



Consultants in Sound and Vibration

Report

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Hatfield Care Home

Environmental Noise Survey

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1 Introduction

- 1.1 It is proposed to develop land between One Hatfield Hospital and Porsche Centre Hatfield to provide a care home. Planning permission has been granted with a number of conditions being set. Three conditions relate to noise.
- 1.2 BY Acoustics has been appointed to undertake an environmental noise survey in order to establish the prevailing noise climate at the site. This report sets out the details of the noise survey along with a description of the existing noise climate in the area. Advice is provided on the basis of these results on glazing and ventilation requirements to allow compliance with planning condition 9. The results of the noise survey are also used to establish noise limits for mechanical services plant.

2 Site Description

- 2.1 The proposed site of the care home is to the north west of Hatfield, Hertfordshire. The site, with indicative layout seen below in Figure F2.1, is a triangular piece of currently disused scrubland and an old at-grade car park located between One Hatfield Hospital, to the west, and Porsche Centre Hatfield, to the east. The site is bound to the north by Manor Road.



F2.1 Site plan indicative site layout



- 2.2 To the north, beyond Manor Road, is a large residential area. To the west, beyond One Hatfield Hospital, is ARLA PCL, a large distribution centre, with further distribution centres beyond this to the west and south west. To the south is a roundabout with Hatfield Avenue running east to west through the roundabout and Mosquito Way running south from the roundabout. Beyond this, to the east of Mosquito Way are office buildings.
- 2.3 To the east is the A1(M) road, which sits in a cutting and runs through an underpass below the town, surfacing approximately 180m to the south east of the site. The A1001 runs at ground level above the A1(M) to the south of this, with a large roundabout located to the east beyond the Porsche Centre.
- 2.4 The proposed care home is to be a two-storey building located in the centre of the site, running close to the east and west boundaries. Garden areas are to be located around the perimeter of the site.

3 Design Criteria

- 3.1 A number of planning conditions have been set for this development. The following conditions are relevant to this report.

Condition 9

- 3.2 *“No development above ground level shall take place until a glazing and ventilation scheme is submitted to and approved in writing by the Local Planning Authority. This scheme must meet the internal noise levels within BS8233:2014, the L_{Amax} levels with the WHO Community Noise Guidelines and the ventilation standards within the Noise Insulation Regulations 1975 (as amended). Outdoor amenity areas must not exceed the 55dB WHO Community Noise Guideline Level.”*

Condition 10

“No development above ground level shall take place until details of noise from plant and equipment to be installed on the premises has been submitted to and approved in writing by the Local Planning Authority. These details must include an acoustic report evidencing that noise emissions from plant and equipment will be 10dB (LA_{eq}) below the background noise level (LA₉₀) at the nearest residential property (using the methodology outlined within BS4142:2014)”

- 3.3 For ease of reference summaries of the relevant sections of the guidance documents detailed within Condition 9 are provided below:

BS 8233:2014 - Guidance on sound insulation and noise reduction for building

- 3.4 BS 8233:2014 provides criteria for relevant internal and external noise criteria for new dwellings. The noise criteria within dwellings are reproduced below:



Activity	Location	Day (07:00-23:00)	Day (23:00-07:00)
Resting	Living Room	35 dB $L_{Aeq, 16hour}$	-
Resting	Dining room / area	40 dB $L_{Aeq, 16hour}$	-
Resting	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$

Relevant Notes:

NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.

Note 7 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.

Table 3.1: Table 4 of BS 8233:2014

- 3.5 The criteria detailed within the standard are based on "anonymous" noise sources such as road traffic. The criteria are also based on normal diurnal fluctuations in the external noise climate, again similar to typical noise levels from road traffic.
- 3.6 It is noteworthy that the proposed development is a care home, and so resting is expected to occur in living rooms and day rooms. The BS8233:2014 criteria are set such that they are considered appropriate for resting in such spaces. Therefore the application of the daytime criteria to the living areas and day rooms in the care home is suitable.
- 3.7 The 1975 Noise Insulation Regulations with amendments does not contain guidance on setting internal noise level criteria. The only reference to noise level is that the regulations come in to for levels at or above 68 dB $L_{A10,18h}$. Compliance with Note 5, ensuring suitable internal levels in line with the levels set out in the above table with trickle ventilators open, providing adequate ventilation, is considered to be appropriate to comply with the intent of Planning Condition 9 also.

