Ian Sharland
LIMITED
Noise & Vibration Control Specialists

[redacted]

ASSESSMENT OF ENVIRONMENTAL NOISE
THE POPLARS, LITTLEHAMPTON

15 June 2012

Client: Hargreaves Limited
Rustington House
Worthing Road
Littlehampton
West Sussex
BN16 3PS

R Sharland MA(Cantab), CEng, MSc, MIOA
P Ashford BSc (Eng), MIOA
M Sharland
Ian J Sharland BSc (Eng), CEng, MRAes, FIOA (Associate)

Registered in England & Wales No. 1293250
Reg'd Office: 25 St Thomas St. Winchester SO23 9DD

CONTENTS

1. SUMMARY 2
2. INTRODUCTION 3
3. SURVEY OF EXISTING NOISE LEVELS 4
4. ASSESSMENT OF AMBIENT NOISE LEVELS 6
5. RECOMMENDATION FOR NOISE ATTENUATION MEASURES 9
FIGURES
Figure 1 - Site Location 16
Figure 2 - Proposed Site Plan 17
Figure 3 - Measured Noise Levels at Survey Position 18
Figure 4 - Proposed Site Plan showing line of barrier 19
APPENDICES
Appendix 1 - Glossary Of Terms 20

1. SUMMARY

1.1 An assessment of ambient noise has been undertaken at a proposed residential development at The Poplars, Worthing Rd, Littlehampton.

1.2 An acoustic survey was commissioned to assess the impact of road traffic noise from the A259 Rustington by-pass and the possibility of industrial noise from a nearby pumping station.

1.3 The existing ambient noise climate affecting the site has been established (Section 3), and the survey has confirmed the levels of noise emanating from road traffic.

1.4 An outline assessment of the site's suitability for residential development has been provided (Section 4).

1.5 Means of mitigating any excess noise have been submitted (Section 5), in the form of a specification for suitable façade glazing, and the provision of attenuated ventilation for the critical accommodation. It is also recommended that the north-western boundary of the site be shielded from noise by an acoustic barrier adjacent to the Rustington by-pass, to provide a broadly similar effect to the existing barrier further to the north-east (Section 5.14 - 5.15).

1.6 It is concluded that, with these recommended measures in place, the occupants of the new houses can be provided with an acceptable acoustic environment.

1.7 In the course of the assessment, consideration has been given to the acoustic impact of the pumping station. It has been concluded that the noise from this installation is not significant. A similar conclusion has been reached in respect of noise emanating from the commercial buildings to the north-west of the bypass (Section 5.17 - 5.25).

2. INTRODUCTION

2.1 An assessment of noise has been undertaken on the site of a proposed residential development at The Poplars, Worthing Rd, Littlehampton.

2.2 The site is located to the south-east of the A259 Rustington by-pass and lies north of the B2187 Worthing Rd (see Figure 1).

2.3 The immediate area is mainly residential premises although there is a Southern Water pumping station within the proposed site plan. There is also a petrol filling station and Burger King Restaurant approximately 70m away, and across the A259 Rustington by-pass there is a large warehouse operated by Body Shop.

2.4 It is proposed that the site be developed with a scheme comprising of seven houses (see Figure 2).

2.5 It is recognised that the development could be subject to high levels of noise from road traffic.

2.6 Concern has also been raised regarding noise emanating from an adjacent water pumping station, and commercial premises to the west of the bypass.

2.7 The current assessment has therefore been commissioned to determine whether the noise affecting the site warrants particular acoustic measures. Formally, the objectives of the current exercise may be summarised as follows:

(i) To determine the existing ambient noise climate affecting the development site, from all sources;

(ii) To compare these levels against appropriate criteria of acceptability;

(iii) As necessary, to specify measures that will attenuate the external noise, to provide a good standard of accommodation for prospective residents.

2.8 This report details the investigations carried out in respect of each of these objectives and summarises the conclusions which have been reached.

3. SURVEY OF EXISTING NOISE LEVELS

3.1 The first step in the assessment of potential noise impact is to measure and describe the existing noise levels affecting the site.

3.2 Given the security of the site, a long term noise survey was not possible. An attended survey was therefore carried out in accordance with the short survey technique described in the Calculation of Road Traffic Noise document, published by the Department of Transport (Welsh Office). This survey was undertaken on Monday 21st May 2012, between 10.40 and 13.40.

3.3 A Rion NL-31 sound level meter was set up 33m from the western carriageway of the A259 Rustington by-pass and 24m from the pumping station, this position relates to the nearest point of the proposed dwellings to the main noise source. This position is shown in Figure 2.

