

APPENDIX 11.2

ROAD TRAFFIC MONITORING

RESIDENTIAL DEVELOPMENT ON LAND AT STAKEHILL
ROAD TRAFFIC NOISE IMPACT ASSESSMENT

On behalf of:
Redrow Homes Lancashire

RESIDENTIAL DEVELOPMENT ON LAND AT STAKEHILL
ROAD TRAFFIC NOISE IMPACT ASSESSMENT

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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Redrow Homes Lancashire to carry out a noise impact assessment in connection with a proposed planning application for residential development on land at Stakehill, Rochdale.
- 1.2 The location of the proposed residential development is shown in Figure 1. The site currently comprises a series of fields, some of which are used for pasture. A single-lane road, Thornham New Road, forms the northern boundary of the site with the M62 Motorway just beyond in a deep cutting.
- 1.3 The site is bounded to the east by the A627(M) motorway, which is in a deep cutting at this point, beyond which lies additional open fields. To the west of the site are existing residential properties off Manchester Road, the All-in-One Garden Centre and Thornham Cricket Club. To the south the land is bounded by the A627(M) spur, which is also in a deep cutting and crossed by a road bridge. The main significant source of noise on the proposed residential development land is traffic noise from the M62 and A627(M) Motorways.
- 1.4 It is proposed to submit a hybrid application (i.e. part outline and part detailed) to develop the site for residential use of up to 1,500 dwellings of which approximately 400 dwellings will form part of Phase 1. The development will also include a new local centre, landscaping, play areas, new pedestrian and cycle routes and associated access. The proposed outline masterplan of the development is shown in Figure 2, with Phase 1 of the development highlighted.
- 1.5 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of noise levels during representative periods of the daytime and night;
 - Assessment in outline terms of the potential impact of road traffic noise on the development land;
 - Recommendation of appropriate outline mitigation measures.
- 1.6 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 GUIDANCE AND ACOUSTIC DESIGN CRITERIA

NPPF:2021

- 2.1 Paragraph 185 of the National Planning Policy Framework (NPPF) 2021 states that planning policies and decisions should *“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;”*

NPSE:2010

- 2.2 The Noise Policy Statement for England (NPSE) 2010, which is referred to the in NPPF, includes three aims:
- i. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
 - ii. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
 - iii. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

BS 8233:2014

- 2.3 Guidance on acceptable noise levels in habitable rooms and private gardens is set out in British Standard 8233: 2014, ‘Guidance on sound insulation and noise reduction for buildings’. BS 8233 recommends that it is desirable that noise from external sources does not exceed the guidelines values that are shown in Table 1 inside habitable rooms for daytime (07:00 – 23:00 hours) and night-time (23:00 – 07:00 hours) periods.

