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PROPOSED RESIDENTIAL DEVELOPMENT ON LAND OFF WHALLEY ROAD, BARROW

NOISE MITIGATION ASSESSMENT

On behalf of:

Taylor Wimpey North West & Barratt Developments

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NOISE MITIGATION ASSESSMENT

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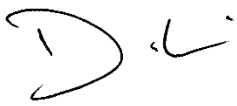

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CONTENTS

1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Taylor Wimpey North West and Barratt Developments to advise on any necessary noise mitigation measures in connection with a planning application for Phase 2 of a residential development on land off Whalley Road, Barrow. Specifically, we were commissioned to carry out a desktop review of the noise survey and assessment work that was carried out at the site in 2012 by Martin Environmental Solutions (MES) on behalf of the vendor and to provide updated advice on appropriate noise mitigation measures taking into account current national guidance.

1.2 Since a doubling in road traffic and railway flows would be necessary in order to equate to any perceptible increase in transportation noise at the site, the measured noise levels as set out in the 2012 MES report are unlikely to have changed significantly in the interim.

1.3 The proposed development area is a Phase 2 of a larger development, with construction of Phase 1 already underway. The site is located to the south west of the village of Barrow in Lancashire. The development land is bounded by Whalley Road to the east, with existing agricultural land to the south. The Phase 1 land bounds the site to the north and wraps around the western boundary. Beyond the Phase 1 land to the west is the Ribble Valley railway line which carries passenger trains. The Phase 2 proposals are for a total of 230 dwellings with a mix of one, two, three and four bedroom dwellings including mews, semi-detached and detached homes.

1.4 The noise assessment has included:

- A review of the proposed layout plans and the MES noise assessment report that has been provided to us;
- Establishing likely road traffic and railway noise levels on the most exposed parts of the Phase 2 development site;
- Assessment of the potential noise impact on the proposed new dwellings; and,
- Recommendation of appropriate mitigation measures.

1.5 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ACOUSTIC DESIGN CRITERIA FOR NEW DWELLINGS

2.1 The *National Planning Policy Framework* (NPPF) July 2018 states in paragraph 180 that *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[60];"

2.2 The *Noise Policy Statement for England* (NPSE) 2010, which is referred to the in NPPF, includes three aims:

i. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

i. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

ii. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2.3 However, there is as yet no specific guidance on numerical acoustic assessment/design criteria for proposed new housing developments provided in the NPPF and accompanying on-line guidance, nor in the NPSE document.

2.4 Therefore, it is necessary to refer to established national guidance such as the acoustic design goals for residential development that are set out in BS 8233: 2014, *Guidance on sound insulation and noise reduction for buildings*, which carries the full weight of an adopted British Standard. The design criteria recommended in BS 8233 for daytime periods (07:00 - 23:00) and night-time periods (23:00 - 07:00) are summarised in Table 1 overleaf:

Table 1: BS 8233:2014 Recommended Acoustic Design Criteria

Activity	Location	Daytime (07:00 - 23:00)	Night-time (23:00 - 07:00)
Resting	Living room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$

2.5 'ProPG: Planning & Noise – New Residential Development' (2017), whilst it is not official government guidance and has no legal standing, also includes essentially the same acoustic design criteria as recommended in BS8233.

2.6 BS 8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of L_{Amax} values. ProPG: Planning & Noise '*Professional Practice Guidance on Planning & Noise'* 2017 states that "*in most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events*". This is broadly consistent with research described in WHO *Community Noise Guidelines* that states: "*for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night*".

2.7 For outdoor amenity spaces of the new dwellings (e.g. rear gardens) BS8233 states that *"it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments"*.

2.8 The BS8233 criteria presented in Table 1 and above are for sources of noise that do not have a specific character, such as railway and road traffic noise and so are directly applicable to this development.

2.9 For this development, we therefore recommend the following noise criteria for be adopted with windows closed and trickle ventilation provided:

- Daytime noise below 35 dB $L_{Aeq, T}$ inside living rooms and bedrooms and below 40 dB $L_{Aeq, T}$ in dining rooms;
- Night-time noise levels in bedrooms not exceeding 30 dB $L_{Aeq, T}$ and generally not exceeding 45 dB L_{Amax}; and,

- Daytime noise levels not exceeding 55 dB $L_{Aeq, T}$ for noise in rear private gardens.

2.10 Meeting the above adopted noise criteria will provide an acceptable standard of protection of residential amenity for future residents of the proposed development.

3.0 AMBIENT NOISE LEVELS

3.1 No noise measurements have been carried out by Hepworth Acoustics Ltd as part of this noise assessment. Instead, we have used the measured noise levels that are set out in the MES report of July 2012 (Full title: *Acoustic Survey and Assessment – Proposed residential Development, Whalley Road, Barrow, Clitheroe*) as a basis for adopting road traffic and railway noise exposure values for the site.

3.2 The details and circumstances of the noise survey carried out by MES in December 2011 are shown in Section 4 of the report (ref as noted above). Noise measurements were taken at two locations on the proposed Phase 2 land. One was adjacent to Whalley Road (to measure road traffic noise) and one near to the south western corner of the site closest to the railway line. From a review of Figures 1 and 2 in the MES report, we note that the measurement locations are approximately the same distance back from Whalley Road and the railway line as the closest proposed dwellings as shown in Figure 1 of this report.

3.3 The following noise exposure levels have been obtained from the report:

Table 1: Noise exposure values obtained from MES report

Location	Daytime $L_{Aeq,16hour}$ (dB)
Close to Whalley Road (road traffic noise)	59*
South west corner of the site (railway noise)	50

*Derived from a measured road traffic noise level of 62 dB $L_{A10,3hour}$ using the shortened measurement procedure set out in *Calculation of Road Traffic Noise*

3.4 The noise levels set out above are for daytime periods only, but it is also necessary to consider the likely night-time noise levels at the site.

Night-time Road Traffic Noise Levels

3.5 Based on a study prepared for the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10,18hour}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating night time road traffic noise levels based on daytime road traffic noise level based on the following formula:

$$L_{Aeq,8hr}\ (23{:}00\text{-}07{:}00\ \text{hours}) \approx (0.90 * L_{A10,18hour}) - 3.77\ (\text{for non-motorways})$$

3.6 The measured $L_{A10,3hour}$ value of 62 dB is equivalent to a $L_{A10,18hour}$ of 61 dB (based upon the guidance set out in CRTN). Therefore, the night-time road traffic noise levels can be estimated as follows::

$(0.9 * 61) – 3.77 = 51$ dB $L_{Aeq,8hr}$

3.7 We note that the speed limit on Whalley Road where it passes the site is 30 mph. As such, we consider that typical peaks of noise at night due to road traffic pass-bys (in terms of L_{Amax}) are unlikely to be excessive and likely to be no more 70 dB outside the most exposed dwellings.