3.4 The microphone was located at a height of approximately 1.5m above ground level, and offered a clear line of sight to traffic moving along the A259 Rustington by-pass.

3.5 The equipment was configured to measure 15min samples of the following acoustic parameters:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

L_{A10} A statistical parameter representing the A-Weighted noise level exceeded for 10% of each sample period. This is commonly used to describe road traffic noise levels.

3.6 The equipment was calibrated before and after the survey. The weather during the survey was dry with sunny spells and fairly warm with a very light breeze.

3.7 Figure 3 provides a graphical representation of the measured noise levels.

3.8 The noise levels measured were primarily the result of traffic passing on the Rustington by-pass, and the peak levels were generated by single vehicle drive-bys.

3.9 The table below confirms the measured levels during each hourly period.

Period	L_{Aeq} dB(A)	L_{Amax} dB(A)	L_{A10} dB(A)
10.40 – 11.40	65.5	85.1	68.3
11.40 – 12.40	65.1	83.2	67.9
12.40 – 13.40	64.9	73.9	67.6

3.10 The CRTN document provides a formula for converting the 1-hour values of L_{A10} into a day time 18-hour L_{A10} value. The result of this calculation is as follows:

$$L_{A10,\ 18\ hr} = 66.9\ dB\ (A)$$

3.11 In fact, assessments of road traffic noise are now more commonly based on the L_{Aeq} parameter, rather than the L_{A10} parameter. It is therefore necessary to convert the 18-hour L_{A10} into the more usual 16-hour day time L_{Aeq} and the 8 hour night time L_{Aeq}.

3.12 The TRL Project Report PR/SE/451/02[1] provides formulae for making the necessary adjustment, and using these relationships, the figures of the $L_{A10,\ 18\ hours}$ equates to the following:

Day Time $L_{Aeq\ 07.00 - 23.00}$	Night Time $L_{Aeq\ 2300 - 07.00}$
64.5 dB(A)	56.5 dB(A)

3.13 The significance of these levels will be discussed in the following paragraphs of this report.

3.14 During the course of the survey, no noise was evident from the water pumping station. This observation will be discussed further in Section 5 of this report.

3.15 Similarly, the site appears to be sufficiently far removed from the commercial operations of The Body Shop that there is no acoustic impact on the development. During the course of the survey, there was no noise audible emanating from their site.

[1] TRL Project Report PR/SE/451/02 CONVERTING THE UK TRAFFIC NOISE INDEX LA10,18h TO EU NOISE INDICES FOR NOISE MAPPING Prepared for DEFRA 2002

4. ASSESSMENT OF AMBIENT NOISE LEVELS

4.1 The newly introduced National Planning Policy Framework (March 2012) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

4.2 Section 123 states

Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

4.3 The Framework states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution. It does not, however, provide any specific formal guidelines.

4.4 However, an informal indication of the acceptability of the site for residential development could be derived found in the 1994 Planning Policy Guidance note 24, "Planning and Noise" (which is now formally replaced by the NPPF). This document gave advice on how planning systems could be used to reduce the impact of noise on people. It outlined the relevant considerations to be taken into account by local planning authorities when determining planning applications for residential developments which will be exposed to existing noise sources. It also set out three key approaches by which noise impact can be minimised:

"(i) Engineering - the reduction of noise at the point of generation, the containment of noise generated, and protection of surrounding noise sensitive buildings;
(ii) Lay-out - adequate distance between source and noise sensitive building or area; screening by natural barriers, other buildings or non critical rooms in a building;
(iii) Administrative - limiting operating time of source, restricting activities allowed on site, specifying an acceptable noise limit"

4.5 In brief, the methodology of PPG24 involved a calculation of the noise affecting the site during a 16 hour day time period, and an 8 hour night time period. The calculated values are then compared to a set of tables which will categorise the results as being 'A', 'B', 'C' or 'D'. For each of these categories, PPG 24 clarifies the acoustic implications. For areas exposed to predominantly road traffic noise, the categories would be determined as follows:

Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq,T}$ dB				
	Noise Exposure Category			
Noise Source	**A**	**B**	**C**	**D**
Road Traffic				
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00[1]	<45	45 - 57	57 - 66	>66

4.6 The site survey suggests that if the facade of the residential building was at the same distance from the roadside as the measurement positions then the highest noise levels recorded on the site, in the absence of façade reflections would be as follows:

Day Time $L_{Aeq\ 07.00 - 23.00}$	**Night Time $L_{Aeq\ 23.00 - 07.00}$**
65	57

4.7 The PPG document would classify the day time values at this position as 'Noise Exposure Category C'. This is defined as follows:

> *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.*

4.8 PPG24 also indicates that, during the night (2300 - 0700):

> *Where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D).*

4.9 Figure 3 confirms that road traffic noise passing the site did generate peak levels over 80 dB(A) $L_{Amax,f}$, but only once within any one hour, and it is therefore concluded that this criterion would not be exceeded.

