104a Finchley Road, London

Residential Noise Assessment

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1 INTRODUCTION

1.1 Entran Ltd has been commissioned to undertake a noise assessment for a proposed residential development at 104a Finchley Road, London.

1.2 The assessment has been prepared to support a planning application for the Proposed Development to be submitted to the London Borough of Camden. This assessment has been undertaken to consider the noise levels at the proposed residential development. The assessment considers the existing ambient noise levels at the site and the sound from proposed rooftop plant items.

1.3 The potential noise impacts are assessed in accordance with the most relevant national and local standards and guidelines.

1.4 Details of the site, including the proposed plant items, have been compiled based on information provided by the applicant and are understood to be representative of the Proposed Development.

1.5 Road traffic noise levels are assessed using criteria provided within BS 8233:2014 and the WHO Guidelines. Fixed plant is considered using the methodology provided within BS 4142:2014+A1:2019. This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

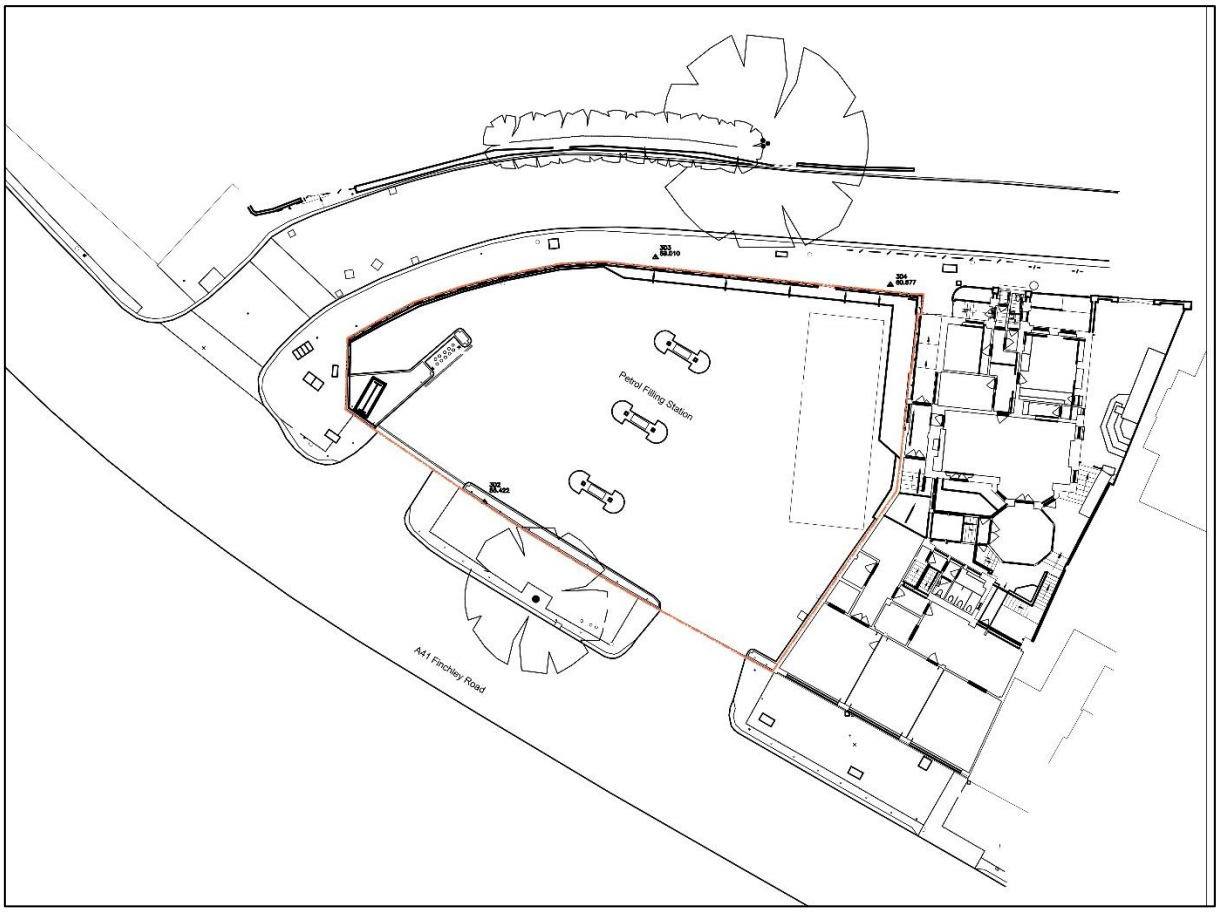
1.6 Additionally, BS 4142:2014 recognises that the context of a sound is important when defining the potential for subjective nuisance. The word “sound” is therefore used as opposed to “noise” to describe any sound assessed in the context of the BS 4142 assessment.