Night-time Railway Noise Levels

3.8 From a review of the train timetables between Blackburn and Clitheroe, we note that no passenger trains travel between the stations between around 23:40 and 06:11 and there are unlikely to be any more than six passenger trains passing the site (in either direction) during the whole of the night-time. As such, railway noise exposure values will be very low. Taking into account the frequency of train pass-bys during the daytime noise survey, and the measured daytime noise levels, we have estimated the corresponding night-time railway noise exposure level to be no more than 44 dB $L_{Aeq,8hour}$.

3.9 Since there are no more than six train pass-bys at night, there is no requirement to consider peaks of noise since they will not occur sufficiently regularly to be significant.

3.10 As such, to summarise, we have adopted the following free-field noise exposure levels for the development:

Table 1: Adopted free-field noise exposure values

Location	Daytime	Night-time	
	$L_{Aeq,16hour}$ (dB)	$L_{Aeq,8hour}$ (dB)	L_{Amax}
Close to Whalley Road	59	51	Up to 70
South west corner of the site	50	44	-

3.11 The implications of the adopted noise exposure values are set out in Section 4.

4.0 RECOMMENDED NOISE MITIGATION SCHEME

Private Gardens

4.1 Except close to Whalley Road, daytime noise levels at the site are within 55 dB $L_{Aeq,16hour}$. Furthermore, we note that the proposed layout is such that the dwellings most exposed to road traffic and railway noise are generally orientated with private gardens on the shielded (far) side of the dwelling to the noise source. As such, noise levels will be within 55 dB $L_{Aeq,16hour}$ in the vast majority of gardens without any specific acoustic screening.

4.2 We would however recommend that the rear garden of the northernmost dwelling adjoining Whalley Road (where the garden wraps around the north of the dwelling and is not fully screened from the road by the dwelling itself) is screened from road traffic noise on Whalley Road by an acoustic fence of minimum 1.8m height as shown in Figure 2.

4.3 Acoustic timber fencing should be of at least 20mm thickness and have double-rebated boards or joint cover strips. Some suppliers of proprietary acoustic fences include Jacksons Fencing (www.jacksons-fencing.co.uk), Guardian Fencing (www.guardianfencing.com), GRAMM barriers (www.grammbarriers.com) and Ransfords (www.ransfords.co.uk). Alternatively, a solid brick wall would suffice.

Sound Insulation Measures for Dwellings

4.4 Windows of standard well-sealed thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB R_{tra} (note R_{tra} is sometimes notated as $R_w + C_{tr}$). Therefore, where noise levels are within façade levels (which are typically 3 dB higher than the equivalent free-field values) of 60 dB $L_{Aeq,16hr}$ during the daytime and/or 55 dB $L_{Aeq,8hr}$ and/or 70 dB L_{Amax} at night, no specific sound insulation measures are warranted.

4.5 As such, the adopted noise criteria will be achieved for the vast majority of dwellings, including those closest to the railway line, without any special sound insulation measures.

4.6 For the first row of dwellings facing Whalley Road, façade noise levels could be marginally in excess of 60 dB $L_{Aeq,16hour}$ in the daytime and above 70 dB L_{Amax} at night. We would therefore recommend the following modestly upgraded sound insulation scheme for living rooms and bedrooms of these dwellings that have a view towards the road as highlighted in Figure 2:

- Bedrooms and living rooms - double-glazing formed of 6mm glass - nominal (12-20mm) cavity - 4mm glass (or other double-glazing specification within a minimum sound insulation performance of 29 dB $R_w + C_{tr}$) and acoustic trickle ventilation such as Aereco EHA - Acoustic Trickle Ventilator with external acoustic canopy and acoustic sleeve (or other acoustic trickle ventilation with minimum sound insulation performance of 42 dB $D_{n,e,w} + C_{tr}$). Alternatively, a loft mounted PIV (positive input ventilation) system with duct connections to a non-habitable room (e.g. a landing) would be appropriate and avoid the need for trickle vents.

5.0 SUMMARY AND CONCLUSION

5.1 Hepworth Acoustics Ltd was commissioned by Taylor Wimpey North West and Barratt Developments to review noise mitigation requirements in connection with a planning application for Phase 2 of a residential development on land off Whalley Road, Barrow. The assessment has been carried out using the results of a noise survey carried out at the site in 2012 by Martin Environmental Solutions (MES) on behalf of the vendor and the proposed housing site layout.

5.2 We have determined the daytime and night-time noise exposure values for the dwellings most exposed to road traffic and railway noise.

5.3 We calculate that noise levels within the vast majority of private gardens will be within acceptable levels without any specific acoustic screening measures. We have however recommended acoustic screening for the private garden of one dwelling, as identified in the report.

5.4 Similarly, acceptable noise levels will be achieved within habitable rooms of the vast majority of dwellings without any special sound insulation measures. We have nevertheless recommended modestly upgraded sound insulation for habitable rooms of the dwellings that will be most exposed to traffic noise from Whalley Road.

Key:

Not to scale

X - MES noise measurement locations

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Title: Figure 1: Site layout and MES noise measurement locations

Project: P18-496

Key:

Not to scale

- Sound insulation measures as noted in para 4.6

- Acoustic screening as noted in paras 4.2 and 4.3

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Title: Figure 2: Noise mitigation measures

Project: P18-496

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

C_{tr} This is an A-weighted urban traffic noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to take into account different source spectra such as low frequency sound.

R_w This is the 'Weighted Sound Reduction Index' (L_w), and is a single figure quantity of R, the laboratory measured Sound Reduction Index.

L_{Aeq} This is the A–weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, LAeq is the level of a continuous noise which has the same total (A–weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A–weighted noise level that was recorded during the monitoring period.