The World Health Organisation (WHO) Guidelines

- 3.8 A new version of the WHO Guidelines for Community Noise, as referenced in Condition 9, was introduced in 2018. This version no longer directly references L_{Amax} levels at night and has an updated approach to noise levels in external amenity area. Based on the wording of the condition it is understood that the 1999 edition of The Guidelines for Community Noise is the intended reference. The discussion and relevant criteria in this section are based on this earlier edition
- 3.9 It is important to note that the WHO Guidelines are aspirational, as illustrated by the National Noise Incidence Study (NNIS, 2000), which indicates that 55% of the population of England and Wales are exposed to external noise levels above 55 dB $L_{Aeq, day}$. A National Physical Laboratory (NPL) report (with reference CMAM 16, dated September 1998) reviewing the original 1980 WHO Guidelines and the 1995 draft version of the 1999 Guidelines stated:
"Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached."



"As such, it would be unwise to use the WHO guidelines as targets for any form of strategic assessment, since, given the prevalence of existing noise exposure at higher noise levels, there might be little opportunity for and little real need for any across the board major improvements. On the other hand, the most constructive use for the WHO guidelines will be to set thresholds above which greater attention should be paid to the various possibilities for noise control action when planning new developments. It is important to make clear at this point that exceedances do not necessarily imply an over-riding need for noise control, merely that the relative advantages and disadvantages of noise control action should be weighed in the balance."

- 3.10 To prevent serious annoyance in outdoor living areas, such as gardens and balconies of dwellings, the 1999 WHO guideline value is 55 dB $L_{Aeq, 16h}$. This could be described as an upper limit for the average noise level across the daytime and evening period (07:00h to 23:00h). However, it is again noted that these levels are aspirational in nature, as described above.
- 3.11 In terms of the internal noise environment, in order to achieve speech intelligibility and to avoid moderate annoyance, the guideline value for noise levels within dwellings is stated as 35 dB $L_{Aeq, 16h}$ (covering the day and evening 07:00h to 23:00h). The corresponding value for the night period (23:00h to 07:00h) to avoid sleep disturbance is 30 dB $L_{Aeq, 8h}$. These levels correspond to the limits set in BS8233:2014.
- 3.12 Additionally in terms of sleep disturbance, a guideline value of 45 dB L_{Amax} is given. In relation to this value, the Guidelines state:
- "When the background noise is low, noise exceeding 45 dB L_{Amax} should be limited, if possible..."*
- "For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night..."*
- 3.13 On this basis, a limit of 45 dB $L_{Amax,F}$ is set for the 10th – 15th highest single event level in a room on a typical night. The $L_{Amax,F, 1 min}$ is taken to be an appropriate representation of a single event level at night.

4 Noise Survey Details

4.1 Survey Methodology

- 4.1.1 An unattended noise survey was undertaken beginning at 09:00 on Thursday 23 January and continuing until Monday 27 January 2020.
- 4.1.2 The survey comprised logging measurements at two locations to the east and central to the site. Measurement positions are described below and marked out on the attached Site Plan, F2.1, below.
- P1 - Free-field position at 1.5m above local ground level on the boundary to the east of the site, nearest the Porsche Centre;
 - P2 - Free-field position at 1.5m above local ground level on the northern part of the site.
- 4.1.3 Measurements were undertaken over consecutive 15-minute periods to allow full analysis of the relevant indices as an A-weighted level and in individual octave bands. L_{eq} , L_{max} , L_{10} and L_{90} indices are described within this report, as these are the most relevant to the analysis



undertaken. Short term profiles and audio recordings were also collected during measurement to allow more detailed analysis of specific periods as necessary.