2 SITE DESCRIPTION

2.1 The site is situated to the north of the A41 Finchley Road. The surrounding area is mixed commercial and residential. The site is currently in use as an operational petrol filling station. The existing noise climate within the vicinity of the Proposed Development is dominated by road traffic on Finchley Road and occasional on-site vehicle movements.

2.2 The Proposed Development location and boundary are indicated in Figure 1.

Figure 1: Site Location



3 ASSESSMENT METHODOLOGY

National Policy

National Planning Policy Framework (NPPF) (July 2021)

3.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. It attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

3.2 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 174:

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

preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"

3.3 The NPPF goes on to state in paragraph 185 that:

"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 potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

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;

identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"

Noise Policy Statement for England NPSE (March 2010)

3.4 The Government is committed to sustainable development and the Department for Environment Food and Rural Affairs (Defra) plays an important role in this by working to secure a healthy environment in which current and future generations can prosper. One aspect of meeting these objectives is the need to manage noise for which Defra has the overall responsibility in England.

3.5 In March 2010, the Noise Policy Statement for England (NPSE) set out the long-term vision of Government noise policy as to:

'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

3.6 The long-term vision is supported by the following aims:

'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.'*

3.7 The explanatory note to the policy statement emphasises that sustainable development is a core principle underpinning all government policy. In this respect, there is a need to integrate consideration of the economic and social benefit of the activity under examination with proper consideration of the adverse environmental effects.

3.8 To achieve these objectives the NPSE sets out three noise conditions to be determined by the assessor:

NOEL - No Observed Effect Level

3.9 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

3.10 This is the level above which adverse effects on health and quality of life can be detected.

SOAEL - Significant Observed Adverse Effect Level

3.11 This is the level above which significant adverse effects on health and quality of life occur.

3.12 The NPSE considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable.

3.13 Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the NPSE requires that:

'All reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development…. This does not mean that such adverse effects cannot occur.'

3.14 No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits. Consequently, consideration of the observed effects is made through an assessment methodology as detailed below.

British Standard BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS 8233)

3.15 The scope of BS 8233 is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

3.16 This Standard suggests suitable internal noise levels within different types of buildings, including residential dwellings. It suggests that an internal noise level of 30 dB $L_{Aeq,\,T}$ within bedrooms is a 'desirable' standard. For living areas during the daytime, the standard recommends 35 dB $L_{Aeq,\,T}$ as a desirable standard for resting.

3.17 Whilst BS 8233 recognises that a guideline value may be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*.

3.18 The Standard also states that "*where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved*."

The Institute of Environmental Management & Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

3.19 The Institute of Environmental Management and Assessment (IEMA) have recently published the '*Guidelines for Environmental Noise Impact Assessment*'. The guidelines are applicable to noise impact assessment for any scale of development proposal, including core principles to achieve effectively integration with the EIA, and provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- The appropriateness of the noise parameters used for the situation;
- The reference time period used in making the assessment;
- The level, character and frequency content of the noise sources under investigation; and,
- How the predicted noise levels relate to relevant Standards and guidelines.

3.20 The guidelines also recommend that the assessor should determine the degree of impact based on evidence derived from the assessment.

The Professional Practice Guidance on Planning and Noise (2016)

3.21 The '*Professional Practice Guidance on Planning and Noise'* (ProPG) has been produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) to provide acoustical practitioners with guidance on the management of noise within the planning system in England.

3.22 The reparation of the ProPG acknowledges and reflects the Government's overarching NPSE, the NPPF and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. It provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- promote appropriate noise exposure standards; and,
- assist the delivery of sustainable development.

British Standard BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

3.23 British Standard BS 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and,
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.24 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or calculated sound level from the source in question, the *'specific sound level'*, at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the '*rating level*' that reflects the contextual setting of the site.