4.10 In view of this guidance, Section 5 will describe measures which may be incorporated into the design to provide an acceptable environment for the residents of the proposed buildings.

5. RECOMMENDATION FOR NOISE ATTENUATION MEASURES

Consideration of Road Traffic Noise

5.1 There is much guidance on the levels of intrusive noise which would be considered acceptable within residential accommodation such as this. Typical advice is found in British Standard 8233:1999 "Sound Insulation and Noise Reduction for buildings - Code of Practice". Following similar guidance in the 1999 World Health Organisation report "Guidelines for Community Noise", the Standard sets out the following limits for indoor ambient noise levels within living rooms and bedrooms. This suggests:

BS 8233 Guideline Values

	Typical Situations	**Design Range, $L_{Aeq, t}$ dB**	
		Good	**Reasonable**
Reasonable resting / sleeping conditions	Living Room	30	40
	Bedrooms*	30	35

*For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB LAmax.

5.2 It is therefore recommended that the building be designed to achieve the following levels:

Living Rooms: **35 dB (A) $L_{Aeq, 0700 - 2300}$**

Bedrooms **30 dB (A) $L_{Aeq, 2300 - 0700}$, and also**
45 dB (A) $L_{Amax, fast, 2300 - 0700}$

5.3 Table I below defines the outside to inside sound level difference, dB(A), required through each façade of the building. These figures are based initially on the targets of Para 5.2 and the measured noise levels given in Paras. 3.12 & 4.6.

5.4 Levels have been adjusted to account for the façade reflections which will occur in front of the new building.

5.5 During the survey period there were a couple of high L_{Amax} readings, one of 85.1 dB(A) which was during the first 15min period and was due to the setting up of the sound level meter, the other one was 83.2 dB(A) during the second hour which was the result of a motorbike. For the purpose of designing the L_{Amax} 83.2 dB(A) level will be used.

5.6 The values on each elevation have also been reduced to reflect the reduced view to the traffic on the A259 Rustington by-pass and the shielding of plots by those closer to the road. The values are shown in the table below.

TABLE I – PREDICTED NOISE LEVELS

Elevation	External Noise Level	Target Noise Level	Outside to inside level difference
PLOT 1			
West			
Living Rooms	68 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	33 dB(A)
Bedrooms	60 dB(A) $L_{Aeq, 8\ hrs}$ 86 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	41 dB(A)
PLOTS 1, 2, 3, 4 & 8			
North			
Living Rooms	66 dB $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	31 dB(A)
Bedrooms	58 dB(A) $L_{Aeq, 8\ hrs}$ 84 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	39 dB(A)
South			
Living Rooms	63 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	28 dB(A)
Bedrooms	55 dB(A) $L_{Aeq, 8\ hrs}$ 81 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	36 dB(A)
PLOT 5			
East			
Living Rooms	58 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	23 dB(A)
Bedrooms	50 dB(A) $L_{Aeq, 8\ hrs}$ 76 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	31 dB(A)
PLOT 7			
West			
Living Rooms	65 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	30 dB(A)
Bedrooms	57 dB(A) $L_{Aeq, 8\ hrs}$ 83 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	38 dB(A)
PLOTS 6 & 7			
North			
Living Rooms	63 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	28 dB(A)
Bedrooms	55 dB(A) $L_{Aeq, 8\ hrs}$ 81 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	36 dB(A)
South			
Living Rooms	58 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	23 dB(A)
Bedrooms	50 dB(A) $L_{Aeq, 8\ hrs}$ 76 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	31 dB(A)
PLOT 6			
East			
Living Rooms	55 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	20 dB(A)
Bedrooms	47 dB(A) $L_{Aeq, 8\ hrs}$ 73 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	28 dB(A)

5.7 It is confirmed that the following external wall construction will suffice:

Outer leaf in 102mm brick or rendered aggregate block
Partially insulated cavity of not less than 75mm
Inner leaf of 100mm aggregate block, or studwork frame faced with 25mm Wallboard plasterboard

