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Consultants in Acoustics, Noise & Vibration

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Wellington Way, Waterloooville

Residential planning noise report

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A	20 Dec 17		Ben Southgate	Daniel Stringer
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Summary

Sandy Brown has been commissioned by CPI Wellington Way 2 Limited to provide acoustic advice in relation to the proposed development at Wellington Way, Waterloooville.

An environmental noise survey was performed between 7 December 2017 and 12 December 2017. The representative background sound levels measured during the survey were $L_{A90,15min}$ 49 dB during the daytime and $L_{A90,15min}$ 39 dB at night.

Based on the requirements of Havant Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed L_{Aeq} 49 dB during the daytime and L_{Aeq} 39 dB during the night.

The average ambient noise levels measured during the survey were $L_{Aeq,16h}$ 65 dB during the daytime and $L_{Aeq,8h}$ 54 dB at night.

An assessment has been carried out to determine the building facade sound insulation necessary to achieve internal noise criteria in line with BS 8233 guidance as stipulated by the Havant Council. At the noisiest elevations, the building facade must provide a sound insulation performance of R_w+C_{tr} 31 dB. This can be achieved using standard thickness double glazing and acoustically attenuated passive ventilation openings.

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1 Introduction

Sandy Brown has been commissioned by CPI Wellington Way 2 Limited to provide acoustic advice in relation to the proposed development at Wellington Way, Waterloooville.

An environmental noise survey has been carried out, the purpose of which was to establish the existing ambient and background sound levels in the vicinity of the site and nearby noise sensitive premises.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of the Havant Council.

The facade sound insulation has been assessed in order to determine the necessary performance required to achieve appropriate internal noise levels for residences set in accordance with BS 8233:2014 *Sound insulation and noise reduction for buildings*, World Health Organisation and Havant Council guidelines.

This report presents the noise survey methods, the results of the survey, a discussion of acceptable limits for noise emission from building services plant and minimum sound insulation requirements for the building envelope.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in blue in Figure 1. The site is located in a mixed used area within the town centre of Waterlooville, with many retail and commercial premises surrounding the site.

Maurepas Way (A3) runs to the north of the site and is the main road serving the town, with Hambledon Road bounding the south-west of the site. Much of the surrounding shopping area to the north and east of the site is pedestrianised.

