

ARR/PPN/C/2489.05

10th May 2017

Store Property Investments
Limited

Assessment of noise at Land West of
Brook Lane and South of A259
(within the Parishes of Brookfield and
Angmering and Findon) for proposed
residential and care home
development

Addendum Report

Prepared for :-

Store Property Investments Ltd
Farr House
4 New Park Road
Chichester
PO19 7XA

Prepared by :-

Andrew Raymond

CONTENTS

1.0 SUMMARY

2.0 INTRODUCTION

3.0 SURVEY DETAILS

3.1 Site Times and Personnel

3.2 Instrumentation

3.3 Measurement Positions

3.4 Survey Conditions

4.0 RESULTS AND DISCUSSIONS

4.1 Basic Results

4.2 Assessment

4.3 Mitigation

4.4 Future Traffic Flows

5.0 CONCLUSIONS/RECOMMENDATIONS

Appendix 1: Definition of Acoustic Terms

Appendix 2: Measurement and Calculation Details

1.0 **SUMMARY**

Daytime and night time noise levels, measured over three consecutive days, including a Saturday showed levels slightly below the rush hour and early night time levels used in the main report (Reference ARR/PPN/C/2489.05 Rev A dated 19th February 2017). Noise contours run roughly parallel to the road and railway, not including existing buildings which had no impact on the measurement positions.

A 2m barrier (acoustic fence) is proposed along the A259 and rail boundaries. Together with a 10m standoff from the boundary, this is considered to be sufficient to ensure that the noise levels for prospective residents is at an acceptable level. It should be noted that different heights and positions of the barrier, and different standoff distances can achieve the same effect. Barriers will provide negligible benefit at first floor levels closest to the sources so this will need to be mitigated with sound insulation. The buildings of the proposed site will of course provide very substantial barriers and can be investigated at detailed planning stage but, as a very rough guide, facades of small buildings perpendicular to the road/railway should be around 3 dB lower than those directly facing, and facades facing away can be expected to be around 10 dB lower. Moving further into the site, a combination of increased distance from the sources and intervening buildings will continue to reduce the noise.

Future traffic growth has been mentioned. It is considered that the effect is likely to be very small. To take a worst case example, if the traffic doubles (and is doubled consistently throughout the day and night) then, all else being equal, the increase in noise would only be 3 dB.



A R Raymond

P J Durell

2.0 INTRODUCTION

This addendum report follows our main assessment report dated 19th February 2017 and a series of discussions and emails with Environmental Health. The purposes of this report is to address the queries that have arisen in respect of the noise impacts of the development.

After describing basic survey details, this addendum report primarily discusses the significantly extended survey periods, noise contours across the site, the impact of barriers, and the potential impact of the barrier effects of the proposed buildings. We also discuss in brief outline the potential impact of future traffic flows.

3.0 SURVEY DETAILS

3.1 Site Times and Personnel

The measurements were carried out by Mark Pickering of ADC Acoustics, most of which were unattended.

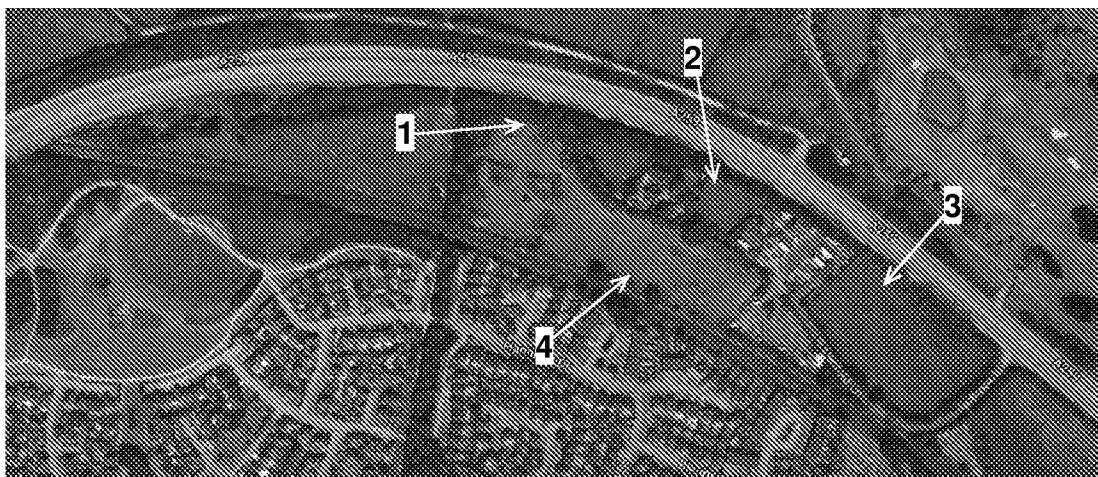
It was agreed with the local authority that 3 days' worth of survey work would be carried out, including a Saturday. The times chosen were from midnight on Wednesday 26th April (ie. 00:00 on the Thursday), until midnight on the following Saturday night. They are referred to sequentially as Day 1, Day 2 and Day 3.