5.8 In fact, the overall sound insulation of the façade will be dictated by the glazing. The table below confirms glazing specification based on the external wall construction stated in section 5.6 and the site noise levels as recorded:

TABLE II – INITIAL FACADE PERFORMANCE TARGETS

Facade	Room Type	Glazing Performance Rw + Ctr	Possible Glazing Specification
PLOTS 1, 2, 3, 4 & 5			
West	Living Rooms	33 dB	5 / 7 / 6.8A
	Bedrooms	41 dB	12 / 20 / 12.8A
North	Living Rooms	31 dB	6 / 12 / 4
	Bedrooms	39 dB	8.8 / 12 / 8.8A
South	Living Rooms	28 dB	4 / 12 / 6
	Bedrooms	36 dB	10 / 12 / 8.4A
East	Living Rooms	23 dB	4 / 16 / 4
	Bedrooms	31 dB	6 / 12 / 4
PLOTS 6 & 7			
West	Living Rooms	30 dB	6 / 12 / 4
	Bedrooms	38 dB	12 / 15 / 8.8A
North	Living Rooms	28 dB	4 / 12 /6
	Bedrooms	36 dB	10 / 12 / 8.4A
South	Living Rooms	23 dB	4 / 16 / 4
	Bedrooms	31 dB	6 / 12 /4
East	Living Rooms	20 dB	4 / 16 / 4
	Bedrooms	28 dB	6 / 12 / 4

5.9 Whichever level of glazing is provided for these sensitive facades, it is of course the case that when the windows are opened, the acoustic performance of the windows will be irrelevant. It may therefore be necessary to provide alternative means by which habitable rooms may be ventilated whilst keeping the acoustic integrity of the façade. The options for achieving this include:

(i) An acoustic trickle vent, such as the Passivent[2] Acoustic Grille. An external grille providing a reduction of up to 48 dB. This fits in conjunction with a standard internal trickle vent;

(ii) A wall ventilation system, such as the Passivent Fresh 90 dB Wall Ventilator. An internal grill and external louvre linked by 150mm diameter duct, providing 300mm^2 - 6000mm^2 ventilation;

[2] Passivent, by Willan Building Services 0161 962 7113

(iii) A whole house mechanical ventilation heat recovery (MVHR) system. This system ducts fresh air through inlet grills in the façade of the building to a heat recovery unit and then distributes to one of more ceiling grills through the property. Extract grills, usually in kitchens and bathrooms, then draw exhaust air from the house and discharge this to atmosphere through external exhaust grills. Whilst no formal figures are published, it is calculated that such systems will offer a reduction of some 40 - 45 dB(A) from outside to inside. Such a loss would be sufficient for this site.

5.10 The ventilation requirements, and preferred method of ventilation, should first be determined by the Architect (this may involve liaison with the Local Authority to determine any local standards which must be met). It is suggested that such provisions are required only for the habitable rooms on the front elevation.

5.11 Details of the preferred means of ventilation should then be passed to Acoustic Consultant for confirmation of appropriate means of attenuation

5.12 In respect of external amenity space, the World Health Organisation indicates that, to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq}.

5.13 It is noted that external noise levels within all dwellings are likely to experience noise levels of some 55 - 65 dB(A) $L_{Aeq,\ 16\ hrs}$ in the garden space.

5.14 In order to attenuate noise to a reasonable level, it is therefore recommended that a 2.5m high boundary fence be erected along north-west boundary of the site, as indicated on (see Figure 4). This would built as either

- Abutting panels not less than 22 mm thick, with joints sealed by cover strips not less than 22 mm thick, and the strip extending not less than 25 % over adjacent panels.
- Not less than 100mm thick brick or rendered block work.

5.15 Such a barrier should provide reductions of approximately 10 dB(A) at ground level, resulting in levels of between 45 – 55 dB(A) $L_{Aeq.\ 16\ hrs}$. Thus, all amenity space will lie within the WHO guidelines, with the much of the site falling below the lower threshold.