F4.1 Site plan showing location of site and measurement positions

- 4.1.4 The attached Appendix A sets out the details of the equipment utilised for this monitoring.
- 4.1.5 Sound level meters were calibrated before and after the survey period. No drift was noted to have occurred.
- 4.1.6 There were some periods of rain and light to medium winds during the survey; in general the weather was cool and overcast with light winds. The wind was from the east on the first two days of the survey, moving around to a south to south-easterly direction at the weekend.
- 4.1.7 Aside from a period on the afternoon and evening of Sunday 26th January, it is not expected that any inclement periods of weather were present such that the noise measurements taken were detrimentally affected. Inclusion of the measured noise levels during the afternoon and evening of Sunday 26th, which were increased due to rainfall and elevated winds, did not change the conclusion of any of the assessments described below (in comparison to the case where those noise levels were excluded from the analysis). Therefore, this period was included



in the analysis for environmental noise impact upon the site, resulting in a robust solution in terms of envelope design of the care home.

4.2 Noise Survey Results

- 4.2.1 The results of the noise survey are presented in histories 19/0001/H1-H2 attached within Appendix B. The background noise level in general was found to be controlled in all locations by road traffic on the A1(M). The general ambient noise climate was found to be contributed to by road traffic on Hatfield Avenue, Mosquito Way and the A1001. Activities in the adjacent Porsche Centre and intermittent aircraft flyovers were also found to contribute.
- 4.2.2 The daily noise indices set out below in Table 4.1, were measured during the survey. All $L_{Aeq, T}$ levels are stated as calculated directly from the measured levels.
- 4.2.3 L_{Amax} levels are stated based on the typical 10th highest $L_{Amax, 1-minute}$ level measured per night across the entire period and the level used to calculate the design requirements based on the planning conditions.
- 4.2.4 Background L_{A90} levels are stated based on the representative L_{A90} level measured over the entire measurement during each relevant time period. This level has been calculated in accordance with guidance set out in BS 4142:2014¹, with the exclusion of periods of high wind and rain during the late afternoon/evening of Sunday 26th January.
- 4.2.5 In addition, a highest $L_{A10,18h}$ level of 61 dB was measured on Sunday 26th January at MP1, with levels of approximately 55-56 dB $L_{A10,18h}$ at both positions during the weekdays.

Measurement Period	Day Time (0700-2300)		Night Time (2300-0700)	
	MP1	MP2	MP1	MP2
$L_{Aeq, T}$				
23-24 Jan '20	58 ^{^*}	55 [*]	49	49
24-25 Jan '20	54	54	50	51
25-26 Jan '20	57	58	53	54
26-27 Jan '20	58	60	53	55
$L_{A90, rep}$				
23-27 Jan '20	50	51	45	45
$L_{Amax, Typical}$	N/A			
23-27 Jan '20	-	-	62	63

Table 4.1: Daily noise indices as measured during the noise survey (*not a complete 16h period; [^]impacted by construction works)

¹ BS 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound, BSI



- 4.2.6 Construction/maintenance works were on going on the Porsche Centre land adjacent to MP1 on Thursday 23 January. If the noise levels associated with these works were to be removed the resultant level at MP1 on this day would be 55 dB $L_{Aeq,16h}$.
- 4.2.7 It can be seen that noise levels increase on Saturday 25th and Sunday 26th during the day and night. It is expected that this is in part due to the change in wind direction from easterly to south to south-easterly. The A1(M) is already quite well screened due to being in cutting and benefiting from screening from the Porsche centre. Therefore, it is expected that noise from road traffic on Mosquito Way and HGV movements in the distribution centres was subject to less atmospheric attenuation under the southerly winds, resulting in the elevated levels.

5 Noise Intrusion Assessment

5.1 Design Criteria

- 5.1.1 The table Table 3.1 above summarises the internal noise limits for the development in accordance with BS8233:2014. In addition, a 45 dB $L_{Amax,F}$ target is set for single event noise levels in bedrooms, based on the 10th highest level measured during the survey on each night. Noise control strategies required in order to meet these are set out in this section.
- 5.1.2 The proposed development site is shown in above figure F2.1. The following assessment is undertaken on the basis of this plan, with the building at least 10m from Manor Rd as currently shown.

