



Reading Borough Council

NORTH STREET

Noise Assessment Report



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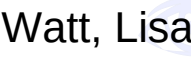
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1 INTRODUCTION

1.1 GENERAL

- 1.1.1. WSP has been instructed by Reading Borough Council (RBC) to undertake a noise assessment of a site at North Street, Reading to determine suitability of the site for residential use.
- 1.1.2. WSP has carried out a survey to determine the existing noise on the proposed development site.
- 1.1.3. A glossary of technical terms used in this report can be found in Appendix A.

1.2 SITE DESCRIPTION

- 1.2.1. The site is located on North Street in Reading, Berkshire. The site lies approximately 500m south west of Reading railway station and 100m north of the A329 Chatham Street. There are existing residential flats to the west of the site and south of the site. There is an ambulance depot to the north of the site and a mix of light industrial and commercial buildings to the east.
- 1.2.2. The site is currently vacant with a small area of hard standing used for parking. The road which runs along the southern boundary of the site is a no-through road.
- 1.2.3. A satellite photo showing the development site bounded with a red line is shown Figure 1

Figure 1 - Site Location (Google Earth)



1.3 DESCRIPTION OF SCHEME

1.3.1. The proposed development is for 41 residential units within 2 buildings – one building comprising 4 storeys (western side of site) and one 5 storey building (eastern side of site). The building heights are between approximately 18 m and 20 m. Both buildings will have ancillary services (bicycle and bin storage) on the ground floor and provision has been made for 9 car parking spaces on the eastern boundary of the site, facing North Street away from existing residential flats.

1.3.2. The building use for each storey of the building is provided in Table 1.

Table 1 - Proposed building use

Storey	Uses	
	Western Building	Eastern Building
Ground floor	5 flats, bicycle storage, bins stores	3 flats bicycle storage, bins stores
First floor	6 flats	4 flats
Second floor	6 flats	4 flats
Third floor	5 flats	4 flats
Fourth floor	N/A	4 flats

1.3.3. The building layouts for each storey are shown in the figures below.

Figure 2 - Ground Floor Layout



Figure 3 - First and Second Floor Layouts



Figure 4 - Third Floor Layout



Figure 5 - Fourth Floor Layout



2 CRITERIA

2.1.1. The following policy and guidance has been taken into consideration in this assessment.

2.2 NATIONAL PLANNING POLICY FRAMEWORK

2.2.1. The NPPF (as amended June 2019) provides guidance and key objectives for local policy development. Relevant policies are outlined below:

2.2.2. Paragraph 11 states (inter alia):

Plans and decisions should apply a presumption in favour of sustainable development...

For decision-taking this means:...

- *approving development proposals that accord with an up-to-date development plan without delay;*
- *or where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*
 - *the application of policies in this Framework [i.e. the NPPF] that protect areas or assets of particular importance provides a clear reason or refusing the development proposed; or*
 - *Any adverse impacts of doing so would significantly and demonstrably outweigh the benefit, when assessed against the policies in this Framework [i.e. the NPPF] taken as a whole"*

2.2.3. Paragraph 170 (inter alia):

"Planning policies and decisions should contribute to and enhance the natural local environment by:...

- *e) Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of...noise...*

2.2.4. Paragraph 180 (inter alia):

"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;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".*

2.3 NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

2.3.1. The NPSE (2010) outlines primary policy aims in relation to the control of environmental, neighbour and neighbourhood noise to achieve sustainable development in line with the NPPF. These aims are to:

- **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.**

- 2.3.2. In March 2014, the Department for Communities and Local Government (DCLG) released its PPG web-based resource to support the NPPF. The guidance advises that local planning authorities should consider:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 2.3.3. This guidance introduced the additional concepts of NOAEL (No Observed Adverse Effect Level) and UAEL (Unacceptable Adverse Effect Level).
- 2.3.4. Factors to be considered in determining if noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts
- 2.3.5. The accompanying explanatory note introduces the concepts behind observed effect levels in relation to noise policy, and the phrases “Significant adverse” and “adverse” in describing the related impacts.
- 2.3.6. The NPSE Explanatory note also states that these relevant descriptors do not have a single objective measure associated with them, and as such additional guidance is required along with relevant context in sufficiently assessing any related noise impact
- NOEL – No Observed Effect Level. *“This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.”*
 - LOAEL – Lowest Observed Adverse Effect Level. *“This is the level above which adverse effects on health and quality of life can be detected.”*
 - SOAEL – Significant Observed Adverse Effect Level. *“This is the level above which significant adverse effects on health and quality of life occur.”*