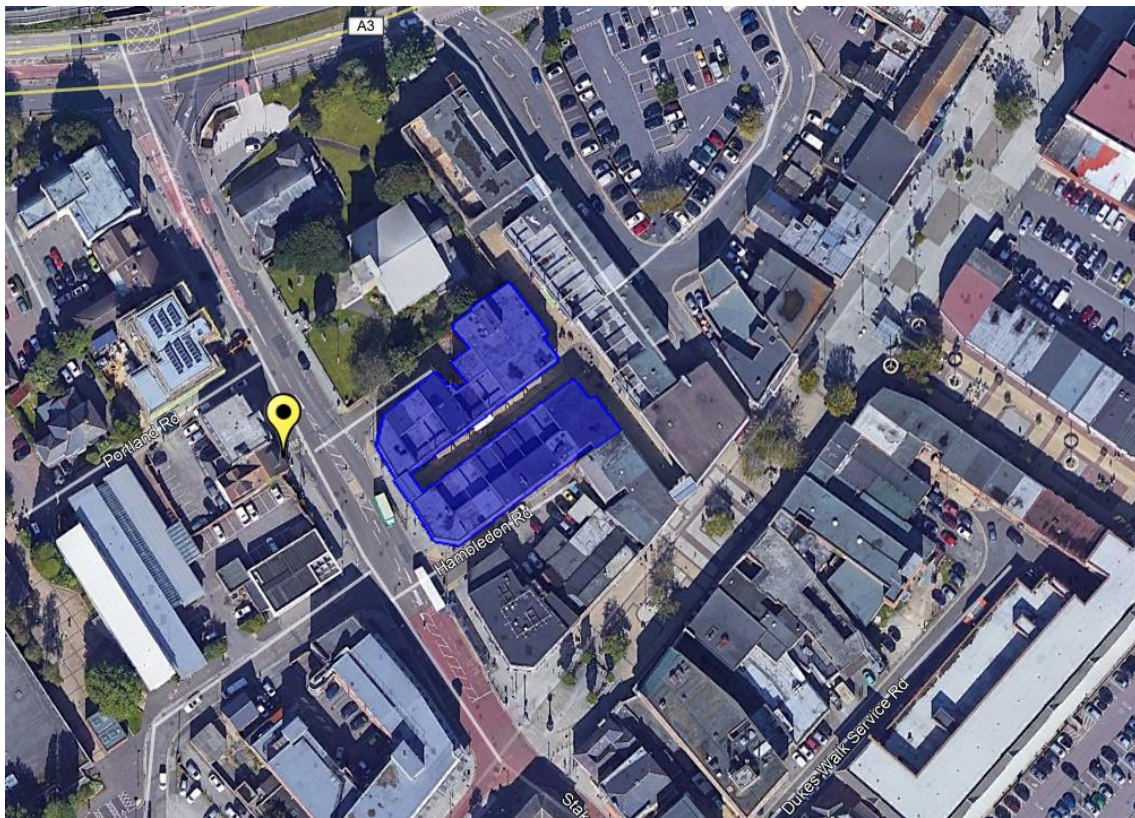


Figure 1 Site map (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is surrounded by retail and commercial units to the north, east and south of the site. A car park serving these premises is located north of the site (behind a row of shops). To the north-west of the site is St George's church and churchyard.

The nearest noise sensitive premises to the site are considered to be the level 1 flats located on the opposite side of Hambledon Road, the nearest of which is marked as yellow in Figure 1.

3 Method

Details of the equipment used, the noise indices and the weather conditions during the survey are provided in Appendix A. Further information on the specific survey method is provided in this section.

A site plan showing both the unattended and attended measurement positions is provided in Figure 2.

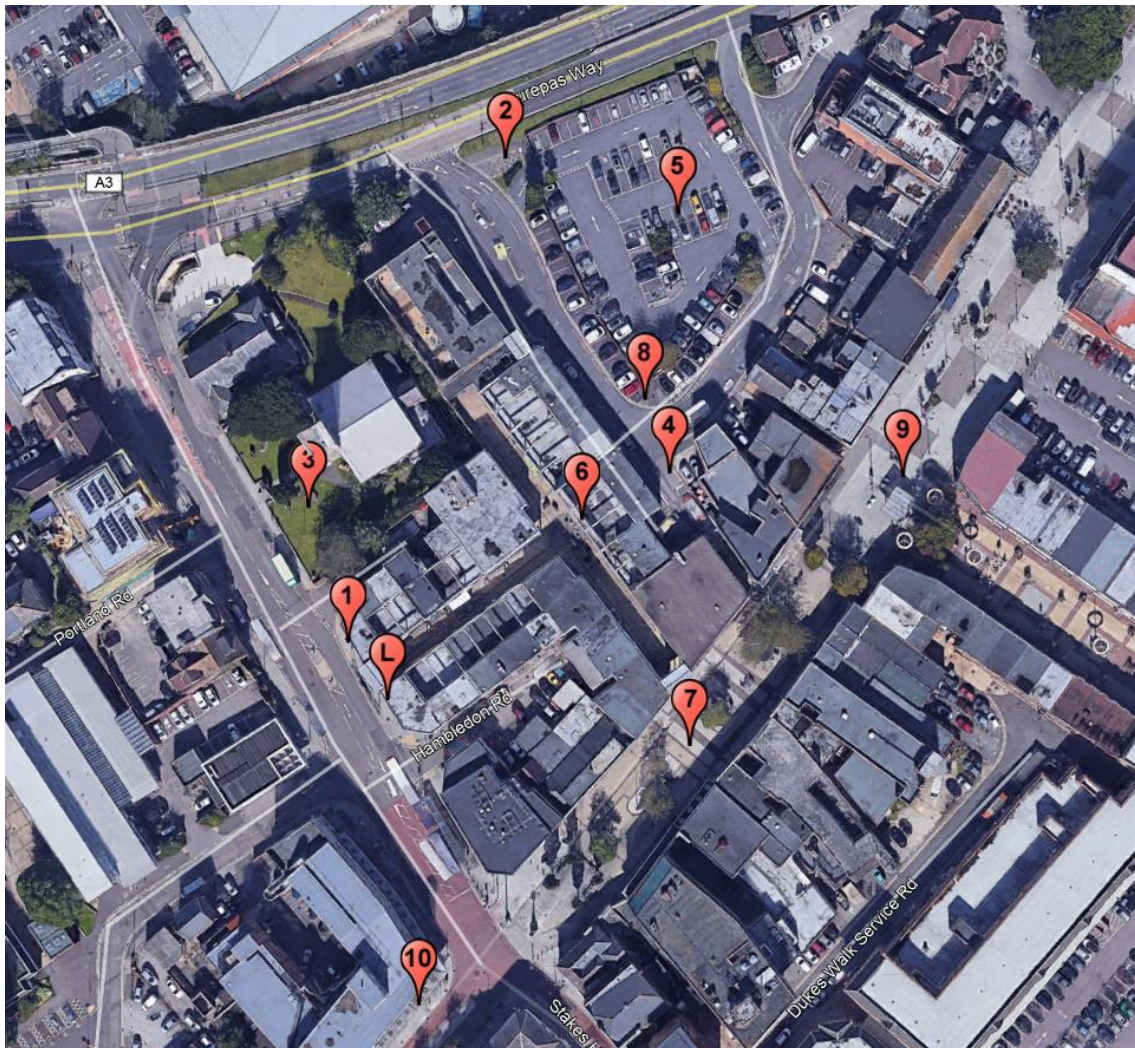


Figure 2 Measurement locations (courtesy of Google Earth Pro)

3.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over six days to determine the existing background sound levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 15 minute periods between 12:00 on 7 December 2017 and 14:30 on 12 December 2017. The equipment was installed by Ben Southgate and collected by Artem Khodov.

