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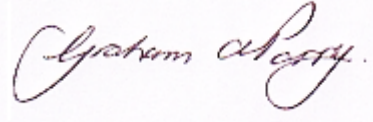
1 Right Plan

57 Basingstoke Road, Reading

Noise Impact Assessment of Kitchen Extract System

Status: Final

Date: 21.09.2018

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Date	21.09.2018
Version Number	A3433/N/001
Status	Final

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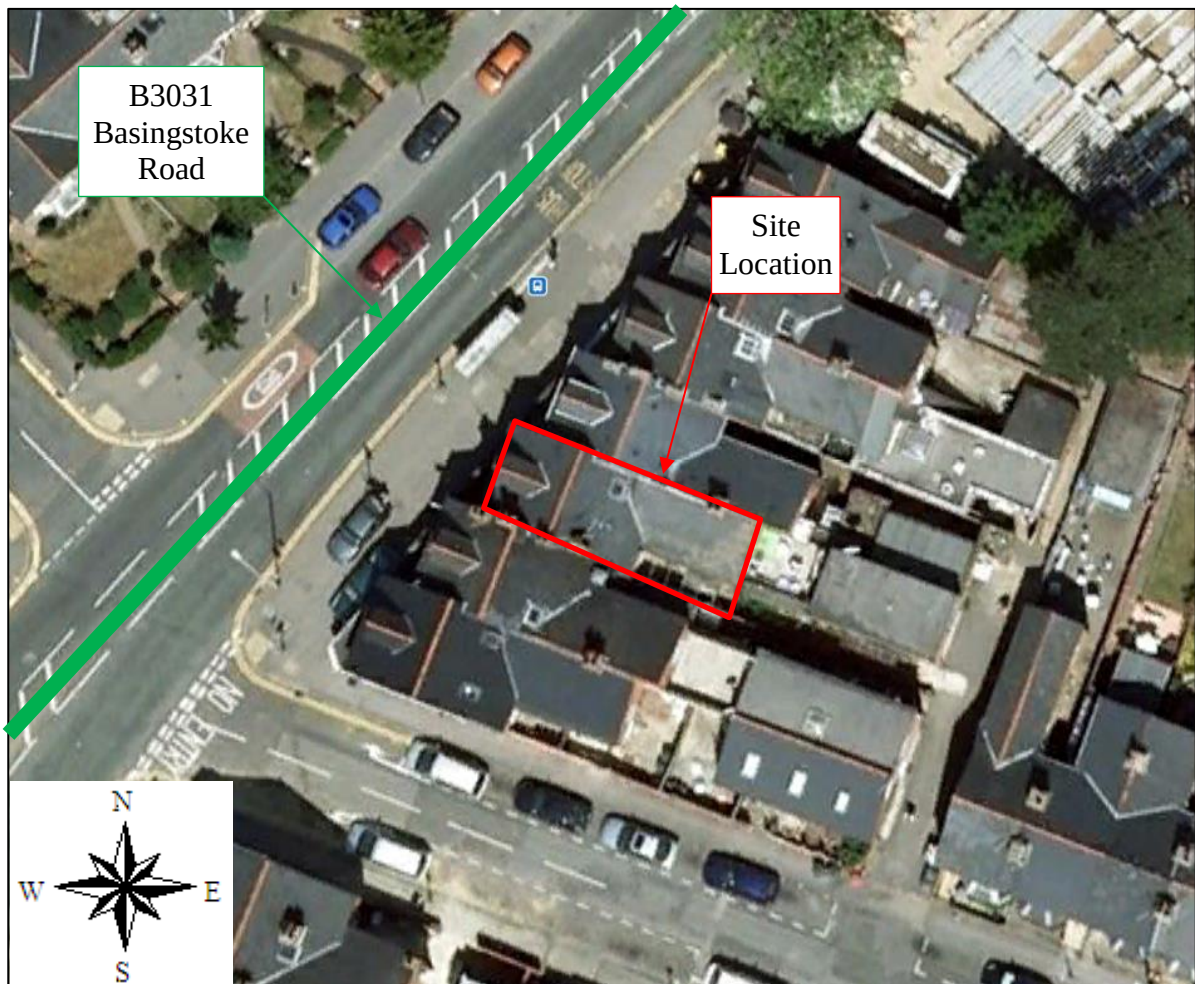
1. INTRODUCTION

ACCON UK Limited (ACCON) have been commissioned by 1 Right Plan, to carry out a noise assessment in order to determine the impact of noise on nearby residential receptors from the proposed hot food takeaway at 57 Basingstoke Road, Reading.