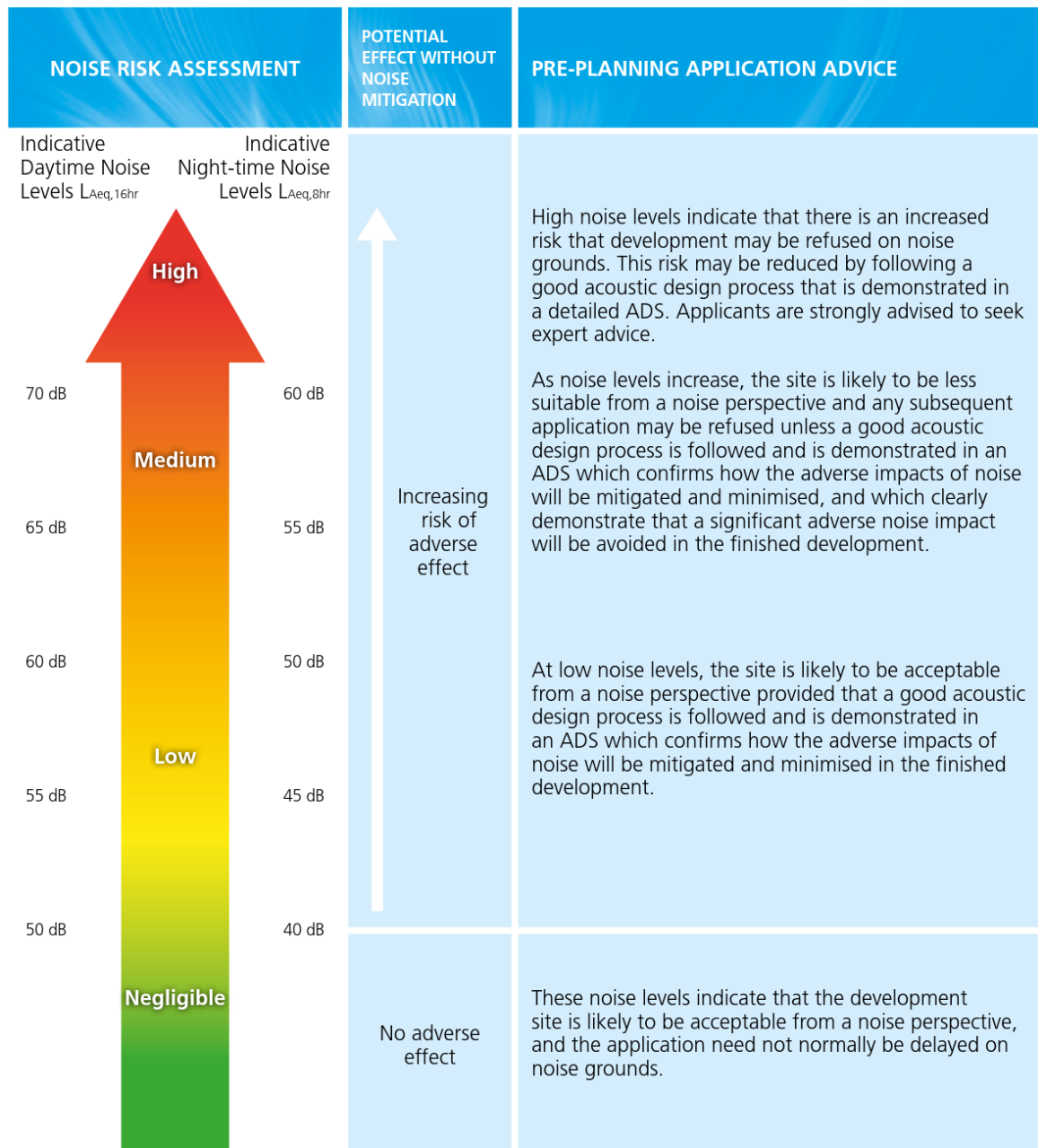
Table 1: BS 8233:2014 recommended acoustic design criteria (dB $L_{Aeq,T}$)

Activity	Location	Daytime 07:00 – 23:00 hours	Night-time 23:00 – 07:00 hours
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

- 2.4 BS 8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of L_{AFmax} values and these can be highly variable and unpredictable.
- 2.5 For private outdoor amenity spaces of the new houses (e.g. rear gardens) BS8233 states that ‘it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,16hr}$ with an upper guideline value of 55 dB $L_{Aeq,16hr}$ which would be acceptable in noisier environments’. In our experience, most local planning authorities have traditionally adopted, or accepted, the 55 dB(A) guideline value for rear gardens of proposed new residential developments near busy roads. However, the standard also recognises that these guideline values are not achievable in all circumstances where development might be desirable and, in such cases, for sites near to the ‘strategic transport network’ higher noise levels than 55 dB $L_{Aeq,16hr}$ in gardens may be acceptable.

ProPG

- 2.6 There is also guidance in ‘ProPG: Planning & Noise – New Residential Development’ (2017), although this guidance does not constitute official government guidance and has no legal standing. The ProPG describes a staged approach to the assessment of noise impact on proposed new residential development sites. Stage 1 is an initial site noise risk assessment, indicating whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective.
- 2.7 The ProPG initial site noise risk assessment criteria are shown in Chart 1.