The measurement position used during the survey is indicated in Figure 2, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 3.

The microphone was positioned 1 m out of the level 1 window and approximately 6 m above ground. The measured levels are therefore considered to be facade noise levels.

This location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises, and also of night maximum noise levels experienced at the site.



Figure 3 Photograph showing unattended measurement position 'L'

3.2 Attended measurements

Attended sample measurements were performed by Ben Southgate on 7 December 2017 and by Artem Khodov on 12 December 2017 at a number of locations around the site. These are indicated in Figure 2 as positions 1 to 10. The attended measurements were carried out over 5-15 minute periods, with the purpose of determining the existing noise levels from road traffic, pedestrians and other significant noise sources around the site.

In each case the microphone was mounted on a tripod approximately 1.5 m above the ground level. Measurements at positions 1, 6 and 10 were taken at 1 m from a building facade and all other measurements were taken at least 3 m from any other reflective surface.

Photographs of the attended measurement positions are provided in Figure 4.



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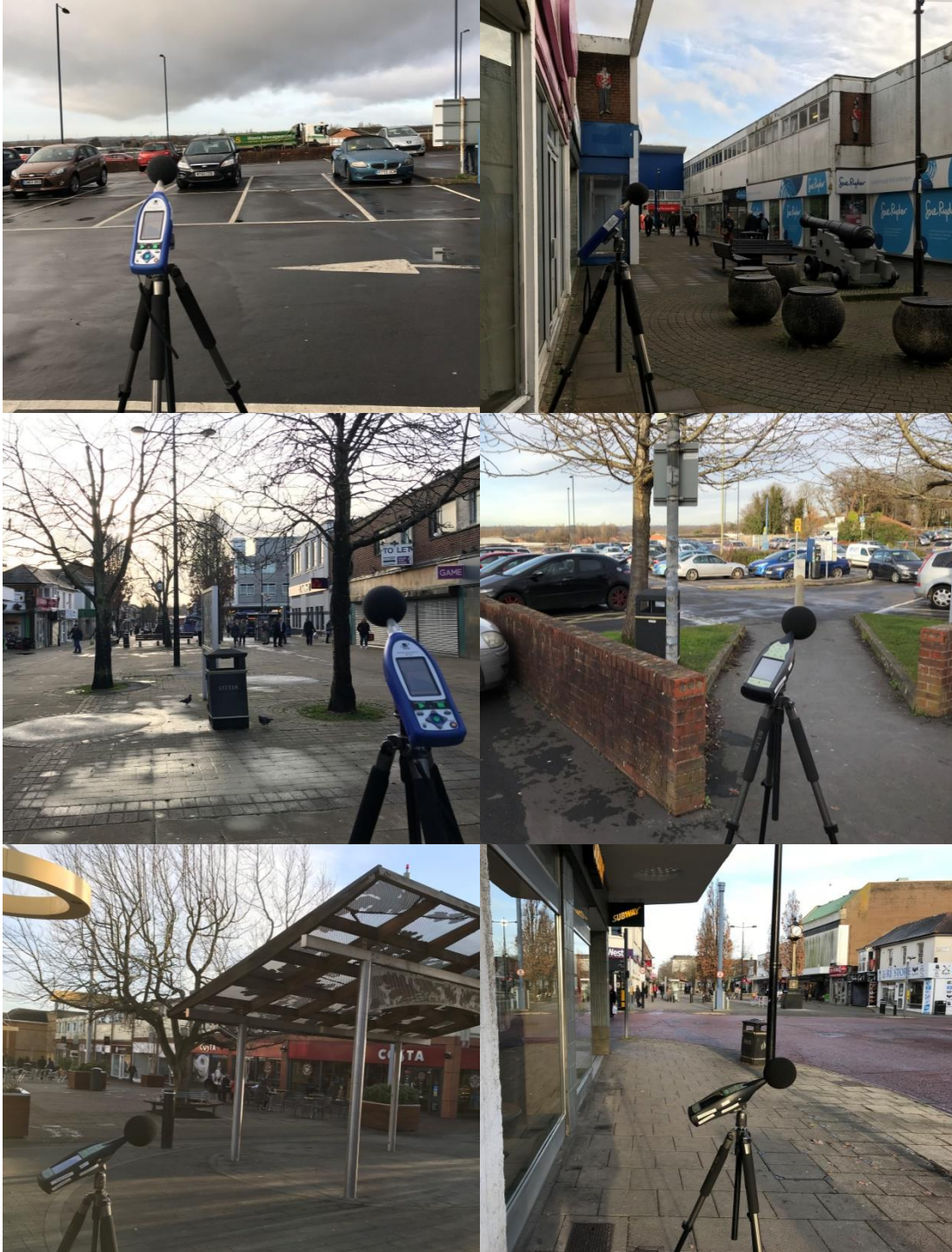