The assessment is required in order to quantify the impact of noise from the proposed kitchen extract system in line with the requirements of Reading Borough Council (RBC) as detailed in Pre-application advice dated 16th July 2018, Ref 180852/PREAPP. The proposed operating hours are 1100 hrs to 2300 hrs.

A noise measurement survey has been carried out in order to determine the ambient and background noise climate in the vicinity of the nearest noise sensitive receptors. A site location plan is shown in **Figure 1.1**.

Figure 1.1: Site Location Plan



2. THE NATURE, MEASUREMENT AND EFFECT OF NOISE

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to characterise the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels, for example from 60 dB(A) to 70 dB(A), would represent a doubling in 'loudness'. Similarly, a 10 dB(A) decrease in noise, for example from 70 dB(A) to 60 dB(A), would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible¹. **Table 2.1** provides typical noise levels of common sources.

Table 2.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

A glossary of acoustic terminology is provided in **Appendix 1**.

¹ Institute of Environmental Management and Assessment (2014). Guidelines for environmental noise impact assessment.

3. NOISE ASSESSMENT CRITERIA

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and has replaced the Planning Policy Guidance which previously covered planning and pollution control and new development in England. The purposed of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

One of the core planning principles is to contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser value, where consistent with other policies in the Framework. 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 soil, air, water or noise pollution or land instability.

Paragraph 123 of the NPPF states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts (see Explanatory Note to the Noise Policy Statement for England (DEFRA)) on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts (see Explanatory Note to the Noise Policy Statement for England (DEFRA)) 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 use since they were established (subject to the provisions of the Environmental Protection Act 1990 and other relevant law); 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.

3.2. Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The vision of the NPSE is to *'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development'*.

The NPSE aims to *'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.'*

3.3. Planning Practice Guidance

The Planning Practice Guidance for Noise (PPG-N), published in March 2014 as an online resource, provides advice on how to determine the noise impact on development.

'Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so 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.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.'

The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:

'Significant observed adverse effect level: *this is the level of noise exposure above which significant adverse effects on health and quality of life occur.*

Lowest observed adverse effect level: *this is the level of noise exposure above which adverse effects on health and quality of life can be detected.*

No observed effect level: *this is the level of noise exposure below which no effect at all on health and quality of life can be detected.'*

It is important to understand that as the PPG-N does not provide any advice with respect to specific noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment.

3.4. Reading Borough Council

Reading Borough Council (RBC) have issued the following advice in pre application advice (Reference: 180852/PREAPP):

"Noise – kitchen extraction

Applications which include noise generating plant, when there are nearby noise sensitive receptors, should be accompanied by an acoustic assessment carried out in accordance with BS4142:2014 methodology.

A noise assessment must be submitted with the application to determine the likely noise impact of the proposal and whether the proposals are acceptable.

A noise assessment of the proposed mechanical plant should be carried out in accordance with BS4141:2014 methodology. The predicted specific sound level (LAeq,TR) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall not exceed the existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment."

3.5. British Standard 4142:2014

BS 4142 *Methods for rating and assessing industrial and commercial sound* provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is used to rate the noise level of the source (this is defined as the 'specific sound level') outside residential dwellings.

The rating level is determined by assessing the character of the noise and applying an acoustic feature correction, if appropriate, to the specific sound level. Corrections are applied for the tonality, impulsivity and intermittency of the noise source which can all increase the impact of noise.