2.4 PROPG: PLANNING AND NOISE

- 2.4.1. Professional Practice Guidance (ProPG) on Planning and Noise for new residential development was published by a Working Group consisting of the Association of Noise Consultants (ANC), Institute of Acoustics (IoA) and the Chartered Institute of Environmental Health (CIEH) in May 2017. Whilst it does not constitute official government code of practice, it provides a framework for delivering sustainable development by promoting good health and well-being through the effective management of noise as encouraged by the NPSE and NPPF.
- 2.4.2. ProPG sets a systematic, proportionate, risk based, 2-stage approach for assessing new residential development. These are:
- Stage 1 – an initial noise risk assessment of the proposed development site: and
 - Stage 2 – a systematic consideration of the four key elements, which comprise the following:
 - Element 1 – demonstrating a “Good Acoustic Design Process”;
 - Element 2 – observing internal “Noise Level Guidelines”;
 - Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
 - Element 4 – consideration of “Other Relevant Issues”.

- 2.4.3. The Stage 1 initial noise risk assessment is based on placing the site within ranges of external noise levels, which correspond to varying degrees of risk. It is noted that the external noise levels refer to those from all sources of transport noise, and only include industrial noise sources where they are 'not dominant'. The external noise level ranges overlap slightly, ensuring that the site is not simply assessed in terms of an absolute noise limit. The initial noise risk assessment approach is illustrated in Figure 1 contained within the ProPG, which is shown in Figure 6 below.
- 2.4.4. The Stage 1 initial noise risk assessment is not designed to enable a final decision to be made on the suitability of the site in terms of noise, but to allow an early indication of the suitability and identification of any noise issues which may be associated with the site.
- 2.4.5. The Stage 2 assessment is then carried out, with the four elements detailed in Section 2.4.2 undertaken in parallel.