Figure 4 Photographs of attended measurement positions 1-10 (top left to bottom right)

4 Measurement results

4.1 Observations

The dominant noise source observed at the site during the survey consisted of road traffic, predominantly from Maurepas Way. Noise from other roads was also audible, generally only in close proximity.

Less significant noise sources included pedestrians and some noise from plant items in a few locations.

4.2 Unattended measurement results

The results of the unattended noise measurements are summarised in the following tables. A graph showing the results of the unattended measurements is provided in Appendix B.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1. These levels are considered to be facade noise levels.

Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 7 December 2017	-	55
Friday 8 December 2017	64	54
Saturday 9 December 2017	64	54
Sunday 10 December 2017	65	55
Monday 11 December 2017	66	54
Average	65	54

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels, day and night time typical levels have been quantified using statistical analysis from the continuous logging measurements.

Daytime and night time statistical analysis of representative values for the site are given in Figure 5 and Figure 6.

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 49 dB during the daytime and $L_{A90,15min}$ 39 dB at night.

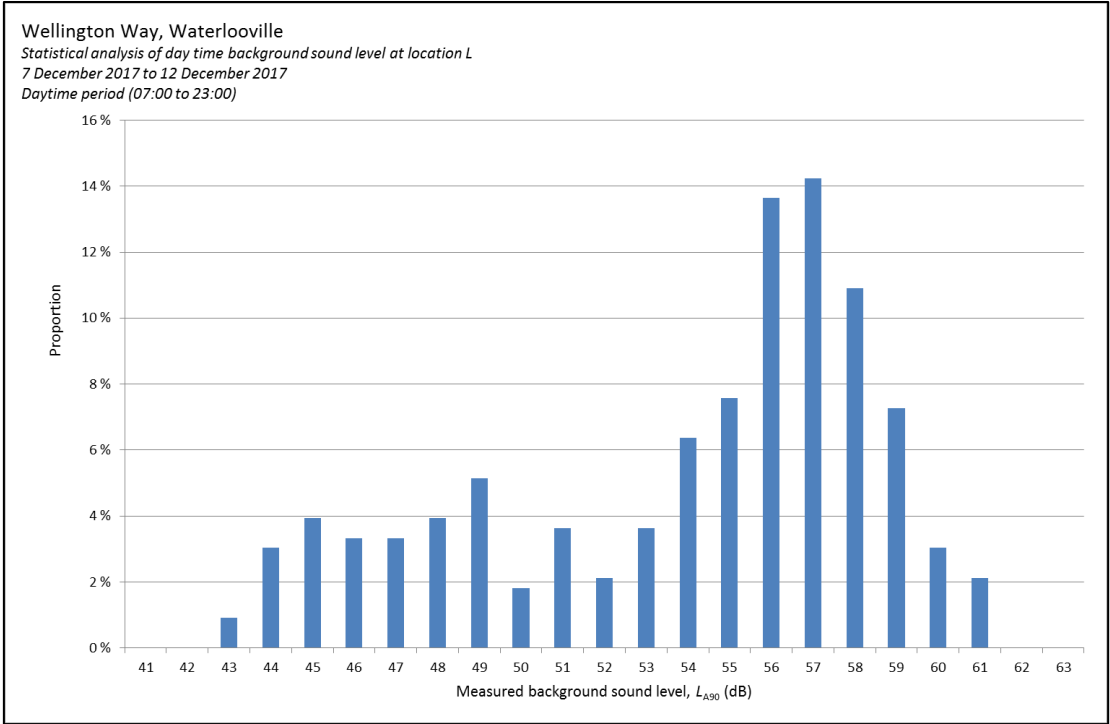


Figure 5 Graph showing statistical analysis of daytime background noise levels

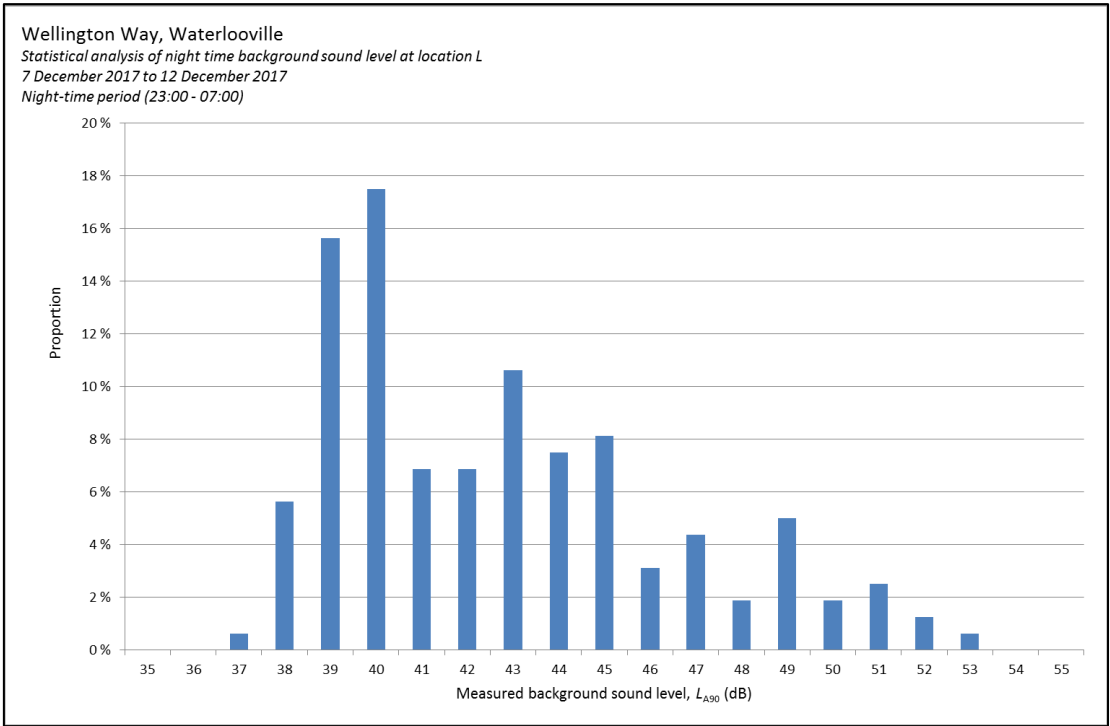


Figure 6 Graph showing statistical analysis of night time background noise levels

4.3 Attended measurement results

The sound pressure levels recorded during the attended measurements are summarised in Table 2, alongside the measurement duration and whether it is considered to be a free field or facade noise level measurement.

Table 2 Sound pressure levels from attended measurements

Position	Date	Start time	Duration (mm:ss)	Sound pressure levels (dB)			Free field/ facade
				L_{Aeq}	L_{AFmax}	L_{A90}	
1	7/12/17	12:30	15:00	65	80	56	Facade
2	7/12/17	12:48	11:31 ¹	69	78	63	Free field
3	7/12/17	13:21	15:00	61	74	55	Free field
2	7/12/17	13:39	15:00	70	79	64	Free field
4	7/12/17	13:56	10:00	65	84	57	Free field
