6. Clearly, the internal noise requirements would not be met at any time if windows were left partially open for ventilation purposes. There is some disagreement about the effect of an open window, with WHO guidelines suggesting 15dB reduction whilst BS8233 suggests as low as 10dB. A compromise figure of 12dB is generally used. However, the argument is largely irrelevant since either method would still leave noise levels well above the recommended values for internal noise.

Therefore, it will also be essential to incorporate an alternative ventilation system to all residential rooms facing Whalley Road. The simplest solution would be for a passive ventilation system such as a louvered ventilation duct fitted into the wall. These systems generally provide as much attenuation as a closed window, particularly to lower frequencies, whilst allowing adequate ventilation. There are several proprietary systems for this purpose and specialist advice should be sought to provide a system that meets the structural and aesthetic requirements of the project whilst achieving better than 31dB attenuation. Ref: www.vents.co.uk, www.vent-axia.com, www.passivent.co.uk.

Conclusions and Recommendations (continued):

7. World Health Organisation Guidelines also suggest that daytime continuous noise levels in open amenity spaces (gardens/room balconies etc) should not exceed an Leq value of 55dB(A) in order to avoid "Serious Community Annoyance" or 50dB(A) to avoid "Moderate Community Annoyance".

Since a site plan does not yet exist, it is impossible to comment on the specific situation for any given dwelling. However, it would be prudent to generally orientate the dwellings with access drives to the Whalley Road side and garden areas to the rear. This would mean that the gardens would be well protected from traffic noise by the houses themselves as well as being at a greater distance away. A combination of these two factors would be expected to reduce the noise impact in any gardens by at least 20dB from the measured level of 66dB(A) at the front of the houses. The resulting level would be well below the WHO criteria.

In cases where there are side gardens, solid timber fences or masonry walls of typically at least 2m height would be needed to reduce the traffic noise. Detailed considerations may be needed when a fixed site plan is available.

8. If the above matters are taken into account, there would not appear to be any significant factor from a noise aspect to preclude the development of houses on this site.

John M Houldsworth. B.Sc. MIOA. *Sound Advice* 27th December 2009