5.16 It should be noted that, if this barrier is erected, it will reduce road traffic noise incident upon the facades of the new buildings as well. Formal barrier calculations indicate approximately 10 dB(A) for ground floor windows, and 5 dB(A) for first floor windows. This will then reduce the requirement for the glazing. Table III confirms the facade noise levels with the barrier in place, and Table IV then details the revised targets for the glazing:

TABLE III – PREDICTED NOISE LEVELS WITH 2m HIGH BARRIER

Elevation	External Noise Level	Target Noise Level	Outside to inside level difference
PLOT 1			
West			
Living Rooms	58 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	23 dB(A)
Bedrooms	55 dB(A) $L_{Aeq, 8\ hrs}$ 81 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	36 dB(A)
PLOTS 1, 2, 3, 4 & 5			
North			
Living Rooms	56 dB $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	21 dB(A)
Bedrooms	53 dB(A) $L_{Aeq, 8\ hrs}$ 79 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	34 dB(A)
South			
Living Rooms	53 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	18 dB(A)
Bedrooms	50 dB(A) $L_{Aeq, 8\ hrs}$ 76 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	31 dB(A)
PLOT 8			
East			
Living Rooms	48 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	13 dB(A)
Bedrooms	45 dB(A) $L_{Aeq, 8\ hrs}$ 71 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	26 dB(A)
PLOT 7			
West			
Living Rooms	55 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	20 dB(A)
Bedrooms	52 dB(A) $L_{Aeq, 8\ hrs}$ 78 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	33 dB(A)
PLOTS 6 & 7			
North			
Living Rooms	53 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	18 dB(A)
Bedrooms	50 dB(A) $L_{Aeq, 8\ hrs}$ 76 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	31 dB(A)
South			
Living Rooms	48 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	13 dB(A)
Bedrooms	45 dB(A) $L_{Aeq, 8\ hrs}$ 71 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	26 dB(A)
PLOT 6			
East			
Living Rooms	45 dB(A) $L_{Aeq, 16\ hrs}$	35 dB(A) $L_{Aeq, 16hrs}$	10 dB(A)
Bedrooms	42 dB(A) $L_{Aeq, 8\ hrs}$ 68 dB(A) L_{Amax}	30 dB(A) $L_{Aeq, 8hrs}$ 45 dB(A) L_{Amax}	23 dB(A)

TABLE IV –PERFORMANCE TARGETS FOR SCREENED FACADES

Facade	Room Type	Glazing Performance Rw + Ctr	Possible Glazing Specification
PLOTS 1, 2, 3, 4 & 5			
West	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	36 dB	10 / 12 / 8.4A
North	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	34	6 / 12 / 10
South	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	31 dB	6 / 12 / 4
East	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	<27 dB	4 / 16 / 4
PLOTS 6 & 7			
West	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	33 dB	6 / 12 / 10
North	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	31 dB	6 / 12 / 4
South	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	<27 dB	4 / 16 / 4
East	Living Rooms	<27 dB	4 / 16 / 4
	Bedrooms	<27 dB	4 / 16 / 4

Consideration of Commercial/Industrial Noise Sources

5.17 In December 2011, Southern Water (through their technical representatives Atkins Limited) wrote to the Local Authority Planning department to express a reservation regarding the proposed development of the site.

5.18 They indicated the principle that, 'due to the vibration, noise and potential odour generated by sewage pumping stations, no habitable rooms should be located closer than 15 metre to the boundary of a pumping station site'. Reference to Figure 2 indicates that this clearance has been provided in the proposed layout.

5.19 As indicated earlier, during the course of the site survey, there was no evident noise emanating from the pumping station. This observation was corroborated through a discussion with an existing resident of a neighbouring house who suggested that he had never heard noise from the station.

5.20 To investigate the installation further, a conversation with the author of the original letter, Mr David Nuttell of Atkins Limited, clarified that normal operational noise should negligible outside the enclosure and that the time when there would be audible noise at adjacent houses would be when a tanker pumps out excess water (a periodic event only, which will have been experienced already by the existing property to the south of the station).

5.21 It is therefore concluded that noise emissions from the pumping station are not a material concern to the development of the proposed houses.

5.22 With respect to the noise emissions from the commercial estate to the north-west of the bypass, it is again commented that no noise was audible through the survey period.

5.23 This observation confirms the results of a study conducted by this practice in 2008, relating to a potential development on Norway Lane (which runs between the bypass and commercial building). Attended surveys indicated no significant noise emissions from the office and warehouse buildings.

5.24 A review of the layout of these buildings indicates that the proposed houses would be facing car parking areas only, with the commercial loading bays and HGV traffic concentrated on the west side of the buildings, shielded from the development.

5.25 It is therefore concluded that noise emissions from this area will have no adverse impact on the proposed residential development.

