# NEXT RETAIL, SHOREHAM BY SEA

# ACOUSTICS REPORT ON THE NOISE IMPACT FROM PROPOSED DELIVERY VEHICLES ON RESIDENTIAL DWELLINGS

**Date:** **12th November 2010**
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# QUALITY MANAGEMENT

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# 1 INTRODUCTION

1.1 RPS (Acoustics) has been commissioned by Roger Tym and Partners to carry out a noise assessment in relation to the proposed redevelopment of an existing Homebase store into a Next retail store.

1.2 The site is located off Upper Shoreham Road, Shoreham by Sea, BN43 6TD.

1.3 It is understood that the existing delivery area and service yard is to be reconfigured and this is of concern to the Local Authority, in terms of potential noise nuisance to nearby residential properties (specifically those on Hawkins Road to the east of the site).

1.4 The purpose of this report is therefore to assess the likely impact of delivery activities and changes to the delivery area.

1.5 The assessment will be based upon guidelines in BS 4142:1997 “Method for rating industrial noise affecting mixed residential and industrial areas”.

1.6 Noise monitoring has been carried out in order to determine the prevailing noise levels at the site, for use in the BS 4142 calculation process.

1.7 A 3D computer model of the site and proposed redevelopment has been created and used to determine the expected noise levels generated by HGV movements. These values are used within the assessment.

# 2 ASSESSMENT CRITERIA

2.1 BS 4142:1997 provides a method to determine whether a noise source (of an industrial nature) is likely to give rise to complaints from nearby residential properties.

2.2 The likelihood of complaints is assessed by subtracting the measured background noise level at the proposed site (at a location representative of the nearest residential property) from the 'Rating level' (the specific noise source to be introduced into the locality, in addition to corrections made for tonality etc).

2.3 The greater this difference, the greater the likelihood of complaints. BS 4142 states that:

- if the Rating level is 10 dB or more above the measured background level then this is an indication that complaints are likely
- if the Rating level is around 5 dB above the background level, this is of marginal significance
- if the Rating level is 10 dB or more below the background level, this is a positive indication that complaints are unlikely.

2.4 Guidance given in BS 4142 states[1] that the specific noise level (the noise source under investigation for assessing the likelihood of complaints) should be evaluated over the appropriate time reference interval, namely:

- 1 hour during the day, and
- 5 minutes at night

[1] Source: BS 4142:1999, Section 6.2.

# 3 SITE

3.1 The site is located off Upper Shoreham Road (A270), Shoreham by Sea, BN43 6TD. The A270 is a busy dual carriageway at this point, linking with the A27 Shoreham Bypass to the north.

3.2 The existing Homebase Unit forms part of the Holmbush Centre retail park. Other tenants include Marks & Spencer, McDonalds restaurant and a Tesco Extra store.

3.3 The Homebase unit is a typical retail park warehouse type construction, with external delivery yard and garden centre. A site plan is presented in Appendix 1.

3.4 Proposals are to reconfigure the service yard and garden centre, with HGV movements being limited to a point approximately half way along the existing building. A layout is presented in Appendix 2.

3.5 It is understood that deliveries to the new store should generally not exceed 6 HGV movements per week, and these are to be limited to daytime hours only.

# 4 NOISE SURVEY

4.1 An attended noise survey was carried out to determine the existing ambient and background noise levels on the site. Measurements were taken on Tuesday 9th November 2010 between approximately 18:00 and 20:00 hours.

4.2 One measurement Position was chosen for the survey, considered representative of conditions at the nearest residential properties. A site plan showing the indicative monitoring location is given in Appendix 1.

4.3 Although numerous noise descriptors were measured, the three main descriptors for the purposes of this Report were as follows:

- $L_{Aeq,T}$, the average A-weighted noise level over each measurement period
- $L_{A90,T}$, the A-weighted noise level exceeded for 90% of the measurement period
- $L_{AFmax}$, the maximum A-weighted noise level in each measurement period

4.4 The time period, *T*, was set to 5 minutes for the duration of the survey. The use of this time period is considered to be conducive to a worst-case assessment.