Figure 6 - ProPG Initial Site Noise Risk Assessment

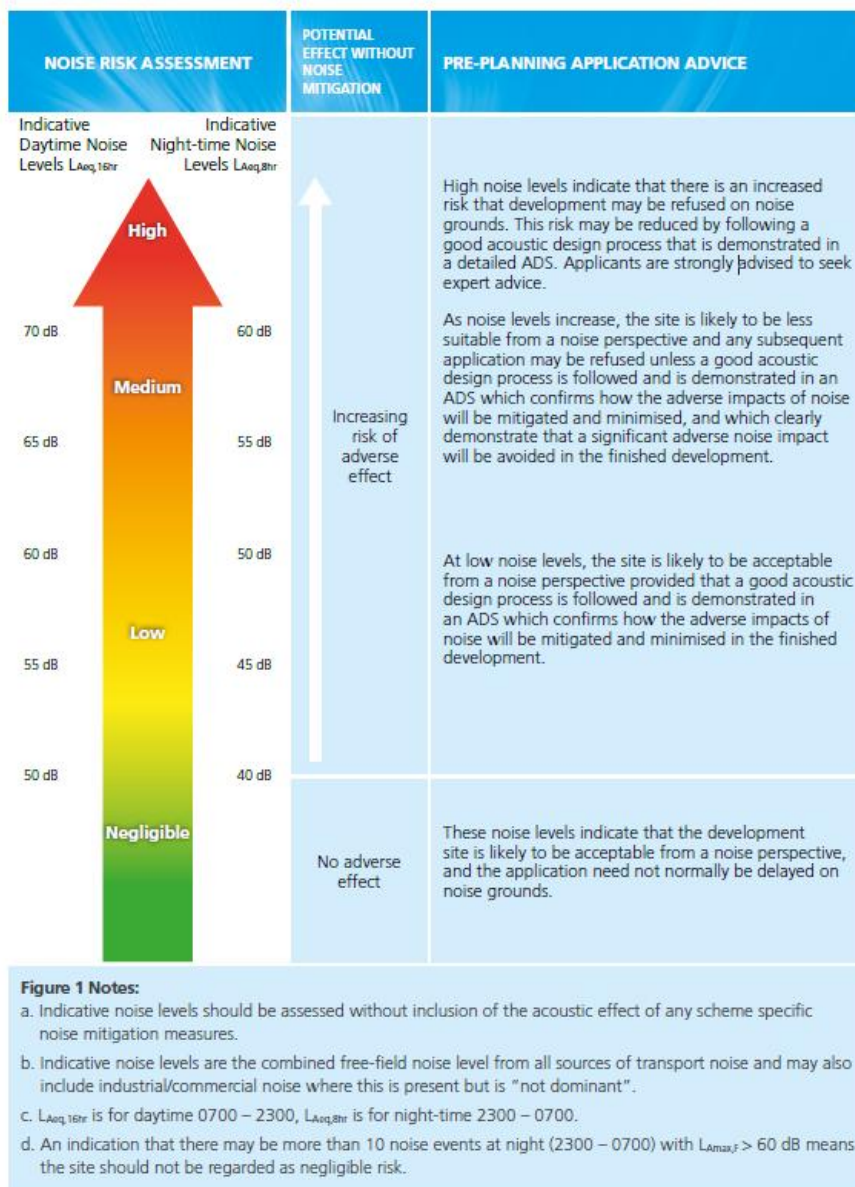


Figure 1. Stage 1– Initial Site Noise Risk Assessment

2.5 LOCAL POLICY

- 2.5.1. The Reading Borough Local Development Framework Core Strategy was adopted in January 2008 (with an alteration adopted January 2015). It contains a policy relating to noise which is relevant to the proposed development site.
- 2.5.2. Policy CS43 Pollution and Water Resources states that developments that are sensitive to noise will only be permitted in areas where they are not subject to high levels of noise pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.
- 2.5.3. A Draft Local Plan was submitted for examination in March 2018 for examination. In the context of the proposed development, the following policies from the draft Local Plan are relevant:
- Policy CC8: Safeguarding Amenity states that ‘*development will not cause a significant detrimental impact to the living environment of existing or new residential properties, in terms of:....Noise and disturbance*’; and
 - Policy EN16 Pollution and Water Resources which states that ‘*development will only be granted where it would not be damaging to the environment through...noise...pollution*’ and that ‘*proposals for development that are sensitive to noise.....will only be permitted in areas where they are not subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution*’.

2.6 BS8233:2014 “GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS”

- 2.6.1. BS8233:2014 recommends appropriate internal noise levels for habitable rooms such as bedrooms and living rooms for daytime and night-time periods.
- 2.6.2. BS8233 recommends an internal noise limit of 35 dB $L_{Aeq,T}$ for bedrooms and living rooms during daytime hours (0700 – 2300) and an internal noise limit of 30 dB $L_{Aeq,T}$ bedrooms during night-time hours (2300 – 0700). BS8233 also recommends an external noise limit range of 50-55 dB $L_{Aeq,T}$ in outdoor amenity areas such as gardens during daytime hours.
- 2.6.3. Shorter duration and intermittent noise events can be responsible for sleep disturbance. While BS8233:2014 does not recommend specific maximum noise limits for controlling these events, ProPG references a level of 60 dB L_{Amax} that when exceeded on more than 10 occasions at night, the site should not be regarded as negligible risk (see notes for Figure 6). As a rough approximation, this equates to 48 dB L_{Amax} internally through an open window.
- 2.6.4. The indoor noise limits for bedrooms during daytime and night-time periods have been taken into consideration in assessing the necessary façade insulation. The values are detailed in Table 2 below:

Table 2 - BS8233:2014 Noise Limits for Bedrooms

Period	Internal Noise Limit (dB)
Daytime (0700 – 2300 hrs)	35 $L_{Aeq,16hr}$
Night-time (2300 -0700 hrs)	30 $L_{Aeq,8hr}$

3 METHODOLOGY

3.1 GENERAL APPROACH

- 3.1.1. The assessment has considered the impact of the existing noise sources on the proposed residential site and the potential impact from the proposed development on existing residential flats.
- 3.1.2. Given the small-scale nature of the development, impacts during construction and changes in road traffic noise levels as a result of the development have been scoped out.
- 3.1.3. The methodology used, standards and guidance followed in this assessment have been agreed with the Environmental Health Officer at RBC.

3.2 NOISE SURVEY

- 3.2.1. The noise survey was carried out at the site between 6th and 7th September 2017. The locations are shown in Figure 7 and exact locations shown in Table 3.
- 3.2.2. The main aim of the survey was to determine the existing ambient noise levels on the site.