The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The British Standard states that the following points should be considered:

- *"Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

Where it is considered that the initial assessment of the impact needs to be modified due to the context in which the noise is occurring, BS 4142 suggests that all pertinent factors are taken into consideration, including:

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound² levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

- 2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*
- 3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
 - i. *facade insulation treatment;*
 - ii. *ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
 - iii. *acoustic screening.*

There is also a requirement within BS 4142:2014 to consider the uncertainty in the measurement and assessment procedure and it is stated that “*The level of uncertainty associated with a measurement of sound level depends upon a number of factors, including:*

- a. *the complexity of the sound source and the level of variability in sound emission from the source;*
- b. *the complexity and level of variability of the residual acoustic environment;*
- c. *the level of residual sound in the presence of the specific sound at the measurement location;*
- d. *the location(s) selected for taking the measurements;*
- e. *the distance between sources of sound and the measurement location and intervening ground conditions;*
- f. *the number of measurements taken;*
- g. *the measurement time intervals;*

² The residual sound is defined as the ambient sound level at the assessment location in the absence of the specific sound source

- h. the range of times when the measurements have been taken;*
- i. the range of suitable weather conditions during which measurements have been taken;*
- j. the measurement method and variability between different practitioners in the way the method is applied;*
- k. the level of rounding of each measurement recorded; and*
- l. the instrumentation used.”*

4. NOISE MEASUREMENT SURVEY

A noise measurement survey has been carried out at the site in order to determine the typical background and ambient sound levels ($L_{A90, T}$ and $L_{Aeq, T}$) at the nearest residential receptors to the proposed location of the roof-mounted kitchen extraction plant.