4.5 Noise measurements were made using a Class 1 Rion NL-31 Sound Level Analyser, generally in accordance with BS EN 60651:1994 and BS 7445:1993.

4.6 The meter was calibrated before and after use; no significant drift was witnessed. Copies of calibration certificates are available upon request.

4.7 Weather conditions during the survey were dry with a little wind.

**b) Survey results**

4.8 The following Table shows a summary of the results obtained. All values are in dB(A). Single figure results can be seen in Appendix 3.

| Logarithmically Averaged $L_{Aeq,5min}$ | Minimum $L_{A90,5min}$ | Maximum $L_{Amax}$ |
|---|---|---|
| 54.3 | 50.3 | 66.5 |

**Table 1 – Summary results**

**c) Discussion**

4.9 From the survey results, existing noise levels are of a moderately high level. This is in agreement with expectations, given the location of the site and nearby road network.

4.10 The background noise level ($L_{A90,T}$) was fairly constant for the duration of the survey, varying within a range of less than 4 dB. Such a small degree of variance would be expected if the dominant noise source is more distant road traffic.

4.11 The lowest background noise level was measured between 19:05 and 19:10 hours. The results from this 5 minute measurement period have been used in the BS 4142 calculations below.

# 5 NOISE MODEL

5.1 To determine the likely levels of noise from HGV movements associated with deliveries to the redeveloped store, a 3D computer model of the site and adjacent area has been created.

5.2 This approach allows the impact of various activities and vehicle locations to be assessed simultaneously, and the results include the effect of any attenuation provided by distance and the effect of barriers.

5.3 By using the computer model, noise levels at the nearest affected residential properties can be calculated and then entered into the BS 4142 assessment procedure.

5.4 The noise model was created using IMMI software[2], and screenshots are given in Appendix 4.

**a) Activities**

5.5 Three scenarios have been investigated using the 3D model, as follows:

1. One HGV per hour – considered to be a worst-case assessment given that deliveries are not expected to exceed six HGVs per week
2. Two HGVs idling – considered to be a worst case assessment should two vehicles arrive at the same time
3. One vehicle at the rear of the store – considered to be equivalent to a smaller vehicle making deliveries, or other activity within the yard area

**b) Results**

5.6 The Table below summarises results obtained from the computer model. All values are in dB(A):

| Receiver | Level | Activity | | |
|---|---|---|---|---|
| | | 1 HGV per hour | 2 HGV's idling | 1 vehicle at rear |
| 1 | Ground Floor | 33 | 39 | 37 |
| | First Floor | 37 | 42 | 39 |
| 2 | Ground Floor | 31 | 40 | 37 |
| | First Floor | 37 | 45 | 40 |
| 3 | Ground Floor | 34 | 40 | 38 |
| | First Floor | 38 | 45 | 41 |
| 4 | Ground Floor | 33 | 40 | 39 |
| | First Floor | 37 | 44 | 41 |
| | Third Floor | 42 | 47 | 45 |
| 5 | Ground Floor | 33 | 38 | 39 |
| | First Floor | 37 | 43 | 41 |
| | Third Floor | 43 | 45 | 45 |

[2] IMMI Plus software version 6.3.1a

| Receiver | Level | Activity | | |
|---|---|---|---|---|
| | | 1 HGV per hour | 2 HGV's idling | 1 vehicle at rear |
| **Worst-case** | | **43** | **47** | **45** |

5.7 The worst-case values predicted at the residential façades will be used in the BS 4142 assessment below.

5.8 As the noise from delivery vehicles and associated activities may be considered to be irregular enough to attract attention, an additional penalty will be added to these figures.

# 6 BS 4142 ASSESSMENT

6.1 BS 4142 sets out a calculation procedure to determine whether introducing an industrial noise source is likely to give rise to complaints from residential properties nearby.