Figure 7 - Monitoring Locations Map (Google Earth)



Table 3 - Monitoring Location

ID	Location	Description
SLM	51°27'27.21"N, 0°58'49.74"W	North Street, to the east of the site

- 3.2.3. Daytime noise measurements were undertaken over a 1-hour period; night-time noise measurements were undertaken over two 15 minutes' periods.
- 3.2.4. The ambient noise levels on the site were characterised by trains (including horns) from the railway line to the north, vehicle pass-bys on North Street and buses on Great Knollys Street accessing the bus depot.
- 3.2.5. The ambulance depot was not considered a significant source of noise at the site as the predominant activity is vehicles manoeuvring at low speeds on the site. Emergency sirens are only used occasionally when vehicles are leaving the depot and only during daytime periods. At the rear of the building there is staff parking and roller shutter doors into the depot. This area is also used for the cleaning of vehicles. There are existing residential flats overlooking this area and there is no record of noise complaints from activities at the depot.
- 3.2.6. Weather conditions over the survey were generally calm, with some gusts below 2.5 m/s during daytime, generally dry with some drizzle at night. The temperature was approximately 18°C during daytime and 11°C during night-time.
- 3.2.7. Sound measurements were made using Rion NL52, Class 1 Sound Level Meter (SLM). The measurement microphone was half inch microphone type UC-53A. The microphone was mounted at a height of 1.2m from the local ground level. The meter was calibrated on site using a Rion NC-74 calibrator; the levels were within accepted tolerances following all calibration procedures. Equipment used in the survey is detailed in Table 4 and calibration certifications are provided in Appendix B.

Table 4 - Sound Equipment

Measurements	Sound Level Meter	Pre-Amplifier	Microphone	Calibrator
SLM	Rion NL-52 S/N 00320637	Rion NH-25 S/N 106453	Rion UC-59 S/N 05708	Rion NC-74 S/N 35125825

- 3.2.8. A summary of the measurement results is provided in Table 5.

Table 5 - Summary of Results from Noise Survey

Date and Time	Duration (minutes)	Daytime			
		L _{Aeq} , dB	L _{A90} , dB	L _{A10} , dB	L _{Amax} , dB
06/09/2017 14:22	60	54.8	48.4	57.4	75.5
07/09/2017 00:07	15	48.8	40.9	51.6	64.1
07/09/2017 00:58	15	41.7	35.5	43.8	57.6

- 3.2.9. Full details of the noise monitoring survey are contained in the monitoring forms within Appendix C.

4 ASSESSMENT

4.1 SITE SUITABILITY

- 4.1.1. Based on the categories set out in ProPG, as assessment of noise risk of the proposed development site has been carried out.
- 4.1.2. The following assumptions have been made in carrying out this assessment:
- Daytime noise levels measured on the site over a 1-hour period are considered to be representative of the 16 hour daytime period.
 - Night-time noise levels measured on the site, taken between 0000 – 0200hrs, over 15 minutes periods in two circuits have been averaged and considered as representative of the 8-hour night-time period.
- 4.1.3. Table 6 shows that, based on the noise levels measured on site the development is likely to be acceptable from a noise perspective provided that a good acoustic design process is adopted, according to the categories described in ProPG. L_{Amax} levels measured during the night were between 58 – 64 dB. ProPG suggests that where there may be more than 10 noise events at night (0700 – 2300 hrs) with an L_{Amax} of greater than 60 dB a site should not be regarded as negligible risk. A site is regarded as high risk if the L_{Amax} exceeded 80 dB more than 20 times a night.
- 4.1.4. L_{Amax} levels were associated with vehicle passbys on North Street and bus movements at the depot on Great Knollys Street, approximately 70 m to the north of the site. Based on the observations during the noise survey, high L_{Amax} levels were not associated with the ambulance depot. Bus movements associated with the depot do not occur all through the night-time period and are restricted to the 'shoulder hours' as buses enter service (approximately 0500 hrs) and end service (approximately 0100hrs). Therefore the likely number of events with an L_{Amax} level greater than 60 dB is limited.
- 4.1.5. Based on the maximum noise level, number of events and the source of the noise being buses which are regular/scheduled, the site is regarded as being at low risk of adverse effect without noise mitigation.