Appendix II: MES Noise Assessment Report

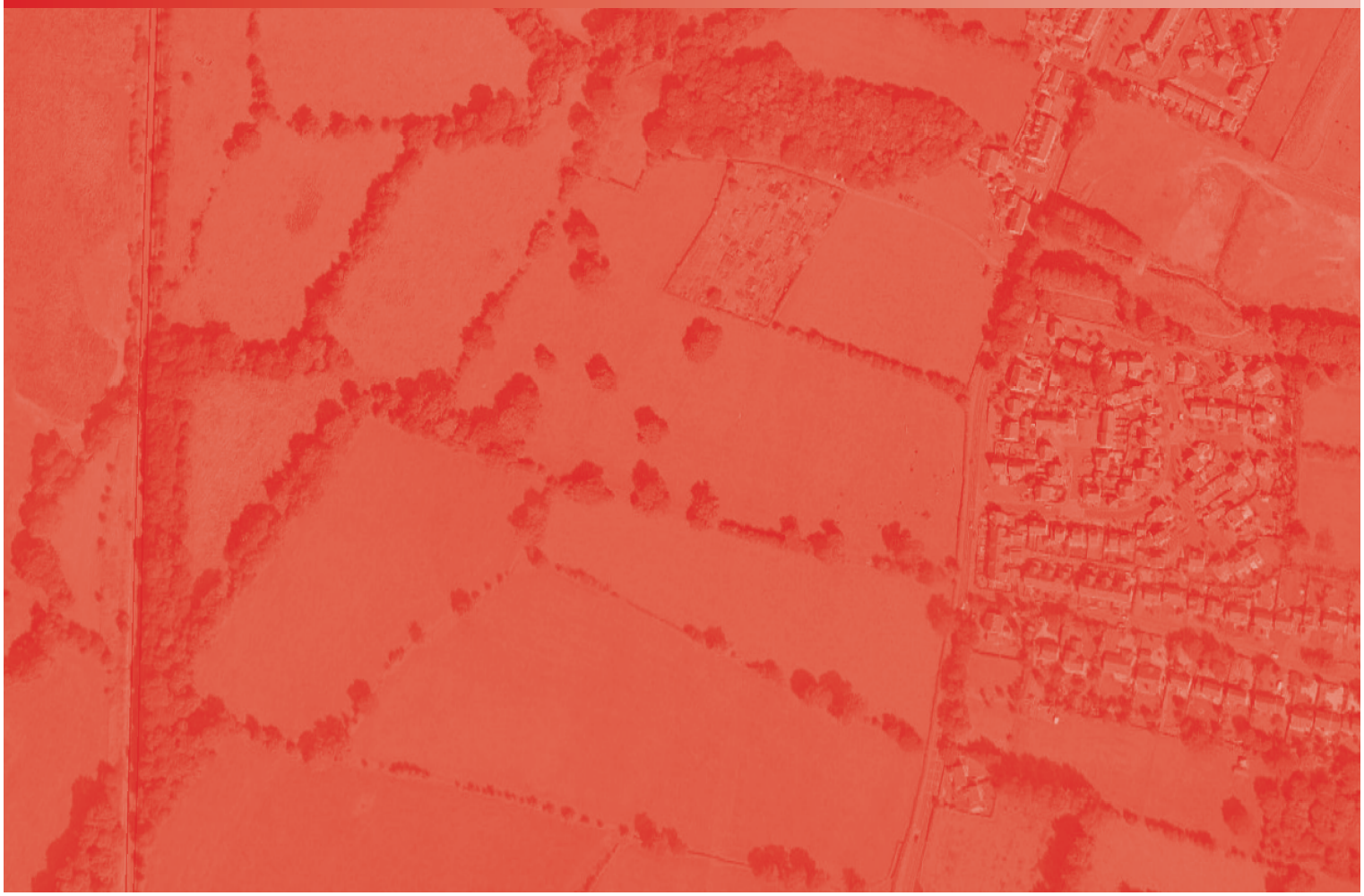
BARROW LANDS
COMPANY LIMITED

David Lock Associates
Town Planning and Urban Design

Acoustic Survey and Assessment

PROPOSED DEVELOPMENT OF LAND TO THE WEST OF WHALLEY ROAD, BARROW, LANCASHIRE

Prepared by **Martin Environmental Solutions**
July 2012



MARTIN
ENVIRONMENTAL
SOLUTIONS

Acoustic Survey and Assessment
Proposed Residential Development, Whalley Road, Barrow, Clitheroe.

Prepared for
Barrow Lands Company Limited
1 Kingsland Passage
London
E8 2BB

Final

July 2012

Contents

1. Introduction

1.1 Martin Environmental Solutions has been commissioned by the Barrow Lands Company Limited to undertake a noise survey and an acoustic assessment in support of an outline planning application (with details of access) for the proposed residential development of land to the west of Whalley Road, Barrow.

Site Location and Context

1.2 The Barrow Lands Company Limited is seeking outline planning permission for a residential development of about 18.26 hectares of land off Whalley Road, Barrow, near Clitheroe, Lancashire. The approximate UK national grid reference for the site is 373436, 438138. The residential development comprises the erection of up to 504 dwellings with associated infrastructure on land to the west of Whalley Road. The site is shown on the plan included as Figure 1. The site is bounded to the west by the Ribble Valley railway line, to the east by Whalley Road, beyond which there is a residential development and the Barrow Brook Business Village, to the north by residential development and to the and south the site is bounded by agricultural land.

Noise Survey and Acoustic Assessment Overview

1.3 The proposed site is bordered by the Ribble Valley Line railway to the west and Whalley Road to the east. Both of these transport routes are potential sources of noise, which have the potential to adversely affect the future occupants of the proposed dwellings to be developed on the site.

1.4 As such this noise survey and acoustic assessment has been carried out to ascertain what if any effect these two potential sources of noise could have on the proposed dwellings. The assessment will also identify any mitigation measurements that should be incorporated into the proposed development to ensure an adequate level of protection is afforded to the future occupants.

2. Policy and Guidance.

2.1 The impact of noise can be a material consideration in the determination of planning applications. The planning system has the task of guiding development to the most appropriate locations. It is recognised that on occasions it will be difficult to reconcile some land uses, such as housing, hospitals or schools, with other activities that generate high levels of noise. However the planning system is tasked to ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development).

2.2 The Government has recently published the National Planning Policy Framework (NPPF), which seeks to prevent new and existing development from contributing to or being put at unacceptable risk from noise pollution. Whilst the NPPF has replaced previous Planning policy Statements and Planning Policy Guidance Notes, it is considered appropriate to refer to the detailed guidance in relation to noise provided by the document Planning Policy Guidance, PPG24: Planning and Noise. In the absence of any new guidance many planning authorities are still using this guidance note as the basis for the guidance contained within it is still valid.

2.3 PPG 24 “Planning and Noise” provided detailed guidance on how the planning system could be used to minimise the adverse impact of noise without placing unreasonable restrictions on development.

2.4 PPG24 outlined the key considerations to be taken into account in determining planning applications for both noise sensitive developments and those activities that generated noise. It aimed to help local planning authorities in their consideration of applications for residential development near transport related noise sources.

2.5 The guidance provided a method whereby a plot of land could be rated and placed into a Noise Exposure Category (NEC) for residential development.

2.6 The recommended range of noise levels for each NEC covering day and night-time periods in relation to road and rail noise are presented in Table 1 below. It should be noted that PPG24 stated that it could be appropriate in some cases for local planning authorities to vary the noise levels that the NEC's applied to. For instance, where there was a clear need for new residential development in a noisy area, some or all NECs could be increased by 3dB(A) above the recommended levels.

Table 1: Noise Levels Corresponding to the NEC for New Dwellings

	L_{AeqT} dB(A)	A	B	C	D
Road	Day Time 0700 - 2300	<55	55 – 63	63- 72	>72
	Night Time 2300 - 0700	<45	45 – 57	57 – 66	>66
Rail	Day Time 0700 - 2300	<55	55 – 66	66 - 74	>74
	Night Time 2300 - 0700	<45	45 – 59	59 - 66	>66
Sites where noise events at night regularly exceed 82 dB L_{Amax} (slow time weighting) several times in any hour should be treated as being in Category C					

2.7 Measurement results are separated into day and night-time periods, and the average L_{Aeq} determined for each period. The results are used to determine which category the residential development will fall into. PPG24 advised that local planning authorities should have regard to the advice presented in Table 2 when considering the NEC in which a development lies.

Table 2: Explanation of Noise Exposure Categories

NEC	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

2.8. The Government have issued the Noise Policy Statement for England (NPSE). The NPSE clarifies the Governments underlying principles and aims in relation to noise and sets a vision to promote good health and a good quality of life through the effective management of noise while having regard to the Government's sustainable development strategy. The NPSE aims to mitigate and minimise adverse impacts on health and quality of life through the effective management and control of noise.