6.2 The likelihood of complaints is assessed by comparing the background $L_{A90}$ noise level (representative of that at the nearest residential property) to the Rating level (the noise level due to specific activity, plus any corrections for tonality). The greater this difference, the greater the likelihood of complaints

6.3 This Section summarises the information used in the BS 4142 calculation. To compliment and verify the results from the BS 4142 assessment, a 3D noise model of the site has been created to plot noise levels at nearest residence. The model has been created using IMMI acoustic software.

6.4 The 3D noise model is capable of more accurately determining the noise propagation, for example, taking into consideration slight variation in ground level heights, barrier attenuation and the fact that the noise sensitive receptors are not located directly in front of the noise source, i.e. they are off-set by approximately 45°.

**a) Background noise level (residual noise)**

6.5 Measurements were carried out at what are considered to be the quietest times of operation (i.e. early evening period) when deliveries may be expected.

6.6 Section 4 above sets out the results of noise surveys at the proposed site. For the purposes of the calculations below, the worst case scenario of 50.3 dB $L_{A90,T}$ has been used as the background noise level.

**b) Rating Level**

6.7 BS 4142 states that "certain acoustic features can increase the likelihood of complaints over that expected from a simple comparison between the specific noise levels and background noise level"[3].

6.8 It is considered that, due to the nature of the noise source from HGVs (i.e. the noise source will include distinguishable, discrete noises that may be impulsive and tonal), a +5 dB penalty should be applied to the rating level as recommended in BS 4142.

**c) Attenuation considerations**

6.9 Within the 3D computer model, a 3.5 meter high barrier has been placed around the delivery area. This is understood to be the height of the existing fence.

6.10 Standard garden fences of 1.8 meters height have also been positioned within the 3D model.

[3] BS 4142 Section 8

### d) BS 4142 calculation

6.11 The worst-case results from the noise model, in conjunction with the lowest background noise level measured, can be inserted into the BS 4142 calculation, as summarised in the Table below.

6.12 As noted above, the three scenarios investigated are as follows:

1. One HGV per hour – considered to be a worst-case assessment given that deliveries are not expected to exceed six HGVs per week
2. Two HGVs idling – considered to be a worst case assessment should two vehicles arrive at the same time
3. One vehicle at the rear of the store – considered to be equivalent to a smaller vehicle making deliveries, or other activity within the yard area

| **BS 4142 Procedure** ***Scenario:*** | ***1*** | ***2*** | ***3*** |
|---|---|---|---|
| Specific noise level ($L_{Aeq}$) | 43.0 dB(A) | 47.0 dB | 45.0 dB(A) |
| Correction for acoustic features (ref. BS4142 Section 8) | + 5.0 dB | + 5.0 dB | + 5.0 dB |
| Correction for residual noise (ref. BS4142 Section 6.3.3) | 0.0 dB | 0.0 dB | 0.0 dB |
| **Rating level at 1 m from residential** | **48.0 dB(A)** | **52.0 dB(A)** | **50.0 dB(A)** |
| | | | |
| Averaged measured ambient noise level (residual $L_{Aeq}$) | 54.3 dB(A) | 54.3 dB(A) | 54.3 dB(A) |
| Minimum measured background noise level ($L_{A90}$) | 50.3 dB(A) | 50.3 dB(A) | 50.3 dB(A) |
| | | | |
| **BS 4142 assessment** | **- 2.3 dB(A)** | **1.7 dB(A)** | **- 0.3dB(A)** |

### e) Discussion of BS 4142 results

6.13 It can be seen that the predicted noise level from one HGV unloading within the delivery yard is below the measured background level at the nearest affected residential façade. Other activities give rise to slightly higher noise levels, but these are not excessive.

6.14 With reference to BS 4142, it can be seen that the assessment values all fall below the 'marginal significance' level, and this is an indication that complaints are unlikely.