Figure 1 - Site Location



Figure 2 - Proposed Site Plan

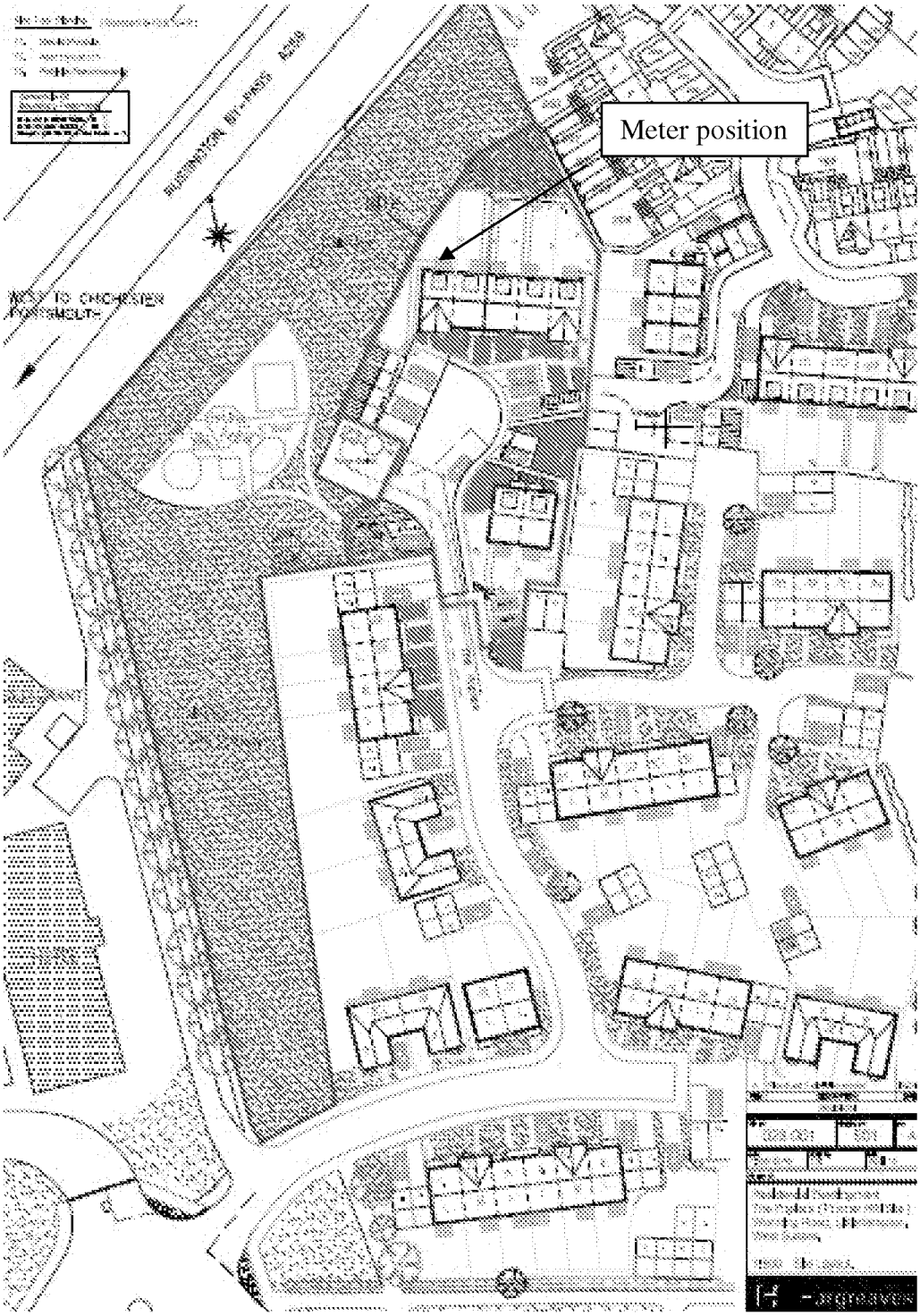