3. Methodology.

3.1 Ideally PPG24 required noise measurements to be taken over the periods 07:00 to 23:00 hours for daytime and/or 23:00 to 07:00 hours for night-time and an overall figure is then compared with a set of Noise Exposure Categories (NEC's) to determine any planning conditions.

3.2 For train noise, as opposed to road traffic noise, the occurrences of noisy events are predictable and repetitive. Therefore, a representative value for train noise can be obtained by sampling over a period of time that represents the typical usage of the railway line.

3.3 The timetable for passenger trains at the proposed development site shows that the busiest time for the line is in the early morning when people are using trains for getting to work or accessing the main line at Blackburn. (Ref: www.nationrail.co.uk). The busiest time is between 6.30 and 9.45 hours, there are usually about 4 trains from Blackburn to Clitheroe and 5 trains from Clitheroe to Blackburn in this time period.

3.4 For road traffic, it has been found by experience that a good PPG24 value can be obtained by an alternative method of daytime averaging, as detailed in the Department for Transport- Welsh Office; Estimating Road Traffic Noise 1988. This method involves measuring the L_{A10} of the traffic noise between 10:00 and 17:00 hours in three separate 1-hour periods. From this data an estimate can be made of both the 18-hour L_{A10} and then the 16-hour L_{Aeq}. This method is very useful in combating variable weather conditions since consistent conditions for 16-hours are fairly rare in the UK.

The formula are: $L_{A10(18hr)} = \sum 3x\ L_{A10(1hr)}/3 - 1dB$

$$PPG24\ L_{Aeq(16hr)} = L_{A10(18hr)} - 2dB$$

3.5 PPG24 advised that noise measurements should be taken 'on an open site at the position of the proposed dwellings, well away from any existing buildings, and 1.2 to 1.5m above the ground'

3.6 The site is currently open and undeveloped thereby allowing suitable noise measurement positions to be identified. At this stage, the proposal seeks to

establish the principle of the proposed residential development on the site. As it is an outlining planning application a detailed plan showing the actual siting of the proposed properties is not currently available. For the purposes of this assessment monitoring positions were identified based on the plan shown in Figure 2, which represents the indicative layout of the proposal. Monitoring positions have been marked on Figure 1. The position chosen for the monitoring of railway noise represents the likely closest property as defined in Figure 2 the position for traffic noise represents the closest proposed properties to Whalley Road.

Equipment

3.7 All measurements were taken using a Bruel & Kjaer Type 2250 Sound Level Meter. The meter was calibrated before and after the measurements using a Type 4321 Class 1 Calibrator and was shown to be operating correctly. The equipment has been recently calibrated. Calibration certificates are available and can be supplied if necessary.

4. Results

Survey Conditions

4.1 The noise survey was undertaken on the 19th December 2011 from 06.30 to 13.00 hours. The weather during the survey and the taking of measurements was cold and damp with occasional showers and with very little wind throughout the measurement periods. The road surface of Whalley Road was wet at the time of the measurements ensuring a worse case sound level scenario.

Rail

4.2 The background noise during the railway measurements consisted principally of distant road traffic along the A59, with intermittent animal noise from cows, cockerels, and wild birds on nearby farmland. There was also experience of airplanes flying over the site during the noise survey. Despite this the levels remained fairly constant with a slight increase as the morning progressed to rush hour and the distant traffic volume increased.

4.3 The graph in Appendix 1 shows the logged profile of noise during the morning measurements at position 1, with all train passes marked. Excluded markers are for overflying aircraft. The parameter shown is for L_{Aeq}. The overall average level L_{Aeq} for the measured period was 50dB(A).

4.4 This places the nearest potential residential property within Noise Exposure Category (NEC) A for daytime (<55dB(A)) and NEC B for night-time (45-59dB(A)).

4.5 During the short periods when trains are passing the site, approximately 12 seconds, the highest level recorded, L_{Amax} slow weighted was 76dB(A). This is well below the PPG24 guidance for increasing the NEC due to the maximum noise level, which is set at 82 dB L_{Amax}, making the level of 76 dB L_{Amax} perfectly acceptable from a planning perspective.

Road Traffic

4.6 Evaluation of the road traffic noise was carried out by monitoring for 3 consecutive hours from 10.00 to 13.00 hours on the 19th December 2011. This produced three L_{A10} values for the road traffic. As with the monitoring of the train noise the background noise at the location was predominantly from distant traffic movements on the A59, with the occasional train passing. Figure 3 shows a map of the development site in context to the A59. Traffic along Whalley Road was moving freely throughout the survey period with passing traffic, especially the larger vehicles, HGV's and buses being clearly audible.

4.7 The long term averages from the measurements were incredibly consistent, with the L_{A10} values differing by only 0.7dB(A).

4.8 The $L_{eq(16\ hour)}$ level for the whole daytime period can be calculated from the three L_{AF10} hourly levels using formula in the Method section above as 58.7dB(A), which is rounded in accordance with the Guidance to a PPG24 Rating level of 59dB(A).

4.9 This result places the properties closest to the Whalley Road in a Daytime Noise Exposure Category B which has a daytime range of 55 -66 dB. Subject to appropriate conditions this level is acceptable from a planning perspective in relation to the PPG24 assessment.

Start Time	Stop Time	Elapsed Time	LAeq [dB]	LAF10.0 [dB]	LAF90.0 [dB]
19/12/2011 09:59	19/12/2011 10:59	01:00:00	58	61.5	50.9
19/12/2011 11:01	19/12/2011 12:01	01:00:00	58.4	61.5	51.5
19/12/2011 12:03	19/12/2011 13:03	01:00:00	58.6	62.2	50.6

5 Construction Noise

5.1. Construction activities have the potential to cause disruption and distress to adjacent residential properties to the development site. As such the contractor has a moral and legal duty to ensure activities on site are adequately controlled to prevent such disruption. The contractor would be required to follow Best Practicable Means to reduce the noise impact on the local community.

5.2. As such the following should be requirements that should be adhered to by the contractor to ensure that there is no undue adverse impact on the amenities of neighbouring residential properties during the construction phase.

- Noisy construction activities shall be restricted to the hours of 07.00 and 18.00 Monday to Friday, and 08.00 to 13.00 on Saturdays, with no noisy activities on Sundays or bank holidays.
- Compounds shall be situated as far away from residential properties as possible as will temporary haul or access roads.
- All construction plant and equipment shall comply with EU noise emission limits including any generators, compressor pumps shall be super silenced models with if required, additional sound insulation provided. In addition all plant when not in use shall be shut down and turned off.
- Contractors should be obliged to adhere to the codes of practice for construction work given in BS5228 regarding the minimisation of noise emissions from the development site.
- A named and competent person responsible for the control of noise shall be assigned to the construction site. A telephone number for public to report any problems shall be posted at a prominent position on the boundary of the site with Whalley Road.