3.2 Instrumentation

Instrumentation used was a 3 x Rion NL52s and 1 x Rion NA28. These are precision grade sound level meters which hold current calibration certificates and which was field-calibrated before and after measurements with no drift noted. The meters were set up to measure continuous 15 minute samples in overall A-weighted terms, and in octave bands across the frequency range. See Definition of Acoustic Terms in Appendix 1.

3.3 Measurement Positions

The approximate measurement positions were as shown on the following plan.



Positions 2, 3 and 4 were approximately 10m from the boundary. Position 1 had to be further away, as the 10m position would have been very close to a public footpath. It was estimated to be around 17m away. The microphone was 1.75 m above ground and well away from other reflecting surfaces.

3.4 Survey Conditions

We have no reason to believe that the conditions we found on the survey were anything other than representative of normal conditions.

Weather conditions were as follows :-

	Day 1	Day 2	Day3
Rain	None	None	None
Cloud	0 to 100%	50 to 100%	0 to 100%
Temperature	3 to 11 Celsius	8 to 11 Celsius	10 to 12 Celsius
Wind	2 to 4 m/s	2 to 4 m/s	2 to 4 m/s

5.0 RESULTS AND DISCUSSIONS

The noise climate was dominated by traffic on the A259. Trains ran approximately every 20 minutes during rush hour and every 30 minutes up to about 00:30 at night.

5.1 Basic Results

Measurements from all three positions generated over half a million results. The graphical time histories of the dB LAeq and the dB LAmax levels are shown for each position in Appendix 2. A summary of the 16 hour days and 8 hour nights is as follows (note that Day1 refers to midnight on the Wednesday night to Midnight on Thursday night, followed sequentially by Day 2 and Day 3 up to midnight on the Saturday night):-

Position 1	Day 1	Day 2	Day 3	Overall
Daytime (dB LAeq)	61	61	59	60
Night (dB LAeq)	53	53	52	53
Night (dB LAmax)*	68	68	68	68
Night (dB LAmax)**	69	69	70	69

Position 2	Day 1	Day 2	Day 3	Overall
Daytime (dB LAeq)	62	62	61	62
Night (dB LAeq)	55	55	53	54
Night (dB LAmax)*	71	71	71	71
Night (dB LAmax)**	71	71	72	71

Position 3	Day 1	Day 2	Day 3	Overall
Daytime (dB LAeq)	63	63	62	63
Night (dB LAeq)	57	56	55	56
Night (dB LAmax)*	71	73	72	72
Night (dB LAmax)**	71	72	71	71

Position 4	Day 1	Day 2	Day 3	Overall
Daytime (dB LAeq)	63	62	62	62
Night (dB LAeq)	56	55	56	56
Night (dB LAmax)*	74	75	74	75
Night (dB LAmax)**	73	74	73	74