6.15 It should also be noted that the calculations above are based on the quietest period monitored. Daytime operations in the week Monday to Friday, when existing noise levels at the site are higher, will provide additional masking against any operational noise.

# 7 NOISE MITIGATION MEASURES / RECOMMENDATIONS

7.1 From the assessment results detailed in the above Section, it is considered that specific noise mitigation measures are not required.

7.2 However, in order to minimise any potential for disturbance to nearby residential properties, it is suggested that the use of the following management controls be considered. All are low-cost measures.

**a) Movement control**

7.3 Proposals are to limit HGV movements to a point approximately half way along the existing building. It is recommended that a 'speed bump' or similar device be located within the delivery yard area, to provide an indication to drivers that they have reached the required location.

**b) Signage**

7.4 It is recommended that appropriate signage be installed within the delivery yard area, indicating that vehicle engines should be switched off during any loading or unloading operations. This will reduce the length of time that the specific activity noise is present, and thereby minimise the potential for disturbance.

# 8 CONCLUSIONS

8.1 The redevelopment of an existing Homebase Unit to a Next Store has been investigated.

8.2 Prevailing noise levels have been measured at the proposed site. Surveyed noise levels have been noted to be moderately high.

8.3 Activity noise levels due to proposed vehicular movements have been considered and the impact at nearby residential façades calculated using 3D modelling software. Three scenarios have been considered.

8.4 A BS 4142:1997 assessment of the specific noise sources has indicated that the proposed activities are below the level of 'marginal significance'.

8.5 A number of additional noise mitigation measures have been suggested.

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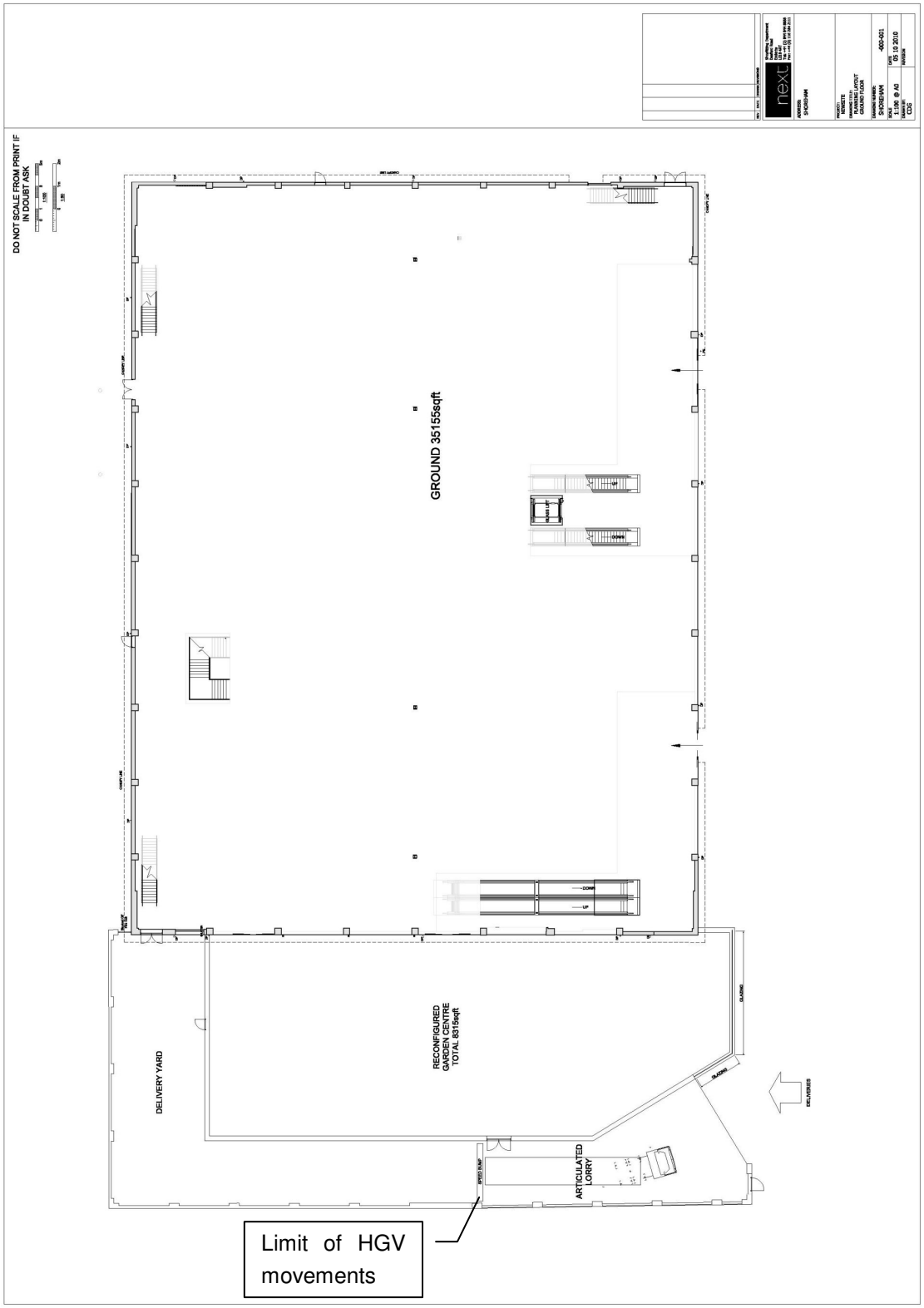
# APPENDIX 1 – SITE PLAN SHOWING INDICATIVE MEASUREMENT POSITION