5.3. These matters can be addressed and suitably controlled by the imposition of an appropriate planning condition on the planning g permission for the proposed development. This condition can require the submission, approval and implementation of a construction management plan for the construction phase of the development so as to protect the quality of life and the residential amenities of adjacent residential properties.

6. Conclusions and Recommendations

Dwellings subject to Train Noise

6.1 The PPG24 assessment categories were intended to be an average over 8 hours at night and 16 hours in the daytime. However PPG24 was a 'guidance' document and it is not unusual for Local Authorities to be guided by other documents such as BS4142, BS 8233 and the World Health Organisations Guidance for community noise. BS4142 prescribes different time periods for monitoring: for example the daytime noise is assessed for a 1 hour period.

6.2 BS4142 however is used to assess the impact of industrial activities being developed next to residential areas, comparing the current background noise levels with the anticipated noise levels once the industrial development is built. It is therefore not appropriate in this case.

6.3 BS 8233: 1999 'Sound insulation and noise reduction for buildings – Code of Practice' sets levels in the bedroom for resting and sleeping. Good levels are set at 30dB $L_{Aeq,T}$, while reasonably levels are set at 35dB $L_{Aeq,T}$. The maximum noise levels during the nightime period are set at 45dB L_{Amax}.

6.4 The average noise levels in the early morning at the position of the nearest proposed dwellings to the railway are likely to be around 50dB(A), There is no reason to believe that train activity will change in any major way over the course of the day and, based on the current timetable, the number of passing trains is actually less than the early morning trips. Therefore the most critical value for a PPG24 noise assessment would be 50dB(A) and would place it in NEC B, Night Time level, even when taking the peak levels of 77dB(A) into account.

6.5 The former PPG24 suggested that for NEC B
'*Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.'*

6.6 However, in addition to the PPG24 NEC levels, which were set with the intention of ensuring a level of 35dB(A) or less in a bedroom at night, a number of local authorities are working in line with the revised World Health

Organisation criteria which suggests that a level of 30dB(A) is required to preserve the restorative process of sleep with 35dB(A) in daytime living rooms to maintain 'acceptable' conditions.

6.7 In order to meet the average internal noise criteria of 30dB, the noise insulation performance requirement for the dwelling windows would need to be:

50 (hourly average L_{Aeq} – 30 (criterion level) = 20dB.

6.8 Published figures from Pilkington glass suggest that this level of insulation can easily be achieved with the use of a conventional thermal double glazed unit with two panes of 4 mm glass (4/12/4mm). A slightly improved performance is given if the two panes are not of the same thickness. These windows when fitted into a solid surround will provide an insulation level of around 31dB(A), resulting in a sound level well below the sought after 30dB(A) in the bedrooms of the new properties to be built on the site.

6.9 With a maximum sound level of 77 dB L_{Amax} being recorded as trains pass the site these glazing units would result in an internal level of 43dB(A), which is below the WHO recommended maximum level of 82 dB $L_{Amax,}$ and BS8233 level of 45dB L_{Amax} internally.

6.10 In light of the results from the noise survey, we conclude that subject to installation of glazing to the above specification the development would not be adversely affected by railway noise from the Ribble Valley line to the west of the proposed properties.

Dwellings subject to Road Traffic Noise

6.11 Turning to road traffic on Whalley Road and its likely impact on the proposed dwellings on the eastern edge of the development, it should be noted that the $L_{Aeq(16hr)}$ level for the daytime period gave a PPG24 rating of 59dB(A), The survey graphs are included in Appendix 2. This results in a Noise Exposure Category of B. The nightime level will be much lower than this due to the substantially reduced traffic flow. Therefore taking the daytime level to be the worse case situation, and in line with the above mentioned WHO criteria in order to achieve a level of 30dB(A) in the bedrooms of the proposed properties, the noise insulation performance of the windows would need to be:

$$59\ (L_{aeq(16hr)}\ -30\ (\text{criterion level}) = 29\text{dB}$$

6.12 The specification for the glazing required would need to be a 4/6/4mm unit. However due to the low frequency noise generated by traffic it would be more appropriate to consider the R_{tra} parameter which reflects the glazing resistance to traffic noise. Therefore a more suitable choice would be for a glazing specification of at least 10/12/4mm unit, which will provide a resistance to traffic noise of 30dB R_{tra}.

6.13 The insulation provided by the above glazing units is only applicable when the windows are closed. As an open window will only provide at maximum 15dB(A) insulation, in order to achieve the sought after 30dB(A) in the bedrooms, windows must remain closed. Therefore some form of additional ventilation will be required. The simplest solution would be for a passive ventilation system such as a louvered ventilation duct fitted to the wall. These systems provide as much attenuation as the closed window, particularly at lower frequencies, while allowing adequate ventilation. There are multiple versions and specialist advice should be sought to select the correct option. This can be secured by the imposition of a suitable planning condition on the planning permission for the development.

6.14 The World Health Organisation guidelines also recommend a maximum level for outdoor amenity areas (gardens) of 55 dB(A) to avoid serious community

annoyance and 50dB(A) to avoid moderate community annoyance. Those properties affected by rail noise will already meet the lower limit while those exposed to road traffic noise should have a solid fence of at least 1.8 metres in height constructed around their rear garden areas. This barrier will reduce the noise levels experienced from the traffic noise to below the 50dB(A) guideline value.

6.15 A typical solid construction fence of this height will be more than capable of reducing the noise exposure to below 50dB(A) in the garden areas. Specific noise attenuation details can be calculated for differing materials/construction. This can be secured by the imposition of a suitable planning condition on the planning permission for the development.