* 75th percentile, essentially the L_{max} level exceed 8 times a night

** logarithmic average of all L_{Amax} readings through the night.

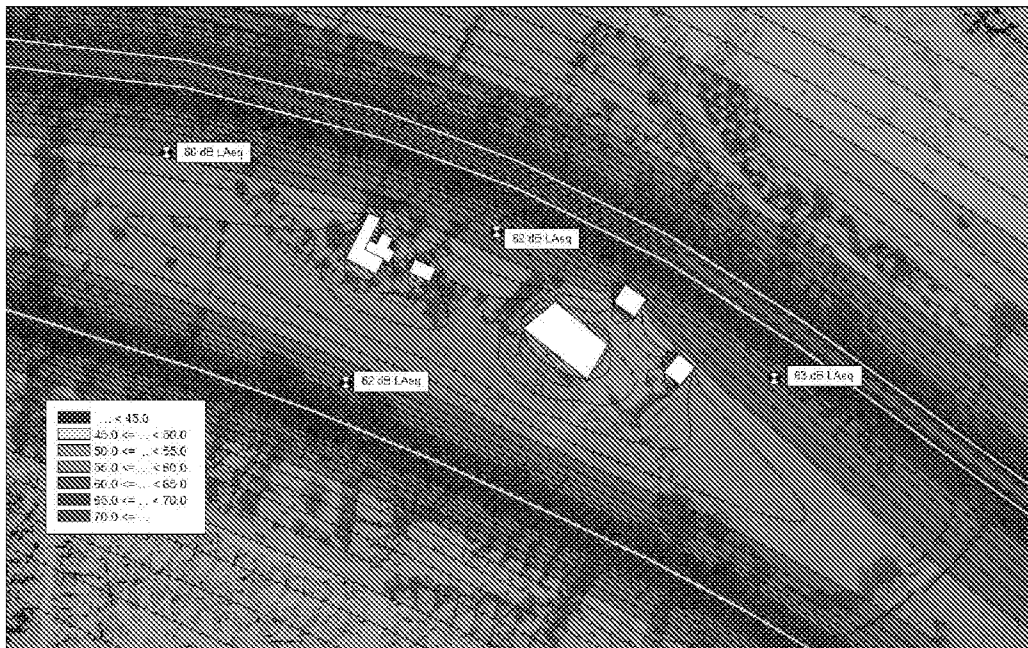
The graphs in Appendix 2 show great consistency between days other than an obvious absence of rush hour effect on the Saturday. There is little drop in levels between the two rush hour periods. Night times are consistently 6.5 to 7.5 lower than daytimes.

5.2 Assessments

The above results are consistent with those of the main report, in fact a little lower, which can be expected as the previous results concentrated on rush hour and early night time.

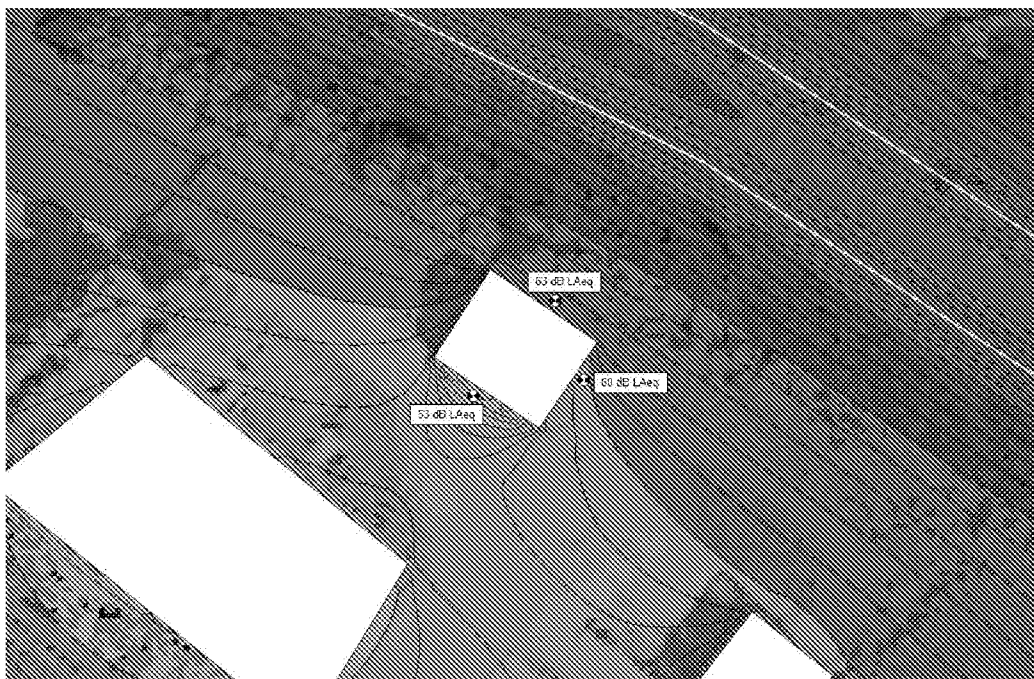
Environmental Health also requested some basic modelling and noise contouring across the site. The main road is presented as two more or less identical line sources rising slightly (with respect to the site) towards the eastern end. The railway is presented as a single line source. All are shown as yellow lines. The sound powers of the roads and the railway were adjusted to match the overall daytime levels at the measurement positions. Night time levels were consistently 6.5 to 7.5 dB lower.