3.25 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'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; and,*

- *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.'*

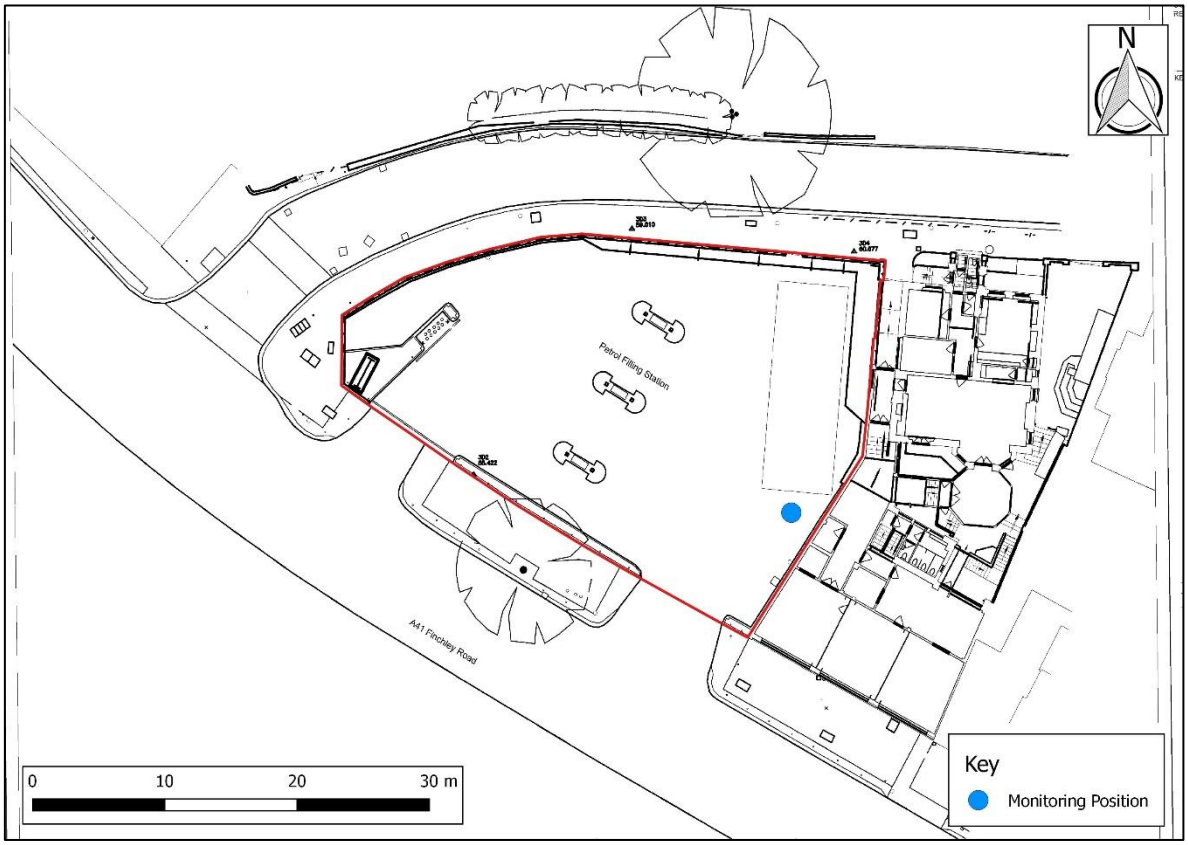
4 EXISTING AMBIENT AND BACKGROUND ENVIRONMENT

4.1 The background environment is dominated by road traffic on Finchley Road and therefore background sound levels at the site are likely to be representative of the future acoustic environment. However, the existing site is currently in use as an operational petrol filling station and therefore measurements of ambient noise levels will not be representative of the future environment at the Proposed Development.

4.2 Accordingly, noise conditions in the vicinity of the Proposed Development have been determined using a combination of environmental noise survey and noise modelling. Ambient noise levels have been assessed by computer noise model, with reference to road traffic flows available from the Department for Transport database for Road Traffic Statistics. Background sound levels have been obtained based on the lowest 15-minute L_{A90} value measured during the survey, which was conducted between 24th and 28th June 2022.

4.3 The monitor was placed at approximately 2 m above local ground at the monitoring position indicated in Figure 2.

Figure 2: Unattended Monitoring Location



4.4 To account for the likely influence of petrol station activities, statistical analysis of background sound levels has not been employed for the identification of limits for fixed plant items. The lowest measured background sound levels have instead been adopted in order to remove any possible influence from the petrol station. Statistical analysis of measurements is presented, for information, in Figure B2 of Appendix B.

4.5 The lowest measured background sound levels during any daytime and night-time period and resultant noise limits for fixed plant, inclusive of a correction of -3dB to account for possible increase due to façade reflections, are presented in Table 1.