5	7/12/17	14:08	05:05	60	69	56	Free field
6	7/12/17	14:16	10:00	60	77	52	Facade
7	7/12/17	14:27	05:00	57	72	52	Free field
2	7/12/17	14:35	15:00	70	78	64	Free field
8	12/12/17	13:38	15:00	59	76	52	Free field
9	12/12/17	13:56	15:00	57	73	52	Free field
7	12/12/17	14:08	10:00	54	71	51	Free field
10	12/12/17	14:20	10:00	65	84	61	Facade
5	12/12/17	15:16	15:00	57	74	54	Free field

¹ This measurement had to be stopped part way through as it started to rain. However based on observations made on site as well as the other measurement results at the same position, it is considered to be a valid measurement, with the levels unlikely to change significantly during the remainder of the aborted measurement.

5 Assessment criteria

5.1 NPPF and NPSE

The National Planning Policy Framework (NPPF) sets out the government planning requirements, and supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF 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.’*

The NPSE states that its aims are as follows:

‘Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.’*

As such, although neither of these documents sets out specific acoustic criteria for new residential development, the requirement to control both the effect of existing noise on the new development and the effect of noise from the development on the surroundings needs to be considered.

5.2 External noise levels - noise egress

5.2.1 *Standard guidance*

Guidance for noise emission from proposed new items of building services plant is given in BS 4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'.

BS 4142 provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

5.2.2 *Local Authority criteria*

Havant Council requires that all plant noise is assessed in line with BS 4142: 2014, achieving 'no observable adverse level above existing background noise levels'. This was confirmed in an email from Mark Moss of Havant Council dated 29 November 2017.

5.3 Internal noise level – noise ingress

5.3.1 Standard guidance

Guidance on acceptable internal noise levels in residential dwellings is given in BS 8233:2014 *Sound insulation and noise reduction for buildings*, and is also provided by the World Health Organisation. The guidance given by BS 8233 and WHO is shown in Table 3.