Table 6 - Potential Development Effect

Period	$L_{Aeq, T}$ dB	Potential Effect Without Noise Mitigation
Daytime, 16 hour (0700 – 2300 hrs)	55	Low risk of adverse effect
Night-time, 8 hour (2300 – 0700 hrs)	47	Low risk of adverse effect

- 4.1.6. It is noted that noise measurements were made at ground floor height and the proposed development comprises up to 5 storeys, with residential units on all floors. Existing noise on the site is characterised by local sources, close to the site. There are no dominant noise sources such as main roads which are being screened at lower levels by surrounding buildings. Therefore, it is unlikely that noise levels at increased heights would be significantly different to those at ground level. The assessment has assumed that the measured noise levels are representative of the noise level at all 5 storeys.

FAÇADE NOISE INGRESS

- 4.1.7. The results from the noise survey have been used to determine the sound insulation required to achieve the internal limits from BS8233:2014.
- 4.1.8. The BS8233 simple calculation method for the evaluation of sound insulation requirements for facades has been used in this assessment to provide a typical sound insulation performance requirement value ($R_w + C_{tr}$, dB) for habitable rooms at this preliminary stage in the design process. The calculation and derived $R_w + C_{tr}$ performance requirement values for the site are shown in Table 7. The assessment is based on the measured day and night-time noise levels at the site.

Table 7 - Required Façade Sound Insulation for the Site

Period	External Noise Level dB	Target Indoor Criteria dB	Sound Reduction ($R_w + C_{tr}$) dB
Daytime L_{Aeq}	55	35	20
Night-time L_{Aeq}	47	30	17
Night-time L_{AFmax}	64	45	19

- 4.1.9. An external building façade would typically achieve a minimum sound insulation of 40-45 dB $R_w + C_{tr}$. The weakest elements in a building façade will be the glazing and ventilators, and these will therefore determine the overall composite performance of the façade as a whole.
- 4.1.10. Achievement of the BS8233 internal noise limits is based on windows being closed in habitable rooms, with ventilation provided through trickle vents or a mechanical ventilation system, depending on the design development.
- 4.1.11. Typical performance ranges for glazing and ventilators are shown in Table 8 and Table 9 below. It is noted that glazing performance is stated in terms of an $R_w + C_{tr}$ value, whereas ventilator performance is stated in terms of a $D_{ne,w} + C_{tr}$ value, which is a weighted laboratory sound reduction performance value for a single ventilation element. The configurations are indicative only and full detailed calculations will be required during the detailed design stage.

Table 8 - Typical Sound Insulation ratings for glazing (BS6262-2)

	$R_w + C_{tr}$
Typical 4mm / 12mm / 4mm glazing	29 dB
Typical 6mm / 12mm / 4mm glazing	31 dB
Typical 6mm / 12mm / 6mm glazing	32 dB
Typical 10mm / 12mm / 4mm glazing	35 dB
Typical 10mm / 12mm / 6mm glazing	36 dB

Table 9 - Typical Sound Insulation ratings for passive ventilators

	$D_{ne,w} + C_{tr}$
Trickle vent with direct air path	32 dB
Through wall vent (100mm diameter)	34 dB

- 4.1.12. It can be seen by comparing the required sound reduction values in Table 8 with the information in Table 7 that a workable glazing solution exists that would result in the target internal noise levels being achieved. A minimum performance value of 12 dB is required for the glazing which is achieved by all the glazing specifications list in Table 8. The values in Table 9 also show that a suitable arrangement for passive ventilations could be achieved. A minimum performance value of 17 dB is required for the glazing and passive ventilators which is achieved by all specifications list in Table 8 and Table 9.

EXTERNAL NOISE LEVELS

- 4.1.13. BS8233 recommends an external noise level of 50-55 dB $L_{Aeq,T}$ in outdoor amenity areas including balconies intended to be used for relaxation during daytime hours. External daytime noise levels measured at the site are around 55 dB L_{Aeq} (ground floor) and therefore at the upper limit of the BS8233 recommended level. It is likely that on some balconies, not overlooking North Street which is the dominant source of noise of the site, noise levels will be lower.