Conclusion

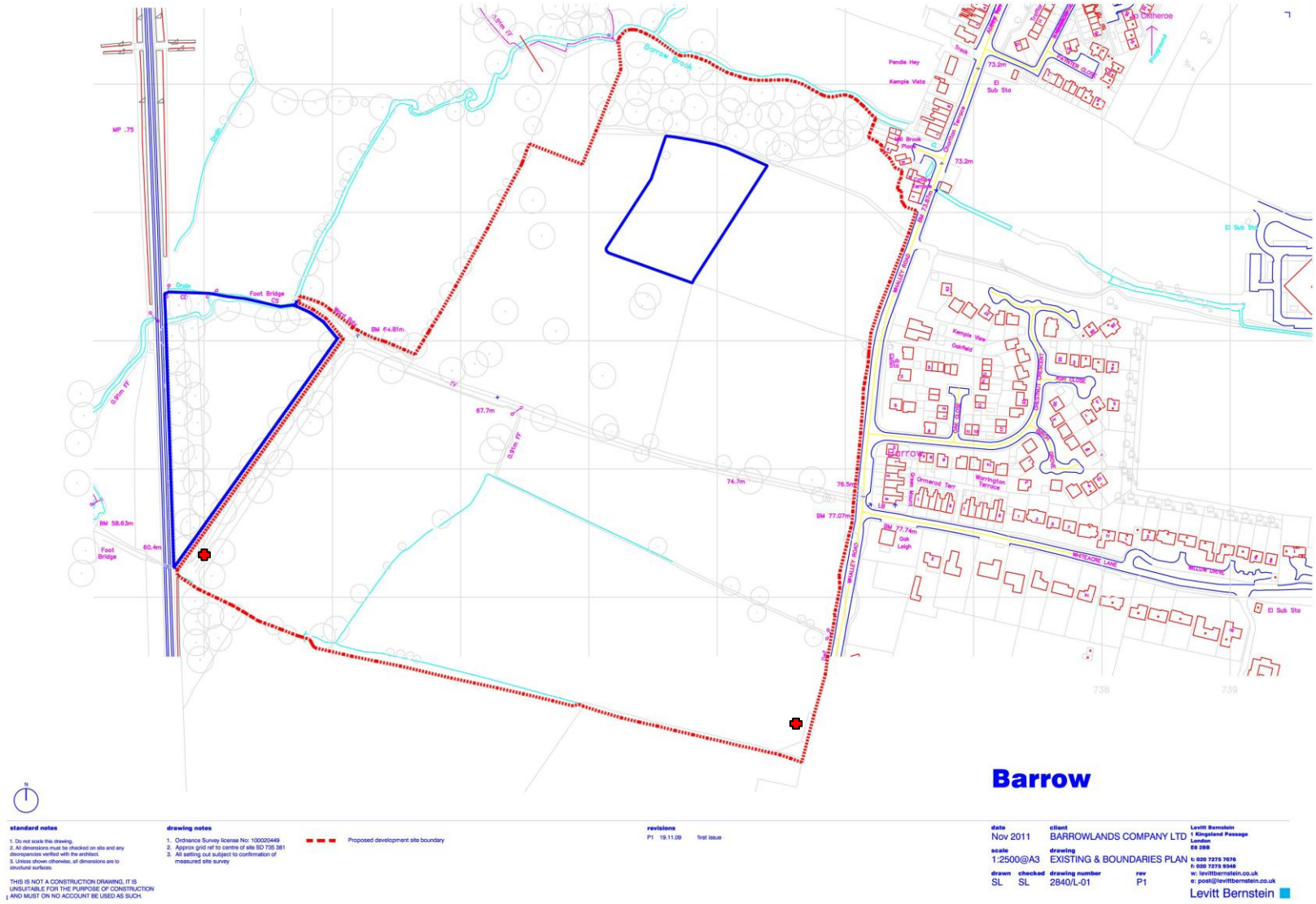
6.16 It should be particularly noted that the above recommendations only apply to those properties with facades that will be situated adjacent to either the railway line or Whalley Road. The remainder of the development will receive adequate protection from rail and road noise due to the effect of distance attenuation and by the physical intervention or 'barrier effect' of those properties directly affected.

6.17 The noise survey undertaken and the assessment of the results detailed in this report have demonstrated that noise levels on the site arising from railway and road traffic noise can be satisfactorily mitigated so as to meet Government, World Health Organisation and British Standard requirements aimed at achieving a suitable living environment and providing adequate protection for future residents of the proposed development.

6.18 Any mitigation measures required during the construction phase and then the operation of the development can be adequately controlled by planning conditions on any planning permission for the proposal.

Figure 1

Site outlined in Black, the train represents position 1, while the van represents position 2.



Approximate positions of monitoring points.

info@m-e-solutions.co.uk
www.m-e-solutions.co.uk

info@m-e-solutions.co.uk
www.m-e-solutions.co.uk

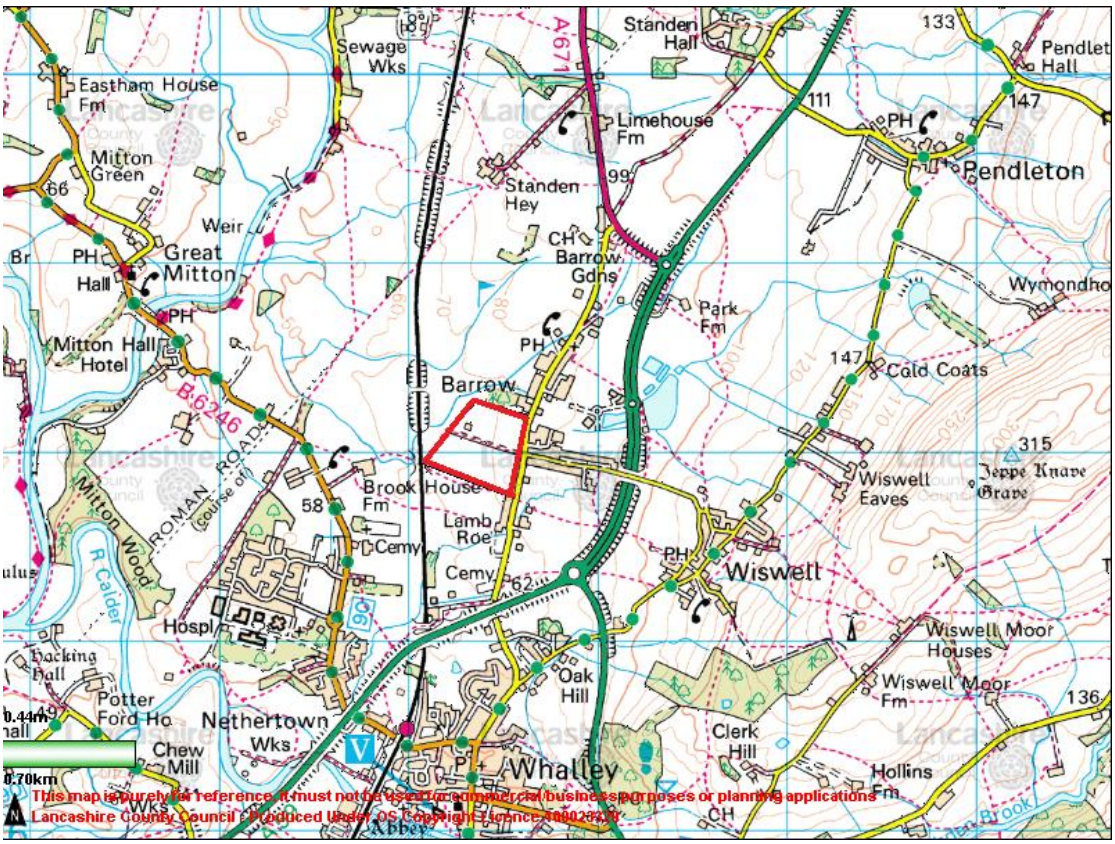
info@m-e-solutions.co.uk
www.m-e-solutions.co.uk