5.2 Façade Design

External Façade

- 5.2.1 It is understood that the dwellings are to utilise a typical masonry construction. This type of construction will provide suitable sound insulation performance. The calculations are based on typical room and glazing sizes as set out below:
- Bedrooms – 20m² with 2.6m room height and allowance for up to 4m² glazing
 - Living Areas - 50m² with 2.6m room height and allowance for up to 8m² glazing

Glazing and ventilation openings

- 5.2.2 Based on calculations of noise ingress into the proposed residences, standard good quality double glazing would meet the internal noise limits for every dwelling on site. The required sound insulation performance of this glazing type is typically R_w 30 which, based on the existing noise levels, would result in internal levels compliant with the design criteria in all cases.

Ventilation

- 5.2.3 As is standard, it will be necessary to provide trickle ventilation in order to achieve suitable background ventilation rates while windows are closed. It is necessary to consider such ventilation as part of any BS8233 assessment:



"any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment"

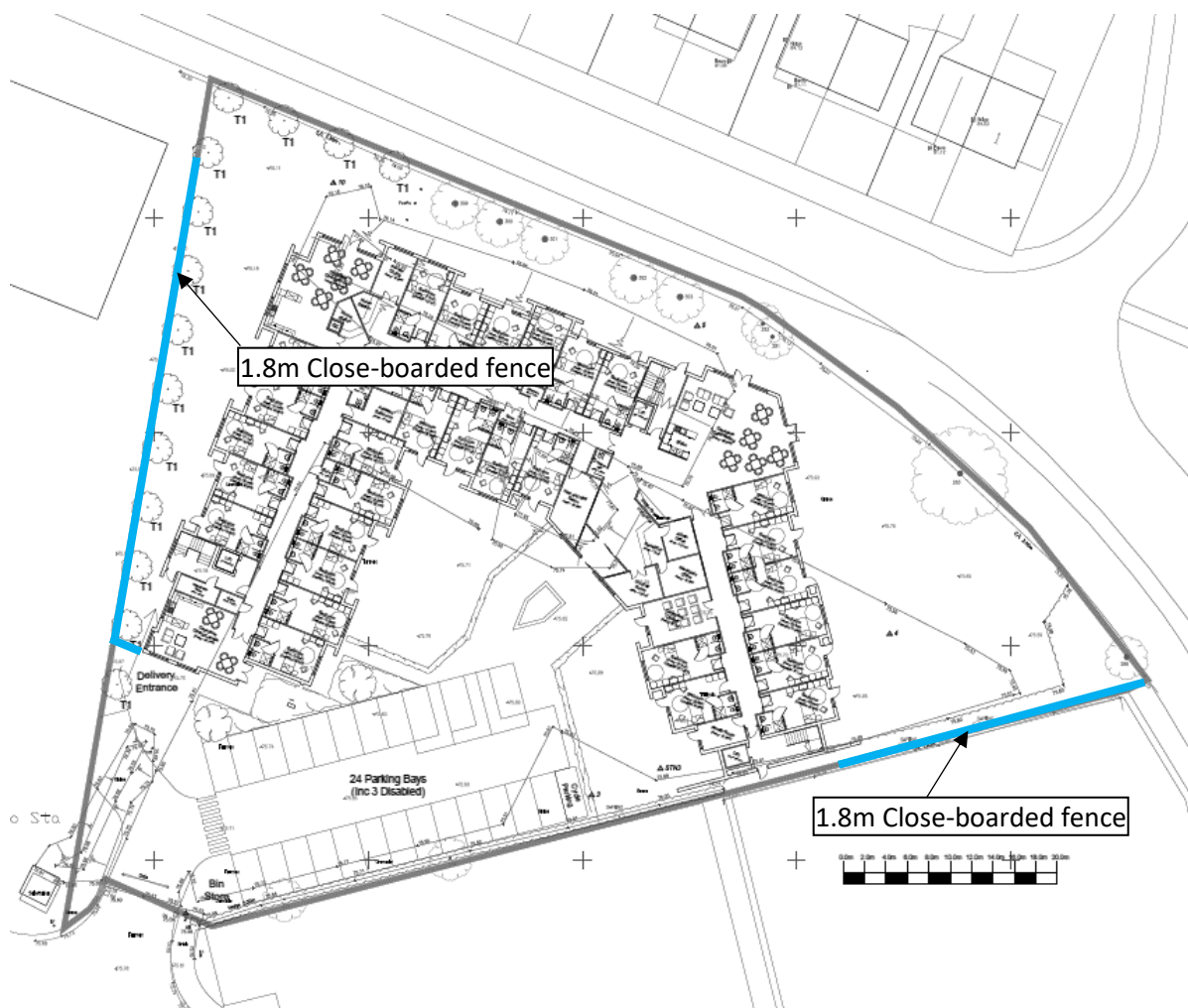
- 5.2.4 This requirement, being the standard approach for dwelling construction in order to provide suitable ventilation when windows are closed, is further underlined by reference to the need to provide adequate ventilation in Condition 9. Throughout the site this can be provided using acoustic rated through frame trickle vents. The noise levels internally have been assessed on the basis of up to two vent units per bedroom, mounted in the window frame or the outer wall, with each unit providing a weighted element normalised level difference of 35 dB $D_{n,e,w}$.
- 5.2.5 The required performance relates to a typical acoustic through frame trickle ventilator, with such units providing greater than 2500mm² open area per unit. It is expected that this ventilation provision will allow ventilation in excess of that required by Approved Document F 'Ventilation' of the Building Regulations and Planning Condition 9. This should be confirmed by the relevant consultants. Further advice can be provided on suitable or alternative options as required.
- 5.2.6 The requirements applying to day rooms are less onerous than those applying to bedrooms; 4 no. units rated to 29 dB $D_{n,e,w}$ would be suitable in each day room. This performance is equivalent to a typical non-acoustic through-frame trickle vent. Further advice can be provided on the ventilation to day rooms as required.
- 5.2.7 The above design would ensure that the minimum requirements are met in terms of ventilation and acoustics. It is considered suitable for the users to open windows at their discretion and during purge ventilation scenarios. If open windows are required regularly in order to control overheating in rooms further advice should be sought on solutions to provide suitable internal noise levels.
- 5.2.8 It is noted that non-habitable rooms (such as bathrooms) have no requirements, so no specific acoustic ventilation is necessary to such rooms.
- 5.2.9 With the above glazing and ventilation specification in place, the habitable rooms within the care home are considered to be compliant with the requirements of Planning Condition 9.