Table 1: Adopted Background Sound Levels

Period	Background Sound Level, $L_{A90,T}$	Noise Limit for Fixed Installations of Mechanical Plant, $L_{Ar,Tr}$ (dB)
Daytime	54	51
Night-Time	47	44

4.6 All noise measurements were undertaken by competent individuals with experience in environmental noise monitoring. Measurements were obtained in accordance with the principles of BS 7445: 2003: '*Description and measurement of environmental noise'*.

4.7 On-site vibration levels were qualitatively assessed during the noise survey and no vibration was observed to be perceptible. It is therefore considered that a vibration survey was not required for the purpose of this assessment.

4.8 All acoustic measurement equipment used during the noise surveys conformed to Type 1 specification of British Standard 61672: 2003: *Electroacoustics. Sound level meters. Part 1 Specifications*. The noise measurement equipment used during the survey was calibrated at the start and end of the measurement period. There was no significant drift in calibration measurements observed during the survey period.

4.9 The microphone was fitted with a protective windshield and the sound level meter was situated in a weatherproof case. Consideration of weather conditions and stability of the unattended data indicates that the weather conditions during the survey did not significantly affect the survey.

5 NOISE ASSESSMENT

Ambient Noise Levels

5.1 Noise emission levels affecting the Proposed Development have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation' to predict noise levels generated at receiver locations by noise sources.

5.2 The ambient noise levels have been modelled using data obtained from the DfT Road Traffic Statistics to calculate the noise emissions from Finchley Road. The traffic data is presented in Appendix Figure B3.

5.3 The typical façade reduction afforded by insulated double glazing and attenuated trickle ventilation is given within BS 8233 as 33 dB. For partially open windows the reduction is given as 15 dB.

5.4 With consideration to these reductions, noise levels at facades not overlooking Finchley Road are calculated to achieve the BS 8233 criteria with closed windows. Properties overlooking Finchley Road will require specific consideration of glazing and ventilation options, with a reduction of up to 36 dB R_W+C_{tr} calculated as required.

5.5 The calculated façade reduction requirements are identified in Figure 3

Figure 3: Identified Façade Reduction Requirements, R_W+C_{tr}

5.6 Roof and façade constructions typically achieve an attenuation of at least 55 dB R_w, with the windows and trickle ventilators being the weakest part of any facade. It is therefore considered that no specific consideration of the façade design is required.

5.7 All proposed dwellings will require insulated double glazing and attenuated ventilation. Glazing and ventilation options should be specified to ensure the BS 8233 criteria is achieved when windows are closed. Ventilation should provide adequate reduction whilst in the 'open' position. Windows may remain openable to allow for purge ventilation or to be used at the occupants' discretion.

5.8 To ensure the R_W values take account of possible low frequency noise, the sound reduction index of each element should include a correction for the C_{tr} urban traffic noise spectrum. Any passive ventilation should achieve this value when open, to allow ventilation to the dwelling. Additionally, the glazing and ventilation installation must maintain the integrity of the façade with regard to noise insulation.

5.1 Calculated noise levels at the Proposed Development exceed the upper guideline noise level for external amenity.

5.2 However, it should be noted that the guidance (BS 8233) states that the guideline criteria for amenity areas *"are not achievable in all circumstances where development might be desirable. In areas such as city centres or urban areas adjoining the strategic transport network"*, and that *"a compromise between elevated noise levels and other factors, such as the convenience of living … might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*

5.3 BS 8233 goes on to state that for locations such as small balconies *"specification of noise limits is not necessarily appropriate"* but that the noise criteria should be achievable in some areas of larger amenity space.

5.4 Due to the size and location of the development additional amenity space cannot be provided. The balcony and terrace areas are provided for additional convenience to the occupants and in accordance with BS 8233 excess noise levels should not prohibit development, provided noise levels are mitigated as far as practicable.

Fixed Plant

5.5 The potential impacts of the proposed rooftop plant have been determined by calculation of continuous $L_{Aeq,T}$ sound levels during operation. Calculated sound levels at nearby residential receptors, with consideration to any possible corrections for acoustic features, have been assessed against the identified background sound levels.