Table 3 Internal noise criteria for sleeping/resting

Internal space	Indoor ambient noise level L_{Aeq} (dB)		
	BS 8233 (07:00 to 23:00)	BS 8233 (23:00 to 07:00)	WHO
Living rooms	35	-	30/35 ¹
Dining room	40	-	-
Bedrooms	35	30 ²	30 ²

¹ WHO does not differentiate between different types of living spaces, but recommends L_{Aeq} 30 dB in relation to sleep disturbance and L_{Aeq} 35 dB in relation to speech intelligibility. WHO provides a 16 hour time base when referring to speech intelligibility and an 8 hour time base when referring to sleep disturbance.

² BS 8233 notes that individual noise events can cause sleep disturbance, and that a guideline value may be set depending on the character and number of events per night, although no specific limit is provided. Section 3.4 of the WHO guidelines for community noise suggests that good sleep will not generally be affected if internal levels of L_{Amax} 45 dB are not exceeded more than 10-15 times per night.

5.3.2 Local Authority requirements

Havant Council requires that noise ingress from external noise sources into residential dwellings is assessed in line with BS 8233: 2014. This was confirmed in an email from Mark Moss of Havant Council dated 29 November 2017.

6 Plant noise limits – noise egress

6.1 Limits

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the worst affected windows of the nearest noise sensitive premises should not exceed the limits set out in Table 4.

Table 4 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Daytime (07:00-23:00)	49
Night time (23:00-07:00)	39

The limits set out in Table 4 do not include any allowance for attention catching features. The penalties for attention catching features may be significant, and will need to be considered as the building services design progresses. Assessment

At this stage, no information is available in relation to the proposed installation of building services plant, and this will need to be assessed in detail as the design progresses. However, all plant items will be designed to achieve the plant noise limits set out above, including any corrections for attention catching features.

7 Facade sound insulation – noise ingress

This section discusses internal noise level criteria and assesses the required facade sound insulation performance. In principle, the required facade specification depends on two factors – the external noise levels at the site, and the internal noise criteria.

The following assessment is based on achieving the internal noise levels recommended in BS 8233 as defined in Section 5.3.1 and as stipulated by the Havant Council.

7.1 External noise levels

In order to assess worst case, the highest noise levels provided in Table 2 have been used to calibrate an acoustic noise model of the site. The model was created in CadnaA which predicts noise propagation from various different noise sources and takes account of the effects of topography, reflections, screening and distance attenuation. Screen shots of the model are shown in Figure 7.