4.2 ASSESSMENT OF IMPACT FROM PROPOSED DEVELOPMENT

- 4.2.1. The impact of noise associated with the proposed development on existing noise sensitive receptors (NSRs) adjacent to the site has been considered. There is no fixed plant associated with the proposed development and therefore an assessment of plant noise is not required.
- 4.2.2. The proposed development has a small car parking area (9 spaces) for residents, therefore noise from cars movements has been considered. The car parking area is on the eastern boundary of the site, facing North Street away from existing residential flats. In order to represent a worst-case scenario, the potential noise impacts of cars leaving during night-time periods has been assessed. Noise break-in at the nearest NSRs from the car park has been considered in relation to potential sleep disturbance.
- 4.2.3. Recent measurements undertaken by WSP of a car ignition and pull away (including car door slam) in a car park demonstrated maximum sound levels of up to 72 dB L_{Amax} , at approximately 10 m from the car.
- 4.2.4. For a typical façade with an open window a reduction of 12 dB can be expected. The site layout means that vehicle movements within the car park would be screened from the closest NSR by two new buildings. Therefore, a screening correction of 10 dB can expected to be achieved. This would result in an internal level of approximately 47 dB L_{Amax} at the nearest NSR to the car park. This is below the 60 dB level (equivalent to 48 dB internally) referenced in ProPG above which a site should not be regarded as negligible risk.
- 4.2.5. Typical L_{Amax} levels during night-time periods measured during the baseline noise survey were between 58 – 64 dB, indicating that the existing noise environment is characterised by noise events of a greater magnitude than those associated with car movements from the proposed development.



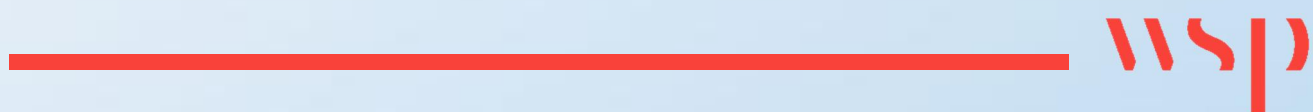
Therefore, given the predicted noise level, the small number of events, and within the context of the existing noise environment, it is unlikely that noise levels related to use of the car park will result in sleep disturbance at the nearest NSRs.

5 CONCLUSIONS

- 5.1.1. This assessment has been prepared to determine the suitability of the site for residential development.
- 5.1.2. The assessment concludes that noise levels at the proposed site are currently characterised by intermittent noise sources close to the site such as car door slams and individual car pass-bys. Distant road traffic noise, train noise and aircraft noise was also noted. Noise levels are not considered high in absolute terms.
- 5.1.3. The site is suitable for residential use subject to provision of appropriate building envelope sound insulation.
- 5.1.4. Full detailed calculations will be required to determine specific sound insulation performance requirements at different façades. It is anticipated that this requirement will be included as a condition to any planning permission granted for the scheme.
- 5.1.5. The impact of the proposed scheme on existing NSR from the proposed development has been considered from car park activities. This shows that, with the provisions stated in the assessment, no impact would occur from the proposed development.
- 5.1.6. The limitations to this report can be found in Appendix D.

Appendix A

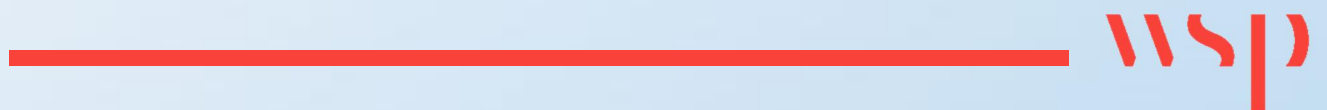
GLOSSARY OF ACOUSTIC TERMINOLOGY



Decibel (dB)	The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between 2×10^{-5} and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.
Sound Pressure Level (SPL)	The Sound Pressure Level has units of decibels, and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure. It is defined as follows: $\text{SPL (dB)} = 20 \log_{10}(P/P_{\text{ref}}) \text{ where } P = \text{Sound Pressure (in Pa)}$ $P_{\text{ref}} = \text{Reference Pressure } 2 \times 10^{-5} \text{ Pa}$ An SPL of 0 dB suggests the Sound Pressure is equal to the reference pressure. This is known as the threshold of hearing. An SPL of 140 dB represents the threshold of pain.
A-Weighting	The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. SPL readings with the A-weighting applied are represented in dB(A).
L10 or LA10 and other percentile measures	This represents the SPL which is exceeded 10% of the time, expressed in dB or dB(A). LA10 is used to quantify road noise levels. Other percentiles exist and are used for various types of noise assessment. These include L01, L50, L90, L99.
Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Noise Sensitive Receptors (NSR's)	Any identified receptor likely to be affected by noise. These are generally human receptors, which may include residential dwellings, work places, schools, hospitals, and recreational spaces.
Rw + Ctr	Sound insulation requirements are stated in these terms. Rw is the weighted sound reduction index and Ctr is a spectral correction term which takes account of the lower sound insulation performance of building elements at low frequencies.