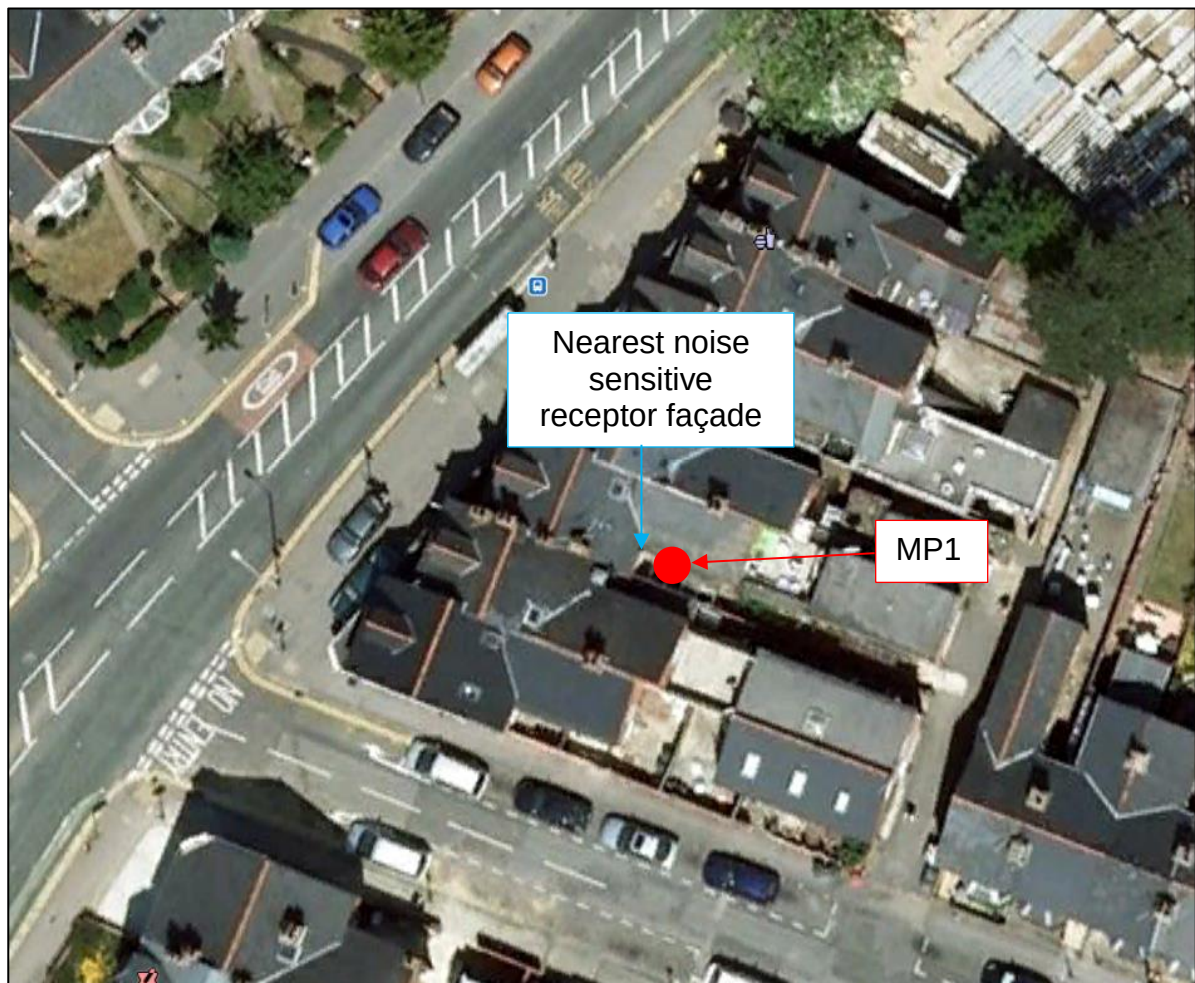
4.1. Semi-Permanent Noise Measurement

A semi-permanent noise monitoring position (MP1) was located on the roof terrace at first floor level to the rear of the proposed development for a period of 24 hours. The noise measurements were carried out between 1100 hrs on Tuesday 21st August 2018 and 1100 hrs on Wednesday 22nd August 2018. The microphone was mounted on a tripod located approximately 1 m from the façade of the building at a height of approximately 4m above the ground level. This position is representative of the first floor flats which are the nearest noise sensitive receptors to the site.

The sources of noise contributing to the noise climate at MP1 were road traffic on the B3031 Basingstoke Road and to a lesser extent traffic movements on Surrey Road. There was also plant noise from existing nearby commercial units.

The measurement position is identified in **Figure 4.1**.

Figure 4.1: Noise Measurement Position



The noise measurements utilised a Svantek 971 Class 1 Sound Level Meter which has a current certificate of calibration. Before and after the measurement period, the equipment was calibrated in order to ensure that the equipment had remained within reasonable calibration limits (± 0.5 dB).

The weather conditions recorded during deployment of the noise measurement equipment on Tuesday 21st August were dry with 80% cloud cover, and a temperature of approximately 23°C. The microphone position was shielded from the wind. The weather conditions recorded during collection of the noise measurement equipment on Wednesday 22nd May were dry with 100% cloud cover and a temperature of 22°C.

The noise levels measured at the semi-permanent noise measurement position (MP1) are summarised in **Table 4.1**. The noise levels have been corrected from façade measurements to free-field measurements by subtracting 3 dB. The detailed noise measurement results are presented in **Appendix 2**.

Table 4.1: Summary of Corrected Free-Field Noise Levels at MP1

Period (Hours)	$L_{Aeq, T}$ (dB)	L_{AFmax} (dB)	Average $L_{A10, 5min}$ (dB)	Average $L_{A90, 5min}$ (dB)	Typical $L_{A90, 5min}$ (dB)
0700 – 2300	46	79	47	43	45
2300 – 0700	43	71	44	41	43

Note: The noise measurements were carried out over consecutive five minute periods. The $L_{Aeq, T}$ was subsequently logarithmically averaged over the time periods indicated in **Table 4.1**, the $L_{A10, T}$ and Average $L_{A90, T}$ were arithmetically averaged and the L_{AFmax} is the maximum measured noise level in each period. The typical $L_{A90, T}$ is the most commonly occurring 5 minute L_{A90} during the specific period.

5. BS 4142 ASSESSMENT

Table 6.1 identifies the BS 4142 assessment that has been carried out in order to determine the maximum noise level that the proposed plant can generate in order to have a low impact on the nearest noise sensitive receptor. This assessment assumes a very worst case in which the plant is running constantly for the identified operational hours and that the plant is approximately 4m from the nearest noise sensitive receptor. The location of the nearest noise sensitive receptor is identified in **Figure 4.1** and is at a distance of 4 metres from the proposed extraction plant. The maximum sound power level (L_{WA}) has been derived using a standard point source attenuation formula.