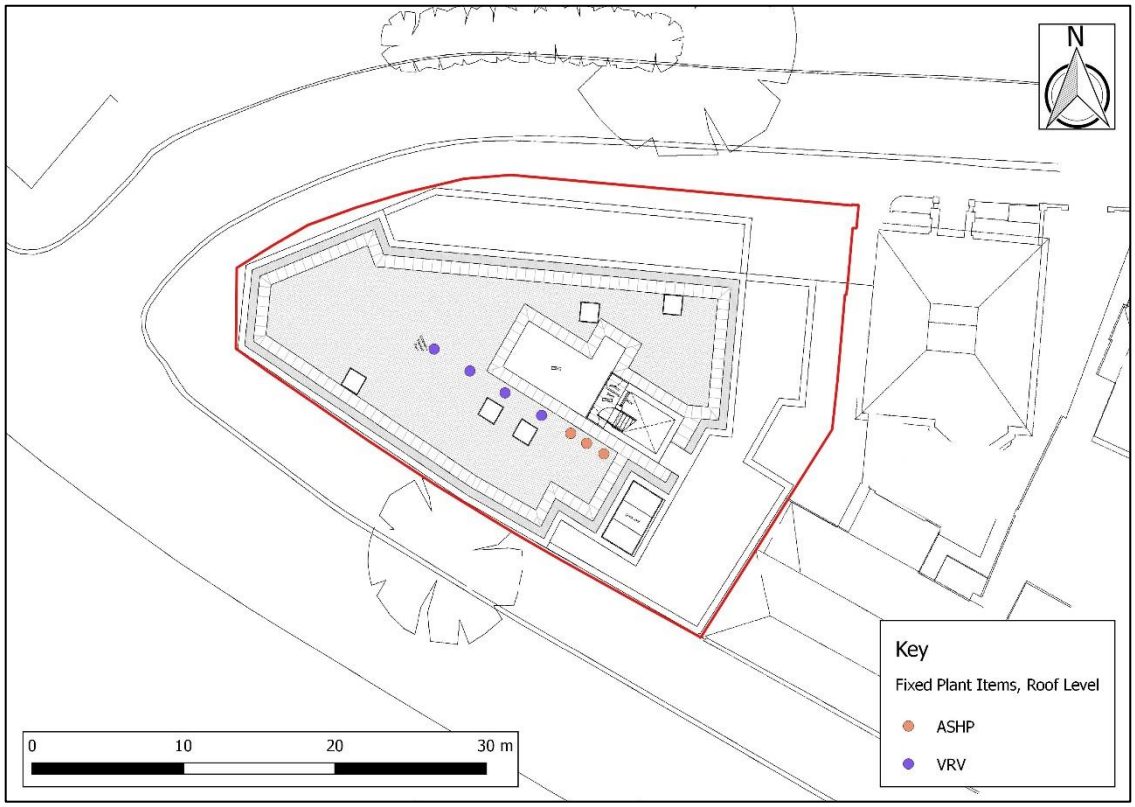
5.6 Sound emission levels from the Proposed Development have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation' to predict noise levels generated at receiver locations by potentially noisy sources.

5.7 The proposed activities have been assessed to ensure compliance with the relevant design standards contained within BS 4142:2014+A1:2019. The operation of the proposed plant items has been assessed for the day 07:00 – 23:00 and night-time 23:00 – 07:00 periods.

5.8 The external sources have been modelled based on information provided by the applicant. The units are modelled using provide noise data and are understood to run at a steady state during typical operation.

5.9 Specific sound levels have been calculated at existing nearby noise sensitive receptors. The modelled plant location is presented in Figure 4.

Figure 4: Modelled Source Location



5.10 A source sound pressure level spectrum has been provided at 1m from the proposed VRVs. This spectrum has been calibrated within the noise model to achieve the provided broadband sound pressure level of 58 dB(A) at 1m. This spectrum was also used to derive a source spectrum for the ASHPs, with a correction applied to achieve a sound power level of 63 dB(A). The modelled source data is presented in Table 2.

Table 2: Source Sound Power Levels

ID	Sound Power Level, dB, per Octave Band Frequency, Hz								L_{WA}
	63	125	250	500	1k	2k	4k	8k	
VRV	71	67	68	66	62	56	52	45	67.2
ASHP*	67	63	64	62	58	52	48	41	63.2

** Calibrated using VRV Spectrum*

5.11 The calculated specific sound levels, resultant rating levels, and consideration against the identified background sound levels, are presented in Table 3.