Figure 2

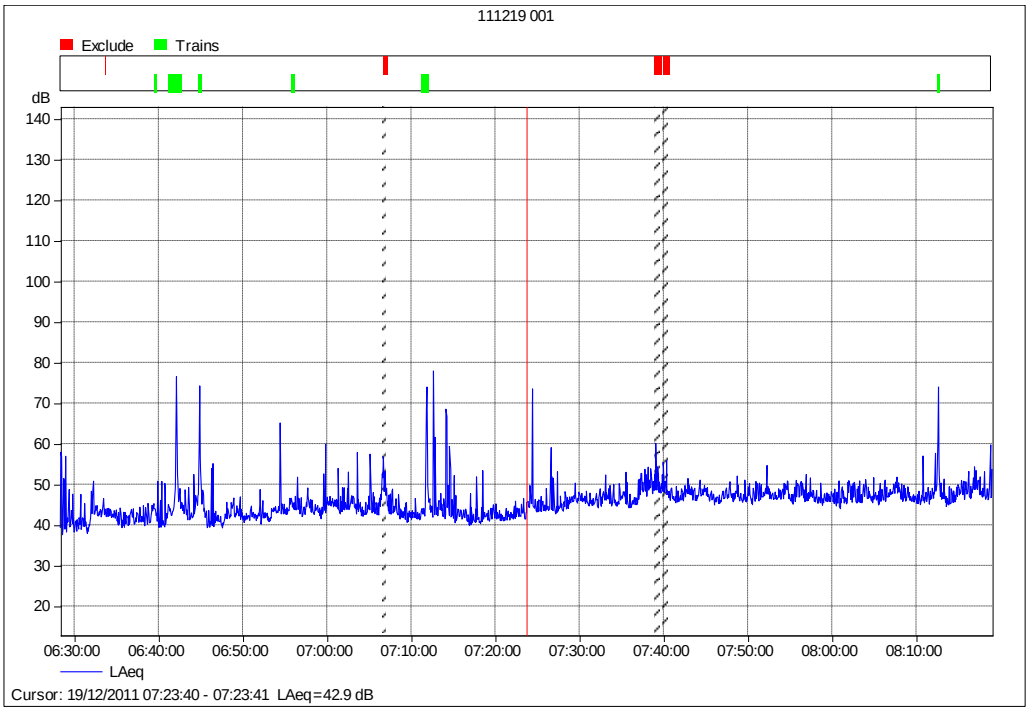
Approximate positions of monitoring points.

Figure 3

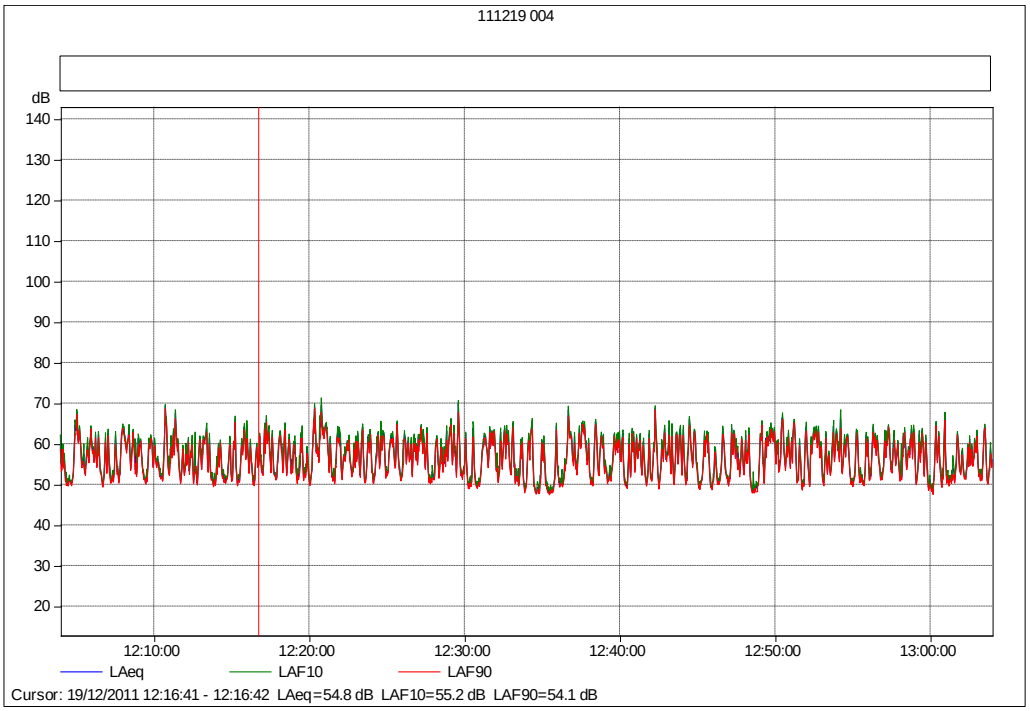
Map showing the site in context with the A59 (in green) and the railway line.