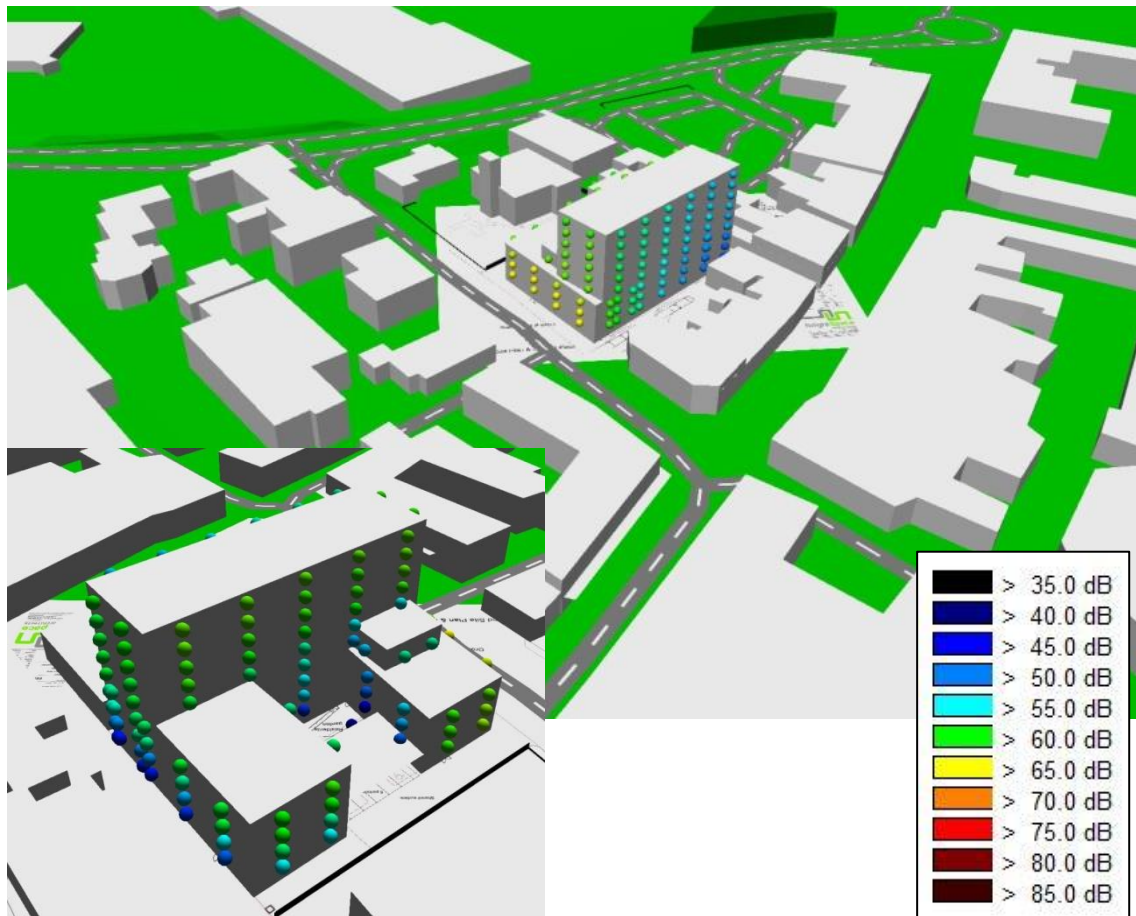


Figure 7 Screenshots of the CadnaA noise model

The predicted external noise levels at the various facades of the proposed development are shown in Figure 8 to Figure 11 and Table 5.

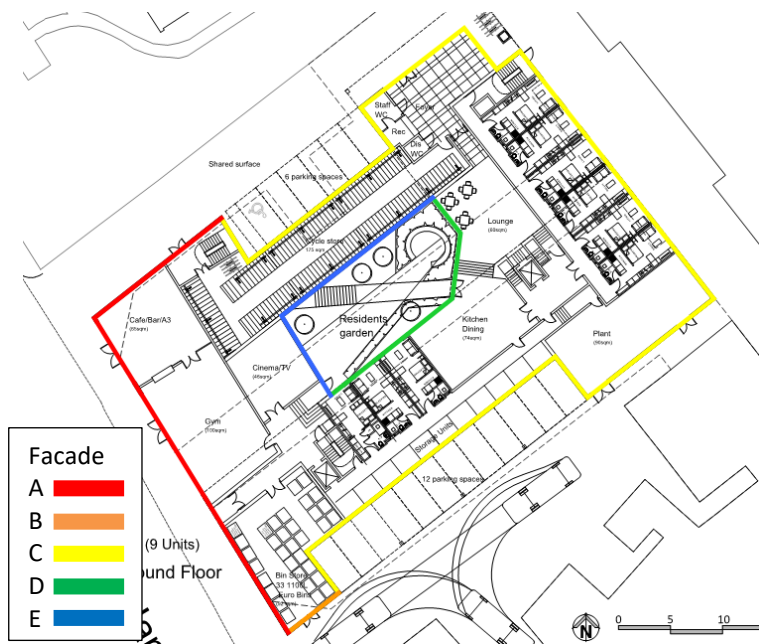


Figure 8 Mark-up of predicted facade noise levels – ground level

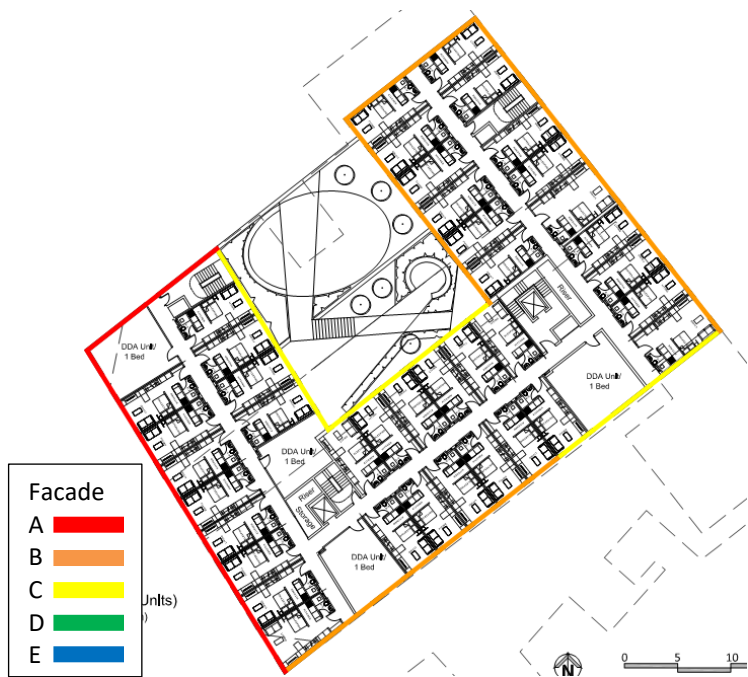


Figure 9 Mark-up of predicted facade noise levels – levels 1-3



Figure 10 Mark-up of predicted facade noise levels – level 4



Figure 11 Mark-up of predicted facade noise levels – levels 5-8

Table 5 Predicted facade noise levels (dB)

Facade	Predicted facade noise level, L_{Aeq} (dB)
A ■	65
B ■	60
C ■	55
D ■	50
E ■	45

7.2 Facade sound insulation

To achieve the internal noise criteria given in Section 5.3 for bedrooms and other living areas, minimum facade sound insulation requirements have been determined, based on the external noise levels at each facade stated above.