Figure 3 - Measured Noise Levels at Survey Position

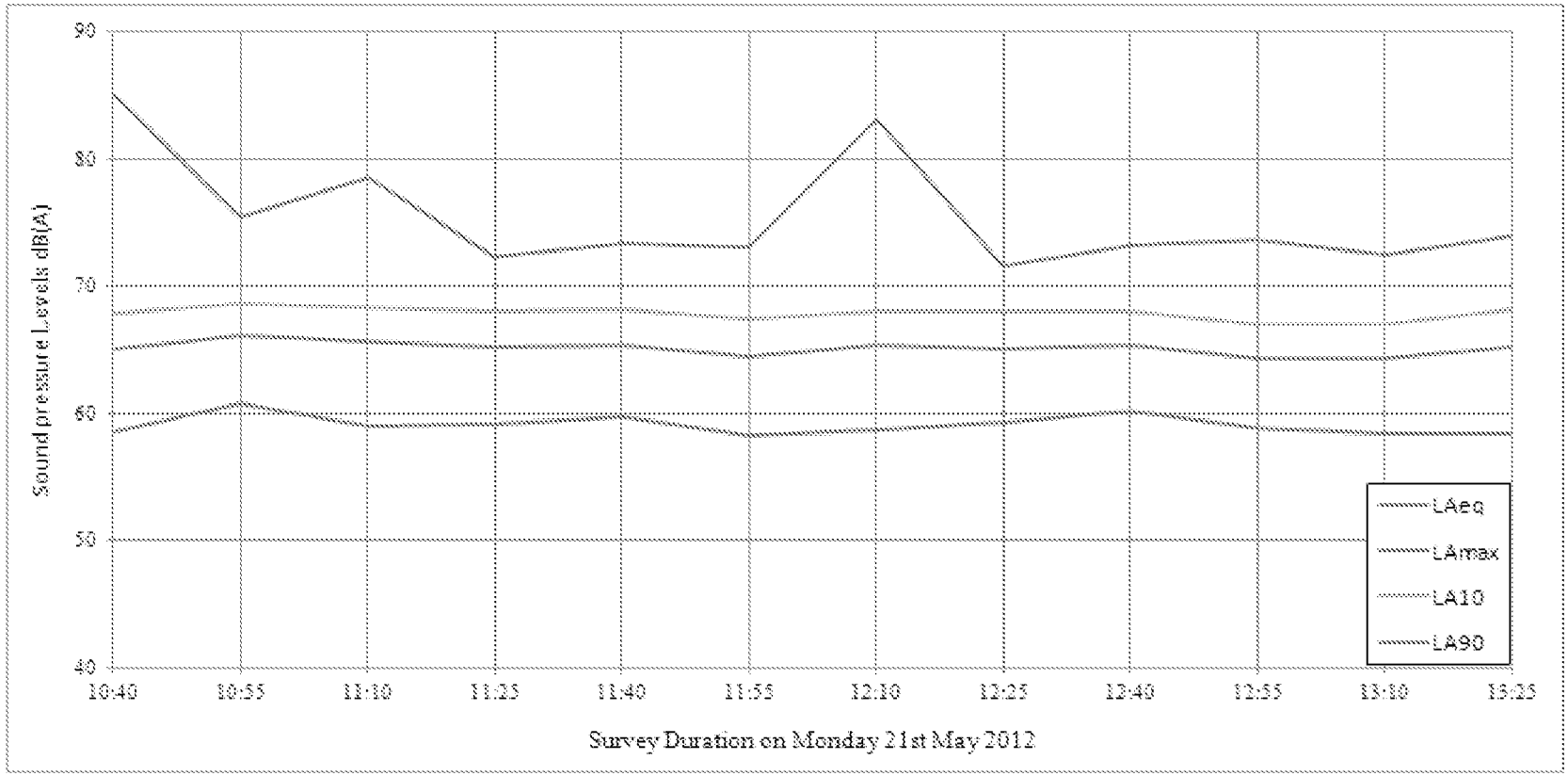
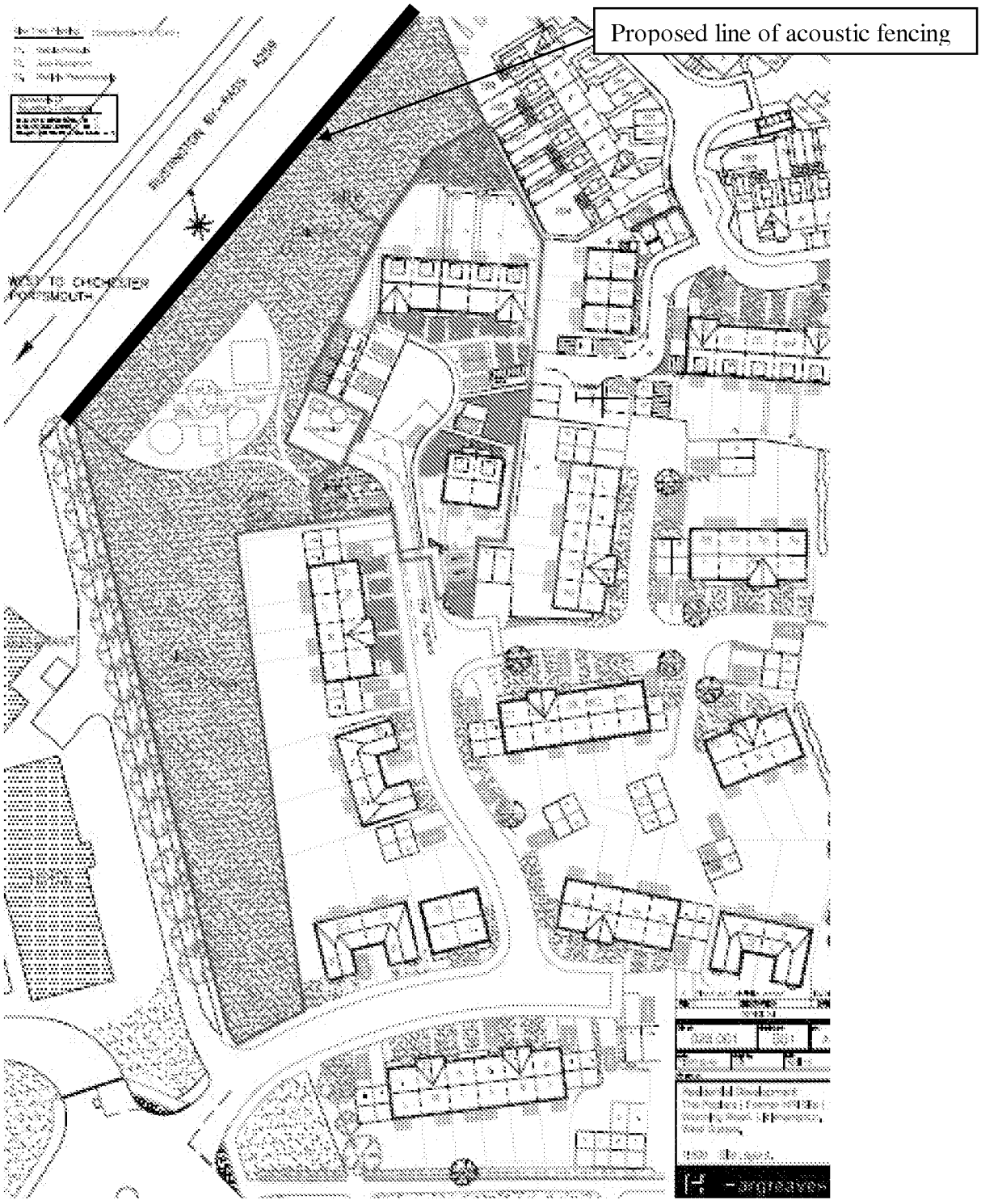