**Key:**

| | |
|---|---|
| 1 Approximate measurement position | Approximate location of delivery yard |
| 1 Receiver locations | Location of nearest residence |

# APPENDIX 2 – PROPOSED SITE



# APPENDIX 2 – SINGLE FIGURE RESULTS 9TH NOVEMBER 2010

All measurements are in dB(A). The measurement period, *T*, was set to 5 minutes.

| Time | $L_{Aeq,5mins}$ | $L_{AFmax}$ | $L_{A90,5mins}$ |
|---|---|---|---|
| 18:00 | 55.0 | 59.8 | 53.5 |
| 18:05 | 55.5 | 58.6 | 54.2 |
| 18:10 | 55.6 | 60.5 | 54.1 |
| 18:15 | 55.3 | 61.1 | 53.8 |
| 18:20 | 54.8 | 58.6 | 53.1 |
| 18:25 | 54.9 | 61.7 | 53.2 |
| 18:30 | 54.9 | 58.9 | 53.0 |
| 18:35 | 54.8 | 66.5 | 53.2 |
| 18:40 | 54.8 | 62.3 | 53.0 |
| 18:45 | 54.4 | 58.3 | 53.0 |
| 18:50 | 53.9 | 59.6 | 52.3 |
| 18:55 | 53.4 | 61.0 | 51.9 |
| 19:00 | 53.1 | 57.4 | 51.4 |
| 19:05 | 52.8 | 63.1 | 50.3 |
| 19:10 | 53.3 | 57.6 | 51.9 |
| 19:15 | 53.4 | 61.8 | 51.8 |
| 19:20 | 53.7 | 57.4 | 51.9 |
| 19:25 | 53.7 | 59.1 | 51.9 |
| 19:30 | 54.4 | 61.2 | 51.7 |
| 19:35 | 53.4 | 61.3 | 51.6 |
| 19:40 | 53.3 | 58.6 | 51.5 |
| 19:45 | 55.1 | 64.9 | 52.2 |
| 19:50 | 53.4 | 57.9 | 51.8 |
| 19:55 | 53.1 | 62.1 | 51.1 |

# APPENDIX 4 – 3D NOISE MODEL