Table 3: Calculation and Assessment of Rating Sound Level

Receptor	Specific Level, $L_{Aeq,T}$	Acoustic Feature Correction	Rating Level $L_{Ar,Tr}$	Excess of Rating Level Over Background, dB	
				Day	Night
R1	32	0	32	-19	-12
R2	25	0	25	-26	-19
R3	29	0	29	-22	-15
R4	36	0	36	-15	-8

5.12 BS 4142 requires that an acoustic feature correction is applied, where applicable, to the specific sound level in order to obtain a rating level $L_{Ar,Tr}$ at the identified receptor. Any correction is applied in order to consider the effect of additional acoustic characteristics present in the source of interest. The correction is applied based on tonality, impulsivity and intermittency that may be perceptible at the receptor location. A correction may also be applied where these features may not be present but the sound may still be distinctive at the receptor.

5.13 The existing fixed plant is in continuous operation and the dominant sound source within the vicinity is road traffic noise. The specific levels at the calculation receptors are below the background and ambient sound levels and are therefore unlikely to be perceptible at the receptor locations. Therefore, no correction has therefore been applied for the derivation of the rating levels.

5.14 The resultant rating levels fall below the identified background sound levels at all assessment locations. BS 4142 indicates that where the rating level does not exceed the background sound level the impact of the specific sound level is likely to be low.

Uncertainty, BS 4142

5.15 The assessment scenarios considered within this report are based on the assumptions of plant items as presented within this assessment, which have been provided by the applicant. Any changes to these assumptions (e.g., revised design, variation is plant items, variation of source data) would require reassessment based on the specific plant items and site layout.

5.16 A reduction of 10 dB is required for the VRV units in order to suitably reduce to sound levels at surrounding residential receptors. Mitigation options such as enclosures and attenuated vents are typically available from the manufacturer and should be employed to reduce the sound power levels to 71 dB. The assessment calculation includes this 10 dB reduction is sound power level.

6 MITIGATION

6.1 For habitable rooms, consideration of glazing and ventilation options will be required in conjunction with typical façade design in order to achieve the BS 8233 and WHO criteria. The reductions as identified in Figure 3 should be achieved by selected glazing and ventilation units.

6.2 Windows may remain openable, such that the choice of meeting the internal noise levels is provided and the windows may be opened at the occupant's discretion. Any ventilation should allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation. To ensure R_W values take account of possible low frequency noise, the sound reduction index of each element should include a correction for the C_{tr} urban traffic noise spectrum. The ventilation must achieve this value when open/operational, to allow ventilation to the dwelling.

6.3 Examples of façade ventilation include acoustic air bricks, trickle ventilation and mechanical ventilation. Any passive or mechanical system should allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation. The specification of the glazing and ventilation should be selected with consideration to the required façade reduction. For non-habitable rooms, such as kitchens, bathrooms, stairways, halls, landings etc, lower acoustic performance glazing configurations may be considered permissible.

6.4 Balconies overlooking the adjacent roads should be designed to incorporate further mitigation measures such as imperforate parapets and absorptive linings.

6.5 The rating levels are calculated to fall below the identified background sound levels. According to BS 4142 this is an indication that adverse effects are unlikely.

6.6 VRV and ASHP units should be selected to ensure rating levels do not exceed the background sound levels. Any variation in the plant identified within assessment should ensure that plant items are selected to achieve a similar source sound power level. Where possible, any vents and outlets should not be sited on the façade facing the direction of the nearby residential receptors.

7 CONCLUSIONS

7.1 An assessment of the potential noise impacts attributable to the existing ambient environment has been undertaken for the Proposed Development at 104a Finchley Road.

7.2 Unattended noise measurements were obtained and considered in conjunction with road traffic data obtained from the DfT to calculate sound levels representative of the ambient environment. Ambient noise levels were considered in accordance with BS 8233:2014 and the WHO Guidelines for Community Noise.

7.3 Window units are required to be closed in order to achieve the BS 8233 and specific consideration of proposed glazing should be undertaken. However, windows are not required to be sealed and may remain openable for rapid or purge ventilation or to be opened at the occupant's discretion. The sound insulation values, R_W+C_{tr}, for glazing and ventilation units have been identified at the proposed facades and are presented in Figure 3. Glazing and ventilation choices should be selected to achieve these values as a minimum.

7.4 External amenity noise levels at areas overlooking the adjacent roads exceed the BS 8233 upper guideline noise level. Noise levels at these areas should be mitigated as far as practicable. Mitigation options such as imperforate parapets and absorptive linings should be considered.