The minimum sound insulation performances for the different building facades are given in Table 6 based on the mark-ups shown in Figure 8 to Figure 11.

Table 6 Facade sound insulation performance requirements

Facade	Overall sound insulation performance R_w+C_{tr} (dB)
A 	31
B 	25
C 	20
D 	15

7.3 Guidance on facade construction, glazing, and ventilation strategy

Table 6 sets out some examples of glazing build ups and ventilation strategies that could be employed to achieve the required sound insulation performance for the various elevations.

Table 7 Example glazing configurations and ventilation strategies

Sound insulation R_w+C_{tr} (dB)	Example glazing configuration	Ventilation Strategy
15	6 mm/12 mm/6 mm	Standard passive ventilation (eg trickle vents)
20-25	6 mm/12 mm/6 mm	Attenuated passive ventilation
31	6.4 mm/12 mm/6 mm	High performance attenuated passive ventilation

The specified sound insulation can be achieved using any thermal double glazing system in the majority of areas. At the noisiest facade locations, standard thickness double glazing will still be suitable but the sound insulation performance requirement should be specified to ensure this is achieved by the contactor.

Where ventilation opening are required, (eg, wall vents or trickle vents) these will need to be specified to maintain the overall sound insulation performance of the building facade.

As the design progresses, a more detailed facade sound insulation assessment will need to be performed, to ensure that the overall performance requirements will be met.

8 Conclusion

The minimum measured background sound levels were $L_{A90,15min}$ 49 dB during the day, and $L_{A90,15min}$ 39 dB during the night. On the basis of the requirements of Havant Council, the relevant plant noise limits at the worst affected existing noise sensitive premises would be L_{Aeq} 49 dB during the day and L_{Aeq} 39 dB during the night. These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent than those set out above.

An assessment has been carried out to determine the building facade sound insulation necessary to achieve internal noise criteria in line with BS 8233 guidance as stipulated by the Havant Council. At the noisiest elevations, the building facade must be capable of providing a sound insulation performance of R_w+C_{tr} 31 dB. This can be achieved using standard thickness double glazing and acoustically attenuated passive ventilation openings.

Appendix A – Survey details

Equipment

A Rion NL-52 sound level meter was used to undertake the unattended measurements. The attended measurements undertaken on 7 December were carried out using a Rion NL-52 sound level meter and the attended measurements undertaken on 12 December were carried out using a Brüel & Kjær 2250 sound level meter. The calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00264531	Rion	14 Jul 18	09292
Microphone	UC-59/09678	Rion	14 Jul 18	09292
Pre-amp	NH-25/64656	Rion	14 Jul 18	09292
Calibrator	NC-74/34367630	Rion	14 Jul 18	09287
Sound level meter	NL-52/00375679	Rion	6 Jul 19	TCRT17/1440
Microphone	UC-59/11168	Rion	6 Jul 19	TCRT17/1440
Pre-amp	NH-25/65806	Rion	6 Jul 19	TCRT17/1440
Calibrator	SV30A/10576	Svan	3 Jul 19	TCRT17/1418
Sound level meter	2250/3011195	Brüel & Kjær	17 Mar 19	UCRT17/1158, UCRT17/1157
Microphone	4189/3086746	Brüel & Kjær	17 Mar 19	UCRT17/1158, UCRT17/1157
Pre-amp	ZC0032/25565	Brüel & Kjær	17 Mar 19	UCRT17/1158, UCRT17/1157
Calibrator	4231/3017676	Brüel & Kjær	16 Mar 19	UCRT17/1147

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meters used in this survey are available upon request.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators. No significant deviation in calibration occurred.

Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

The L_{A90} is considered most representative of the background sound level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

During the attended measurements carried out on 7 December 2017, the weather was generally clear and dry. Some rain did occur, but measurements were timed such that it was not considered to have a significant effect on the measured levels. Wind speeds varied between approximately 1 m/s and 5 m/s.

During the attended measurements carried out on 12 December 2017, the weather was generally clear and dry and no rain occurred. Wind speeds varied between approximately 1 m/s and 3 m/s.

During the unattended noise measurements between 7 December 2017 and 12 December 2017, weather reports for the area indicated that temperatures varied between -3°C at night and 14°C during the day, and the wind speed was less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B – Results of unattended measurements