5.3 Garden Noise Levels

- 5.3.1 The calculated free field $L_{Aeq,16h}$ noise levels at the site as measured at the logging positions varies between 54-55 dB on weekdays (with non-typical construction works removed from the measurement data). At the weekend, with a different wind direction, these levels increased to 57-60 dB.
- 5.3.2 Based on the weekday levels measured, the 55 dB target for external amenity area noise levels is met and therefore all external areas would be considered suitable for garden and external amenity use. Based on the weekend levels, the 55 dB target would be exceeded.
- 5.3.3 With the proposed building in place, the garden areas, located around the perimeter of the building, would be significantly screened from noise sources to the south. Therefore it is expected that with the building in place the targeted 55 dB $L_{Aeq,16h}$ garden level can be met.
- 5.3.4 It is possible that at times, depending on wind direction, this target may be slightly exceeded. However, as noted above in Section 3.9, the WHO guidance is considered aspirational. Therefore, such intermittent, irregular exceedances are considered acceptable.



- 5.3.5 In order to further control potential exceedances of 55 dB $L_{Aeq,16h}$ it is recommended that a 1.8m high close boarded timber fence is located along the boundary with One Hatfield Hospital, and between the north eastern garden section and the Porsche Centre. The following figure F5.1 sets out the location of the required fence.
- 5.3.6 On the basis of the general outline plan, and with the close boarded fence in place, the requirements of Planning Condition 9 would be met.



F5.1 Garden fence requirement to meet design criterion



6 Plant Noise Limits

6.1 As noted above, plant noise limits have been set by the Planning Condition 10 as being 10 dB below the existing L_{A90} background noise level. Based on this, and the noise levels measured during the survey, the following plant noise limits would apply.