The following shows the basic model with the main buildings shown.

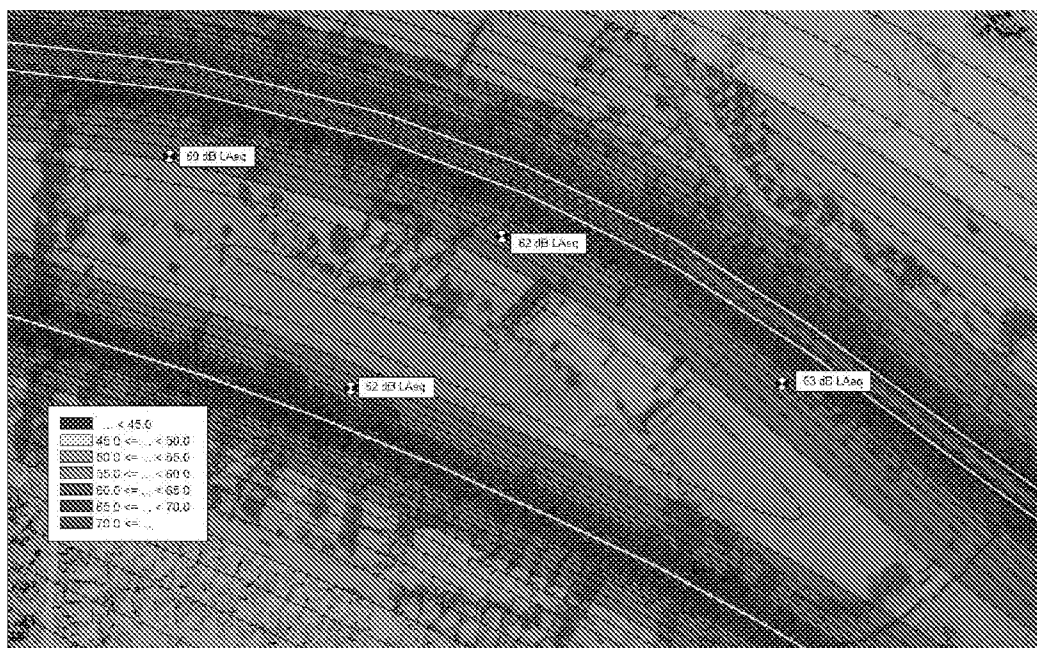


Note that position 1 is further away from the boundary and shows levels consistently slightly lower. Position 3 levels are consistently slightly higher due to the elevated road with respect to the site.

Facades fronting the main sources will clearly be exposed to more or less the full “angle of view” of the road or railway. Facades perpendicular to them will get only half the angle of view and so a 3 dB reduction can be expected. And facades facing away can usually be expected to be at least 10 dB lower than the facing facades for relatively small buildings. A zoomed in view of the nearest building is shown below with receiver positions added which show this effect.