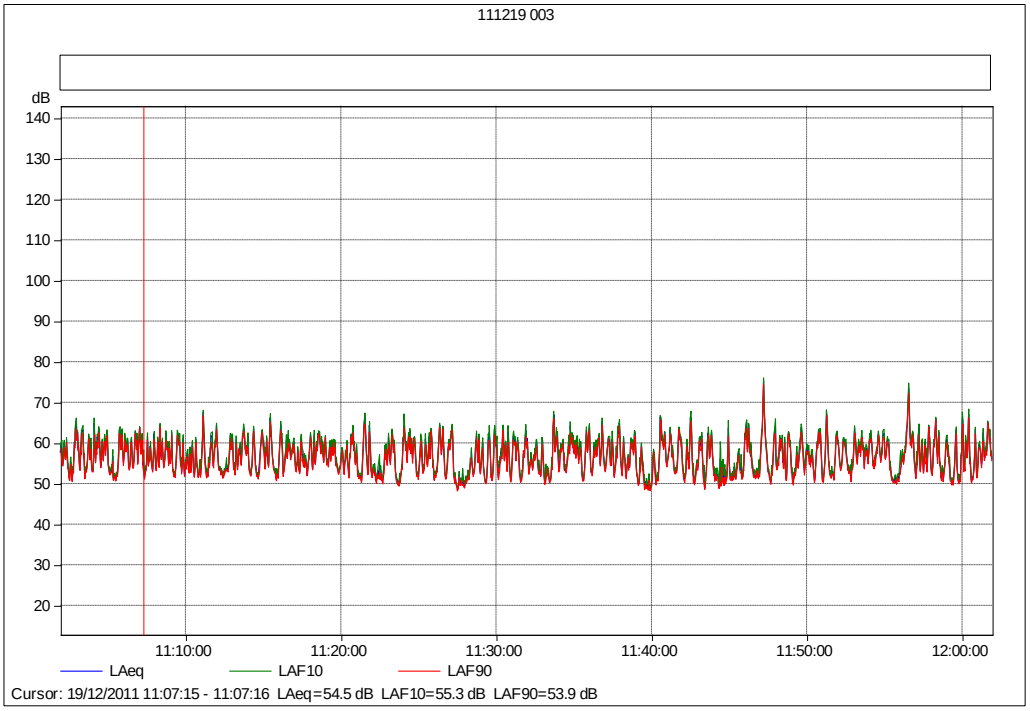


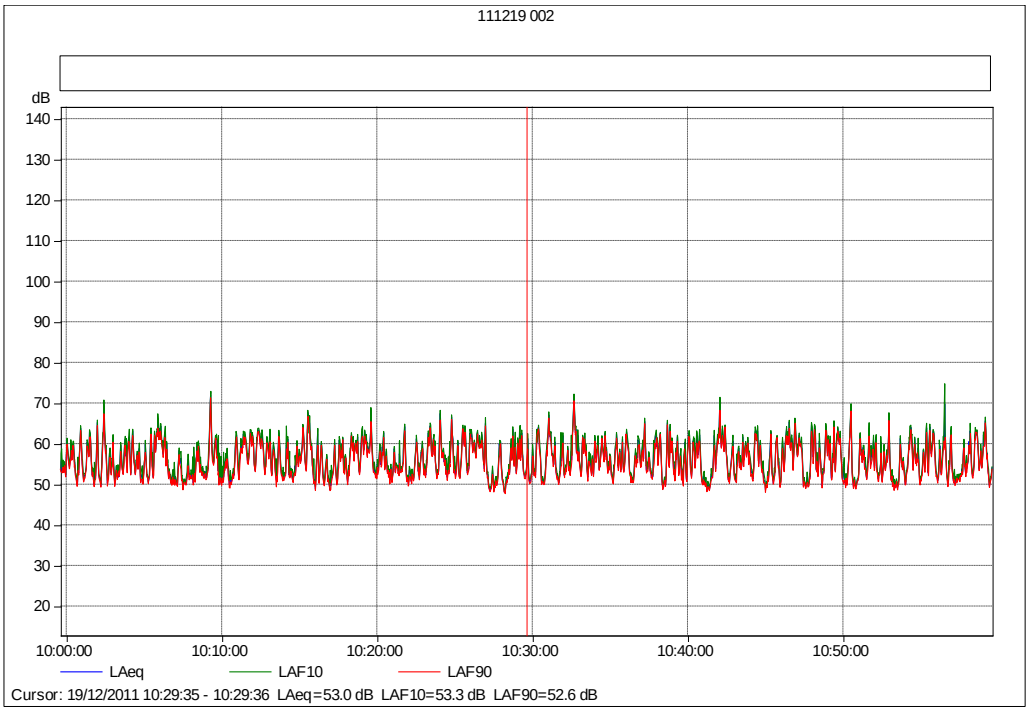
Appendix 1


111219 001
Exclude
Trains
dB
140
130
120
110
100
90
80
70
60
50
40
30
20
06:30:00
06:40:00
06:50:00
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
LAeq
Cursor: 19/12/2011 07:23:40 - 07:23:41 LAeq=42.9 dB

Appendix 2


111219 004
dB
140
130
120
110
100
90
80
70
60
50
40
30
20
12:10:00
12:20:00
12:30:00
12:40:00
12:50:00
13:00:00
LAeq
LAF10
LAF90
Cursor: 19/12/2011 12:16:41 - 12:16:42 LAeq=54.8 dB LAF10=55.2 dB LAF90=54.1 dB


111219 003
dB
140
130
120
110
100
90
80
70
60
50
40
30
20
11:10:00
11:20:00
11:30:00
11:40:00
11:50:00
12:00:00
LAeq
LAF10
LAF90
Cursor: 19/12/2011 11:07:15 - 11:07:16 LAeq=54.5 dB LAF10=55.3 dB LAF90=53.9 dB


111219 002
dB
140
130
120
110
100
90
80
70
60
50
40
30
20
10:00:00
10:10:00
10:20:00
10:30:00
10:40:00
10:50:00
LAeq
LAF10
LAF90
Cursor: 19/12/2011 10:29:35 - 10:29:36 LAeq=53.0 dB LAF10=53.3 dB LAF90=52.6 dB

Appendix 3

Pilkington Glass Specifications

Pilkington **Optiphon**™

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Configuration single glazing										
6.8 mm Pilkington **Optiphon**™	21	26	31	35	37	38	35(-1;-3)	35	34	32
8.8 mm Pilkington **Optiphon**™	24	28	34	38	37	43	37(-1;-4)	37	36	33
10.8 mm Pilkington **Optiphon**™	28	31	36	38	39	47	38(-1;-2)	38	37	36
12.8 mm Pilkington **Optiphon**™	30	32	37	39	41	51	39(-0;-2)	39	39	37
16.8 mm Pilkington **Optiphon**™	29	34	37	39	46	55	40(-0;-2)	40	40	38
Configuration Insulating Glass Unit (IGU), thickness in mm										
6 / 6 to 20 mm / 6.8 Pilkington **Optiphon**™	23	24	34	42	43	52	38(-2;-5)	38	36	33
6 / 6 to 20 mm / 8.8 Pilkington **Optiphon**™	24	26	40	48	46	54	41(-3;-7)	41	38	34
6 / 6 to 20 mm / 10.8 Pilkington **Optiphon**™	23	28	41	47	45	55	42(-3;-7)	42	39	35
6 / 6 to 20 mm / 12.8 Pilkington **Optiphon**™	20	29	43	47	46	49	42(-3;-8)	42	39	34
8.8 Pilkington **Optiphon**™ / 6 to 20 mm / 12.8 Pilkington **Optiphon**™	26	36	46	50	52	63	47(-2;-7)	47	45	40
16.8 Pilkington **Optiphon**™ / 6 to 20 mm / 16.8 Pilkington **Optiphon**™	29	40	45	47	54	68	48(-2;-6)	48	46	42

The above IGUs with Pilkington K Glass™ on one pane and a 16 mm 90 % Argon-filled cavity achieve a U value of 1.5 W/m² K
Further information on solar and thermal performance is available on the Pilkington website using the Spectrum program: www.pilkington.com/spectrum
Impact classification EN12600 Class 1(B)1 for all above Pilkington **Optiphon**™ products
$R_w(C;C_{tr})$ are in accordance with EN717-1

Non Pilkington **Optiphon**™ **glass products. Figures from BS EN 12354**

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Configuration single glazing										
4 mm Float Glass	17	20	26	32	33	26	29(-2;-3)	29	27	26
6 mm Float Glass	18	23	30	35	27	32	31(-2;-3)	31	29	28
8 mm Float Glass	20	24	29	34	29	37	32(-2;-3)	32	30	29
10 mm Float Glass	23	26	32	31	32	39	33(-2;-3)	33	31	30
12 mm Float Glass	27	29	31	32	38	47	34(-0;-2)	34	34	32
Configuration Insulating Glass Unit (IGU), Float glass, thickness in mm										
4 / 6 to 20 mm / 4	21	17	25	35	37	31	29(-1;-4)	29	28	25
6 / 6 to 20 mm / 6	20	18	28	38	34	38	31(-1;-4)	31	30	27
6 / 6 to 20 mm / 4	21	20	26	38	37	39	32(-2;-4)	32	30	28
10 / 6 to 20 mm / 4	24	21	32	37	42	43	35(-2;-5)	35	33	30
10 / 6 to 20 mm / 6	24	24	32	37	37	44	35(-1;-3)	35	34	32

Note that these are conservative figures and cover all products by European glass manufacturers.
R_w = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices.
C = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from music, radio, tv; high speed traffic and other medium to high frequencies.
C_{tr} = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.
Note that a 3 dB difference is barely discernable, 5 dB is clearly discernable and 10 dB is a doubling or halving of the noise.

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