Measurement Period	Plant Noise Limit, dB $L_{A,T}$	
	Day (0700-2300)	Night (2300-0700)
Noise sensitive receptors nearest the development	40	35

Table 6.1: Plant noise limits

6.2 The plant noise criteria apply at 1m from the nearest noise sensitive façade to each plant item. In accordance with BS 4142, corrections and penalties should be applied to account for the character of noise from the proposed plant items relative to the existing noise climate. These plant noise limits apply to the cumulative level from all plant items associated with the development.

7 Conclusion

- 7.1 It is proposed to develop the land adjacent to One Hatfield Hospital as a new residential care home development. The site is located next to an existing hospital, car garage, and local and national roads. This report has shown that the site is considered suitable for development for residential use, and can achieve compliance with the requirements of the relevant planning conditions in relation to the existing noise levels at the site.
- 7.2 An outline of the guidance which has been used to establish external and internal noise criteria from local noise sources has been provided within this report. The report has shown that suitable internal noise levels can be achieved in all of the proposed residential dwellings using typical thermal double glazing, with acoustically treated trickle ventilation to reduce the requirements to open windows.
- 7.3 With the specified glazing and trickle vents installed noise levels within the proposed residences will be controlled to within suitable levels on all parts of the proposed development area on the site. The levels are shown to be compliant with the requirements of Planning Condition 9 of the outline planning permission.
- 7.4 Noise levels within gardens have been assessed within this report and it has been shown that suitable noise levels can be achieved based on the proposed layout of the scheme.
- 7.5 Plant noise limits are also set in accordance with the requirements of Planning Condition 10.



Appendix A

This Appendix sets out information on the equipment utilised for the survey for Hatfield Care Home.

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

Equipment Information

The sound level meters included the ability to measure audio, in order to more accurately identify the source of sound events of note



A1	Position P1 Sound Level Meter			
<i>Equipment</i>	<i>Model / Serial</i>	<i>Manufacturer</i>	<i>Calibration Number</i>	<i>Calibration Date</i>
Sound Level Meter	XL2-TA / A2A-17316-E0	NTi	FL-19-248	19/12/2019
Outdoor Microphone	M2230 / A18353, 8855	NTi	FL-19-248	19/12/2019

Position P1 Measurement Location





A2		Position P2 Sound Level Meter		
<i>Equipment</i>	<i>Model / Serial</i>	<i>Manufacturer</i>	<i>Calibration Number</i>	<i>Calibration Date</i>
Sound Level Meter	XL2-TA / A2A-16898-E0	NTi	FL-19-214	19/12/2019
Outdoor Microphone	M2230 / A17727, 8861	NTi	FL-19-214	19/12/2019