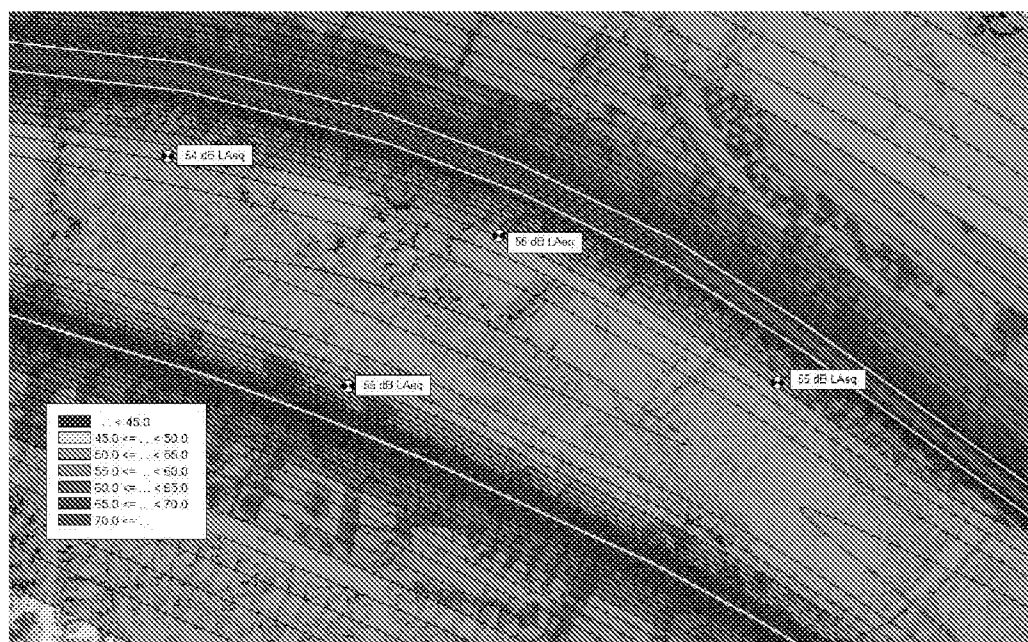
The following contour map is presented with the existing buildings “removed”.



Not surprisingly the contours run roughly parallel to the road and railway line.

5.3 Mitigation

A 2m fence is currently suggested along the main road and railway boundaries. The impact of such a fence is shown below.



Note that the fence height is 2m relative to the ground level at the road and railway, and the heights of the receiver positions and the contours are 1.75m above the ground. There are of course ways to achieve the same effect with different fence heights and different fence positions as well as different standoff distances (distance(s) from the road or railway to the receiver positions). Otherwise the assessment and conclusions are essentially the same as the main report, and a condition requiring details to be submitted and approved would be appropriate.

Barriers will provide a small benefit at first floor levels closest to the sources but this has been ignored in the calculations and they will still need to be mitigated with sound insulation. Mitigation is discussed in our main report. Levels are at worst the same, but in the main slightly lower, as a result of the additional measurements but the conclusions and recommended sound insulation do not change.

The buildings of the proposed site will of course provide very substantial barriers and can be investigated at detailed planning stage but, as a very rough guide, facades of small buildings perpendicular to the road/railway should be around 3 dB lower than those directly facing, and facades facing away can be expected to be around 10 dB lower. This is illustrated with the existing buildings in 5.2 above. Moving further into the site, a combination of increased distance from the sources and intervening buildings will continue to reduce the noise.

5.4 Future Traffic Flows

Future traffic growth was mentioned by Environmental Health, but it was agreed that the effect is likely to be very small. To put it into perspective, if the traffic doubles (and is doubled consistently throughout the day and night) then, all else being equal, the increase in noise would only be 3 dB. The reality of course is the total traffic volumes are likely to increase by nowhere near this amount and any increases are likely to be for limited times of the day only.