Table 5.1: BS 4142 Assessment - Daytime

Results	Noise Level at the Nearest Noise Sensitive Receptor	Relevant Clauses of BS 4142:2014	Commentary
Typical Background Sound Level $L_{A90,T}$ (dB)	45	8.1, 8.2	A typical background sound level during the specific periods.
Maximum Specific Sound Level $L_{Aeq,1hr}$ (dB)	35	9.1	The specific sound level as identified in order to achieve RBC's requirement that the specific sound level should be at least 10 dB below the existing background sound level (L_{A90})
Maximum Sound Power Level (dB)	55	9.1, 9.2	The maximum possible sound power level in order to meet the requirements of RBC

The assessment of the existing noise levels at the proposed development in **Table 6.1**, identifies that in order for the assessment to give an indication of a low impact when assessed in line with the methodologies in BS 4142:2014, the proposed plant must have a maximum sound power level of 55 dBA.

6. CONCLUSION

A detailed noise assessment has been carried out to assess noise from the proposed extract plant of the proposed hot food takeaway at 57 Basingstoke Road, Reading.

An assessment of the sound from the proposed plant site has been undertaken with regard to the methodology in BS 4142:2014. The assessment has identified the maximum sound power level that the plant can produce in order to have a low impact on residents of the nearest noise sensitive receptor.

Subject to the installation of extract plant where the sound power level with any acoustic feature corrections does not exceed 55 L_{WA} then there are no noise reasons for refusal of the change of use application.

APPENDICES

Appendix 1

Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.
Decibel (dB)	This is a tenth (deci) of a bel. A decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.
$L_{Aeq,T}$ (Ambient /Period Sound Level)	The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.
$L_{A90,T}$ (Background Sound Level)	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time. The $L_{A90,T}$ is used to describe the background noise levels at a particular location.
L_{Amax}	The 'A'-weighted maximum sound pressure level measured over a measurement period.
Rating Level, $L_{Ar,Tr}$	The specific sound level plus any adjustment for the characteristic features of the sound.
Residual Sound Level, $L_r = L_{Aeq,T}$	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific Sound Level, $L_s = L_{Aeq,Tr}$	The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr .
Sound Power Level	The total sound energy radiated by a sound source in all directions. In decibels with a reference level of 1×10^{-12} Watts

Appendix 2 **Noise Survey Results**

Start & Time	L _{Aeq, 5min} (dB)	L _{AFmax} (dB)	L _{A10, 5min} (dB)	L _{A90, 5min} (dB)
0700 – 0800	48.2	66.8	49.8	45.4
0800 – 0900	48.7	65.9	50.5	45.8
0900 – 1000	48.4	58.7	50.0	46.1
1000 – 1100	48.7	69.6	50.3	46.1
1100 – 1200	49.6	70.6	50.4	46.6
1200 – 1300	52.9	81.5	51.9	47.0
1300 – 1400	48.3	66.7	49.5	46.3
1400 – 1500	46.7	63.6	48.1	43.8
1500 – 1600	46.7	72.3	47.1	43.0
1600 – 1700	46.4	65.6	47.9	44.2
1700 – 1800	46.7	70.9	47.7	44.3
1800 – 1900	48.9	68.4	50.2	46.6
1900 – 2000	49.5	68.2	50.6	47.4
2000 – 2100	49.9	68.9	51.2	47.3
2100 – 2200	47.6	66.5	48.9	45.6
2200 – 2300	47.2	56.7	48.7	45.1
2300 – 0000	45.9	55.8	46.7	44.3
0000 – 0100	45.7	61.7	46.6	44.1
0100 – 0200	45.3	57.9	46.0	43.9
0200 – 0300	44.0	56.7	44.5	43.1
0300 – 0400	45.9	58.7	46.7	43.8
0400 – 0500	44.6	55.1	45.4	43.1
0500 – 0600	45.8	60.1	47.0	44.0
0600 – 0700	47.9	74.1	48.8	44.8
0700 – 2300	48.7	81.5	49.6	45.7
2300 - 0700	45.8	74.1	46.5	43.9



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