Appendix B

CALIBRATION CERTIFICATES



CERTIFICATE OF CALIBRATION

Certificate Number

UCRT16/1036

UKAS Accredited Calibration Laboratory No. 7623

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Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Customers Calibrator
Calibrator adaptor type if applicable		NC-74-002
Calibrator cal. date		15 January 2016
Calibrator cert. number		UCRT16/1034
Calibrator cal cert issued by		7623
Calibrator SPL @ STP	94.03	dB Calibration reference sound pressure level
Calibrator frequency	1001.90	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.57	22.06	± 0.20 °C
Humidity	37.2	34.0	± 3.00 %RH
Ambient Pressure	100.26	100.23	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.2	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	10.7	15.5	20.7
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

Additional Comments

None

R 2

Span 948 Cal



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 19 April 2017

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT17/1289

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Approved Signatory

K. Mistry

CUSTOMER

WSP UK Ltd

4th Floor

6 Devonshire Square

London

EC2M 4YE

ORDER No

20043455

Job No

UKAS17/04171

DATE OF RECEIPT 13 April 2017

PROCEDURE

Procedure TP 1 Calibration of Sound Calibrators or Calibration Engineer's Handbook section 2

IDENTIFICATION

Sound Calibrator 01dB type CAL21 serial number 35103574(2010) with one-inch housing and adapter type BAC21 for half-inch microphone

CALIBRATED ON

19 April 2017

PREVIOUS CALIBRATION

Calibrated on 01 April 2016, Certificate No. 09050 issued by this laboratory.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

UKAS ACCREDITED CALIBRATION LABORATORY No 0653

Certificate No UCRT17/1289

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MEASUREMENTS

The sound pressure level generated by the Sound Calibrator in its half-inch configuration was measured using a B&K type 4134 microphone with the protective grid in position. The microphone sensitivity was traceable to National Standards.

RESULTS

The mean level of the calibrator output, corrected to the standard atmospheric pressure of 101.3 kPa using manufacturers' data, was

$$94.00 \pm 0.1 \text{ dB rel } 20 \mu\text{Pa}$$

The fundamental frequency of the sound output was $1002 \text{ Hz} \pm 0.06 \%$, and its total distortion was $(1.14 \pm 0.09) \%$.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

During the measurements the laboratory environmental conditions were:

Temperature: 21 to 22 °C

Atmospheric pressure: 102.6 to 102.7 kPa

Relative humidity: 32 to 44 %

The tests carried out were based on Annex B of BS EN 60942:2003, but with five determinations of sound pressure level, and limited to the above level(s) & freq(s). This is a subset of the tests specified in Annex B of BS EN 60942:1998. The mean level, frequency and total distortion of the sound output as measured meet the Class 1 requirements of BS EN 60942:1998 for the environmental conditions under which the tests were performed. This does not imply that the sound calibrator meets this standard under any other conditions. However it has successfully undergone pattern evaluation to the earlier Standard IEC 942:1988

Appendix C

NOISE MONITORING FORMS



Noise Monitoring Form



Equipment:	Rion NL-52 sn 00320637	Engineer:	Angela Lorenzo
Pre-Calibration Level:	94 dB	General Weather Description:	Dry and calm
Post-Calibration Level:	94 dB	Location:	North Street (51°27'27.21"N, 0°58'49.74"W)
Additional Comments: 1.2 m above ground, hard ground			

Measurement Period		Weather			Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed (m/s)	Wind Direction (from)	Temperature (°C)	L _{Aeq}	L _{A90}	L _{A10}	L _{Amax}	
06/09/2017 14:22	60	<2.5	W	18	54.8	48.4	57.4	75.5	Trains on the main line, road traffic noise, train horn
07/09/2017 00:07	15	<1	SW	11	48.8	40.9	51.6	64.1	Distant road traffic noise, trains, buses leaving and arriving to the depot
07/09/2017 00:58	15	<1	SW	11	41.7	35.5	43.8	57.6	Distant road traffic noise and trains.



Appendix D

REPORT LIMITATIONS





LIMITATIONS

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