6.0 CONCLUSIONS/RECOMMENDATIONS

The additional data supplied within this addendum has been carefully scoped with the Arun District Environmental Health Team, and represents a robust assessment of the noise impacts of the development. The two reports combined demonstrate that the proposed uses (residential and care home) would be acceptable in this location from a noise perspective, and that the amenity of prospective resident would be within defined acceptable limits. We therefore hope that the additional information supplied will provide reassurances regarding residential amenity.

The design of the development will be considered in more detail pursuant to the submission of reserved matters. However, provided that the development falls within the parameters outlined in this assessment it is considered that they would be acceptable from a noise perspective.

A broad condition along the lines of details to be submitted and approved is likely to be the most appropriate way to control the development. In addition, or as an alternative, conditions requiring internal noise levels to achieve BS8233 criteria for “desirable” to “reasonable” conditions would also be appropriate.

Appendix 1

Definition of Acoustic Terms

The Decibel

The decibel is the basic unit of noise measurement and is denoted dB. Technically, it is a means of expressing the difference in noise level between the measured noise and a standard level of noise. Most often the threshold of human hearing is used as the standard reference but it really should be stated. The threshold of human hearing is a sound pressure of $20\mu\text{Pa}$ or a sound power of 1pW .

A sound pressure level or SPL should be expressed in dB(re. $20\mu\text{Pa}$). A sound power level or SWL should be expressed in dB(re. 1pW). If the reference levels are omitted, it will often (but not always) be safe to assume that they are referenced to the threshold of human hearing.

A-Weighting and dB(A)

The human hearing system responds differently to different frequencies. The A-weighting system takes account of this by emphasising mid and high frequencies more than low frequencies to give an overall level. An A-Weighted noise level, therefore, reflects the way normal, healthy hearing would perceive the overall level of the noise. The basic unit is dB(A), although other systems of expressing an A-weighted level are discussed below.

Other weighting systems, such as C-Weighting, denoted dB(C), reflect the human hearing system's response at higher noise levels.

Equivalent Continuous Sound Level, L_{eq}

This is a kind of mean noise level.

The unit is dB L_{eq} . For A-weighted levels the unit is dB(A) L_{eq} or, in more modern units, dB L_{Aeq} . The Noise at Work Regulations use $L_{eq(s)}$ which refers to a sample level.

Maximum Level, L_{max}

This is the maximum level reached (usually for a fraction of a second) in the measurement period.

The unit is dB L_{max} . For A-weighted levels the unit is dB(A) L_{max} or, in more modern units, dB L_{Amax} .

Statistical (Percentile) Levels, L_n

During a measurement of fluctuating noise, it is often useful to establish the levels exceeded for a percentage of the time. L_n is the index representing the level exceeded for $n\%$ of the measurement period.

The unit is dB L_n . For A-weighted levels, the unit is dB(A) L_n or, in more modern units, dB L_{An} .

Common examples are as follows :-

dB L_{A90} is the A-weighted level exceeded for 90% of the time and is often used to describe the underlying background noise.

dB L_{A50} is the A-weighted level exceeded for 50% of the time. Mathematically, it is the median, another kind of average.

dB L_{A10} is the A-weighted level exceeded for 10% of the time and has traditionally been used to describe the intermittent highs in the noise climate such as passing cars or aircraft.

Frequency Analysis

Here the audible frequency range is divided up into bands and the noise level is expressed in each frequency band from low pitches to high pitches.

Octave Band analysis is where the frequency range is divided into 8 bands from 63 Hz to 8kHz, or sometimes into 10 bands from 31.5 Hz to 16kHz.

1/3 Octave Band analysis provides more detailed subdivision into 24 bands from 50 Hz to 10kHz, or sometimes into 30 bands from 20Hz to 20kHz.

Narrow Band analysis takes this further with the possibility of many thousands of bands, possibly only 1Hz wide, or even less.

In all types of frequency analysis, the level in each band can be expressed in terms of L_{eq} , L_{max} , L_n , etc. as defined above.

Appendix 2

Measurement Details