7.5 The proposed rooftop plant items have been assessed to identify the potential impacts attributable to the sound emitted from the proposed VRV and ASHP units.

7.6 Information provided by the applicant has been used to calculate the likely specific and rating sound levels at the nearest receptors. Based on the information used in this assessment the excess of the calculated rating levels over the background sound level indicates that, provided suitable mitigation is employed at the VRV units, there is low likelihood of adverse impacts from the proposed external sources.

APPENDIX A – INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}. This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as $_{A90(1hour)}$ and $L_{A90(5mins)}$. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

Table A1: Glossary of Terms

Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,F}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the 'average minimum' noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ($L_{Aeq,T}$)
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ($L_{Aeq,T}$)
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ($L_{Ar,Tr}$).

APPENDIX B – FIGURES

Figure B1: Unattended Survey Results at Position 1

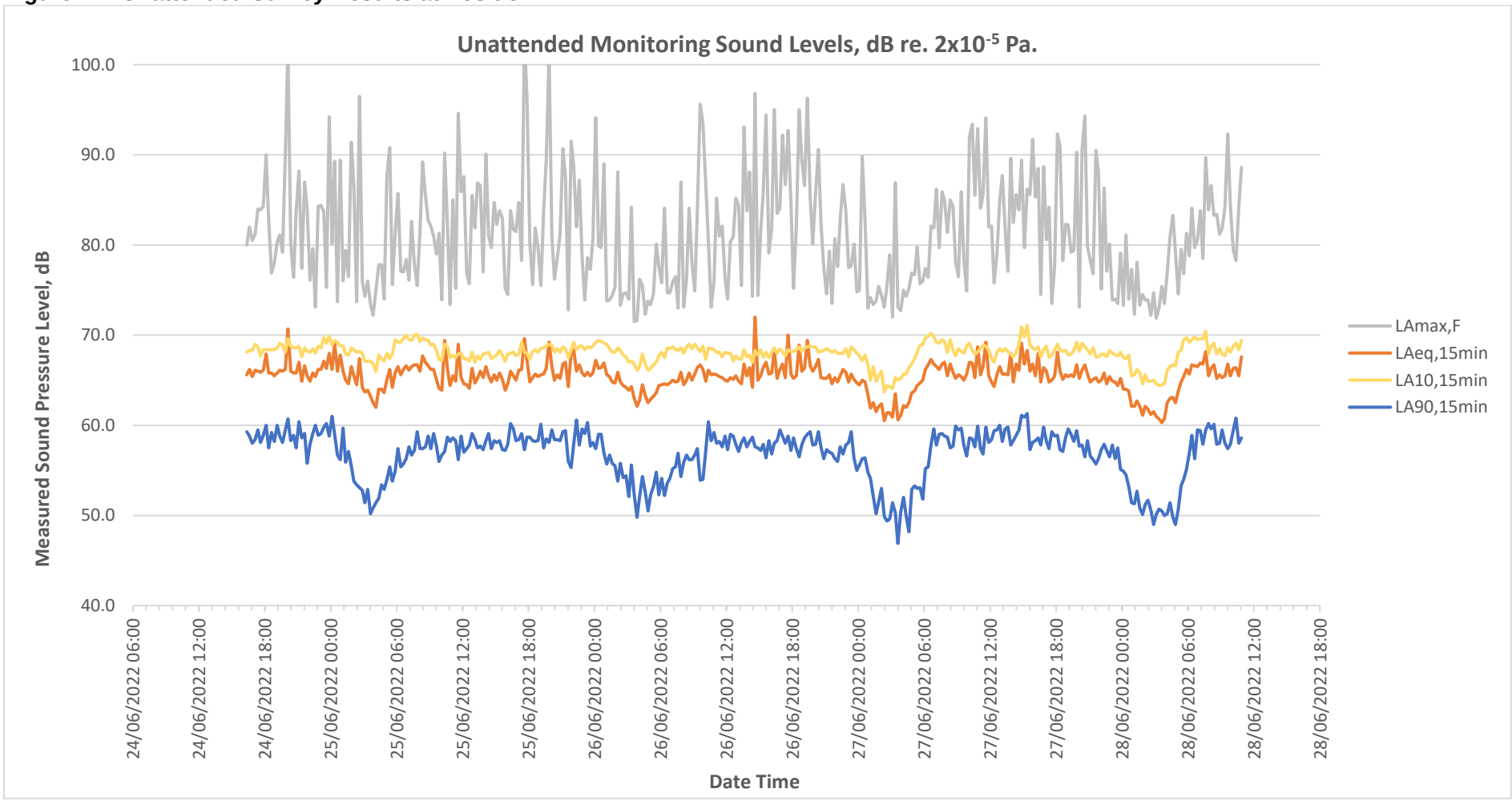


Figure B2: Statistical Analysis of Survey Data at Position 1

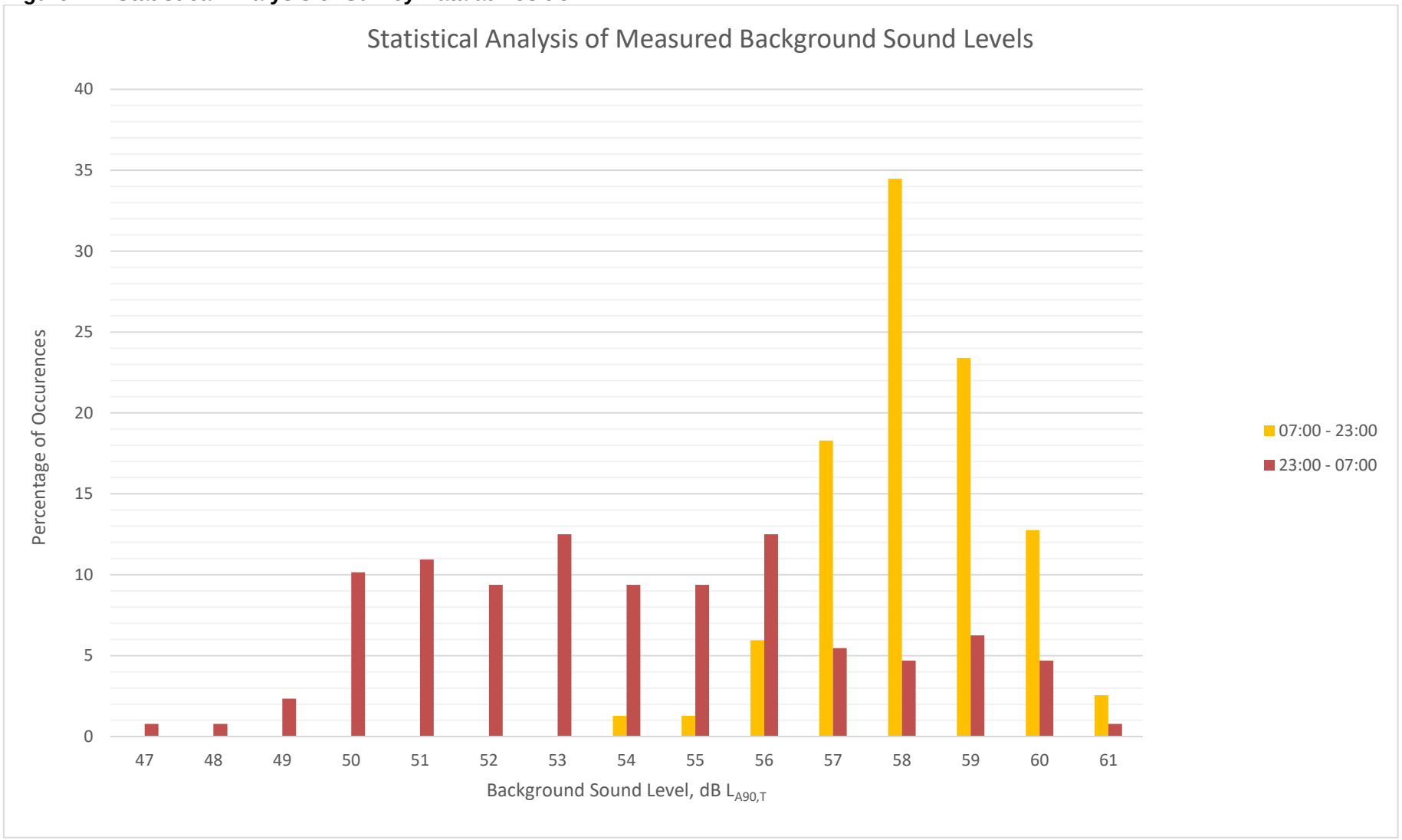


Figure B3: DfT Traffic Data

Road Link	DfT Traffic Data		Speed, kph
	Traffic Flow	HGV No.	
A41 NB	19445.0	506	48
A41 SB	19551.0	429	48