Figure 4 - Proposed Site Plan (showing line of barrier)



Appendix 1 - Glossary Of Terms

dB	Decibel: a logarithmic scale applied to acoustic units such as sound pressure and sound power. Decibels are always the ratio between two numbers. Sound Pressure in Pascals becomes "Sound Pressure Level re 2x10-5 Pa" in decibels. Sound Power in watts becomes "Sound Power Level re 10-12 W" in decibels. It is also used for sound reduction or sound insulation and is the ratio of the amount of sound energy incident upon a partition and the proportion of that energy which passes through the partition. The result is stated as a "decibel reduction".
dB(A) A-weighting:	This is an electronic filter which attenuates sound levels at some frequencies relative to the sound levels at other frequencies. The weighting is designed to produce the relative response of a human ear to sound at different frequencies. The A-weighted sound level is therefore a measure of the subjective loudness of sound rather than physical amplitude. A- weighting is used extensively and is denoted by the subscript A as in L_{A90}, L_{Aeq} etc. (Levels given without the subscript A are linear sound levels without the A- weighting applied, e. g. L_{90}, L_{eq} etc.).
$L_{Aeq,T}$	The “A” weighted equivalent continuous sound pressure level. This may be thought of as the "average" sound level over a given time “T”. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises.
$L_{A90,T}$	The “A” weighted sound pressure level that is exceeded for 10% of the time T. It reflects the loudest events periods during that time and is often referred to describe traffic noise levels.
$L_{A90,T}$	The “A” weighted sound pressure level that is exceeded for 90% of the time T. It reflects the quiet periods during that time and is often referred to as the "background noise level". It is used for setting noise emission limits for industrial and commercial premises.
L_{Amax}	The maximum "A" weighted sound pressure level during a given time on fast or slow response.