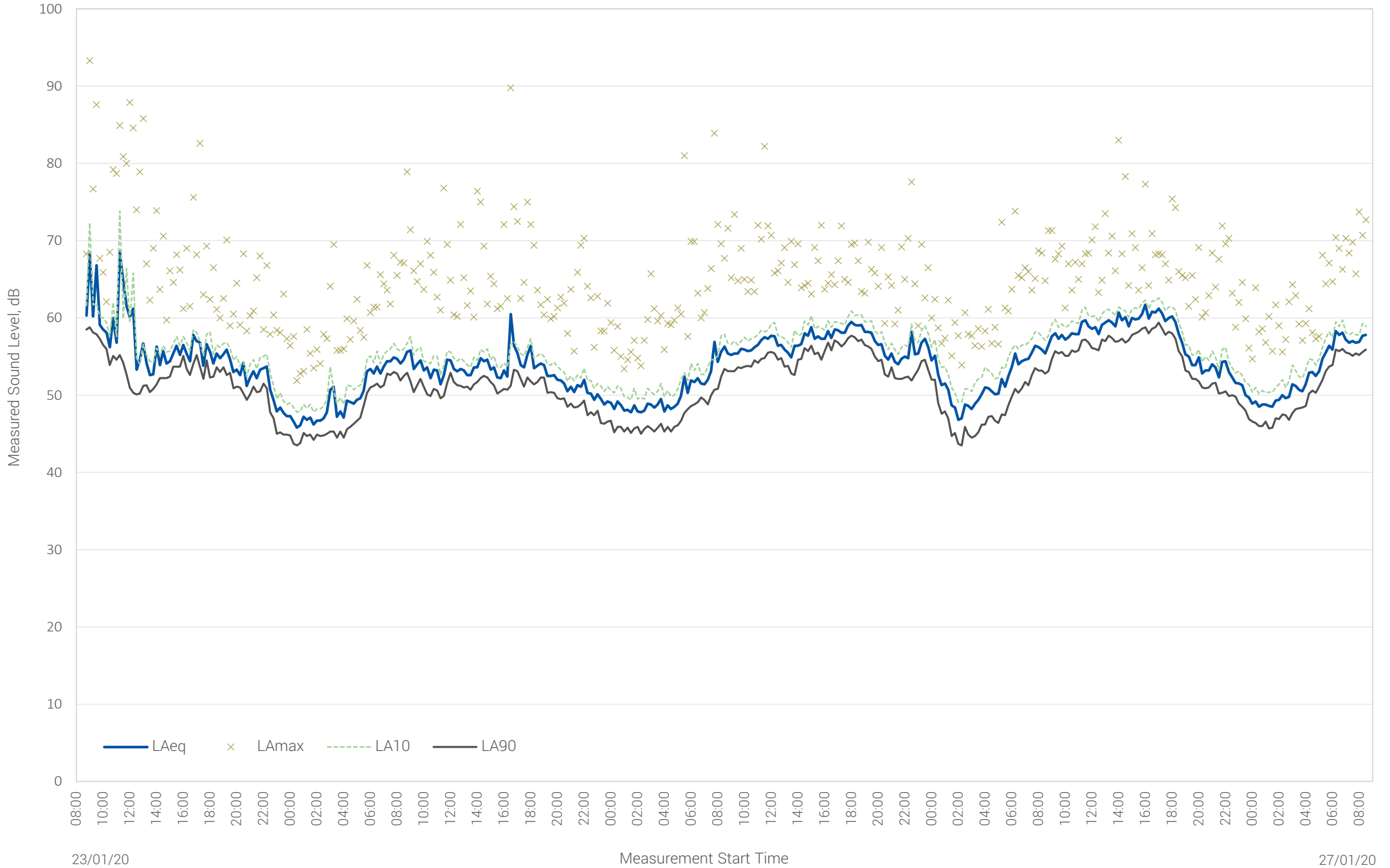
Position P2 Measurement Location

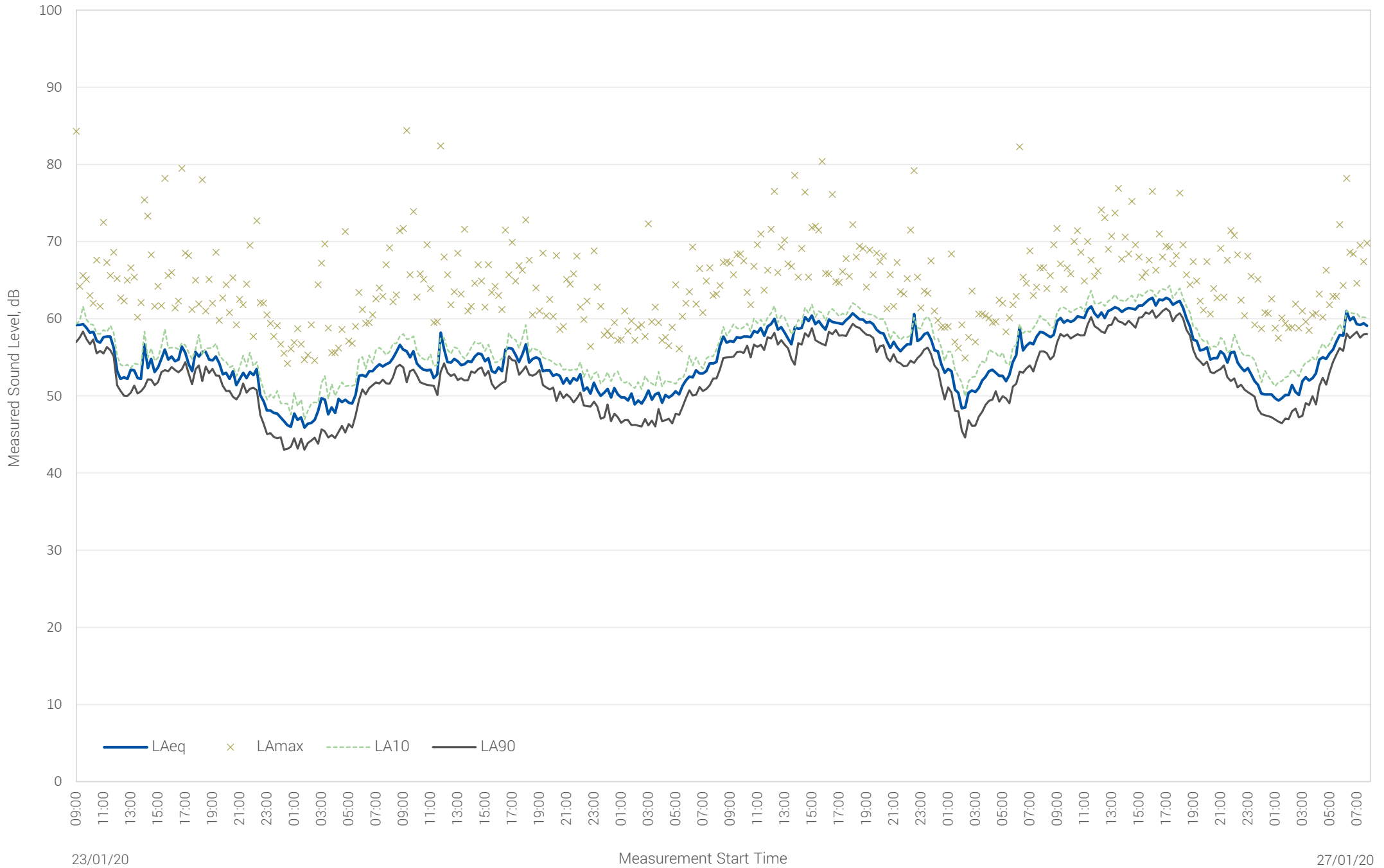




Appendix B

Measured Sound Level Histories







Glossary of Terms

decibel: Usually written as decibel or dB, it is a logarithmic scale used for two purposes. One is to make the expression of numerical sound levels more convenient (with a smaller range and fewer digits). The other is to express sound levels in a manner aligned with human interpretation of differences in sound level, which itself is logarithmic in nature.

A-weighting: Applies different weight to sound levels at different frequencies, to represent the variation in sensitivity of the typical human ear with frequency. Thus, a single-value expressed in terms of dBA or dB(A) is the A-weighted sound level, which takes account of the frequency content of the sound.

L_{Aeq} : The A-weighted equivalent continuous sound level in dB. This unit can be described as the notional steady noise level that would, over a period, contain the same energy as the fluctuating noise source. It is often considered as the energy average level. This unit is typically used to describe typical day and night time noise levels.

L_{A90} : The A-weighted sound level (in dB) exceeded for 90% of the time specified. This level gives an indication of the sound level during the quieter periods of time in any given fluctuating sound sample. It is used to describe the "background sound level" of an area.

L_{A10} : The A-weighted sound level (in dB) exceeded for 10% of the time specified. This level gives an indication of the sound level during the louder periods of time in any given fluctuating sound sample. It is typically used to help define, measure, and assess road traffic noise.

L_{Amax} : The maximum A-weighted level (in dB) of sound measured in any given period. This unit is used to measure and assess transient noises, particularly those such as individual vehicles, etc impacting on sensitive receptors at night. Unless otherwise stated, the L_{Amax} level is stated as measured using a "fast" sound level meter response (i.e. $L_{Amax,F}$).

L_{AX} , L_{AE} , or SEL: The sound exposure level which contains, within a notional 1-second period, the same quantity of sound energy as the time varying level contained in a single noise event. It could be considered an L_{Aeq} level normalised to 1 second. The use of this unit allows the calculation of the $L_{Aeq,T}$ level over a given period of time for a known number of such single noise events.