Chart 1: ProPG Stage 1: Initial Site Noise Risk Assessment Criteria**Figure 1 Notes:**

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".
- $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

2.8 Chart 1 broadly sets out indicative noise levels that define the element of risk of noise impact on proposed residential development land, ranging from 'Negligible' to 'High'.

- 2.9 The guidance states that these noise levels *“should be interpreted flexibly having regard to the locality, the project and the wider context”*.
- 2.10 The ProPG criteria apply to residential development land that is exposed to transportation noise or mixed transportation noise and industrial/commercial noise where the latter is not the dominant noise source.
- 2.11 Stage 2 of the ProPG approach is a more detailed assessment in the form of an Acoustic Design Statement (ADS). However, the acoustic design criteria that are specified in ProPG, and which forms the basis of the ADS, are essentially the same as those recommended in BS8233, as summarised previously in Table 1 of this report.
- 2.12 Similarly to BS 8233, ProPG recognises that regular individual noise events at night can cause sleep disturbance. The ProPG guidance suggests that for design purposes, wherever practicable, peaks of noise inside bedrooms from external sources should be controlled so as not exceed 45 dB L_{AFmax} more than 10 times per night’.

Acoustic Design Criteria

- 2.1 For this development we therefore recommend the following noise criteria be adopted in respect of road traffic noise with windows closed and trickle ventilation provided:
- Daytime noise below 35 dB $L_{Aeq,16hr}$ inside living rooms and bedrooms, 40 dB $L_{Aeq,16hr}$ inside dining rooms; and
 - Night-time noise levels not exceeding 30 dB $L_{Aeq,8hr}$ and generally not exceeding 45 dB L_{AFmax} in bedrooms (i.e. no more than 10 times per night).
- 2.2 For this development, we have adopted a criterion of 55 dB $L_{Aeq,16hr}$ for gardens as far as is practicable.
- 2.3 Our outline noise mitigation recommendations are described in Section 5.0.

3.0 NOISE SURVEY

- 3.1 An environmental noise survey has been carried out over a 24 hour period at three locations (Locations 1 to 3) on the boundaries close to the motorways with some supplemental noise measurements undertaken at seven other locations (Locations 4 to 10). All noise measurement locations are shown in Figure 1.
- 3.2 Automated noise measurements were carried out at Locations 1-3 in consecutive 5-minute periods between approximately 14:00 hours on Monday 18 June and 14:00 hours Tuesday 19 June 2019. The attended noise measurements were carried out between approximately 11:30 and 14:00 hours on Tuesday 19 June 2019.
- 3.3 The noise measurements were taken in 'free-field' conditions and at a microphone height of approximately 1.4m above the ground. Calibration checks were carried out both before and after the measurement periods with no variance in levels noted. Octave band frequency analysis was also carried out.
- 3.4 The weather conditions during the noise survey were suitable for the purposes of the survey and subsequent assessment.
- 3.5 The noise survey results for Locations 1-3 are shown in chart form in Appendix II along with details of the equipment used, and the weather conditions during the survey. From analysis of this data the overall daytime and night-time road traffic noise exposure levels have been evaluated and are presented in Table 2.

Table 2: Road traffic noise exposure values (dB)

Location	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$
1. 60m south of M62 Motorway	62	58
2. 90m from Thornton Interchange	58	56
3. 18m from A627(M), east site boundary	72	68

- 3.6 The noise levels measured at all three locations were due to road traffic on the M62 and A627(M) Motorways.
- 3.7 Short-term peaks of noise at night were in the range 59 – 81 dB L_{AFmax} at Location 1, 57 – 75 dB L_{AFmax} at Location 2 and 74 – 87 dB L_{AFmax} at Location 3, with the 10th highest values being 66, 67 and 79 dB L_{AFmax} respectively.

- 3.8 Supplementary attended noise measurements were undertaken on the site at a number of locations around the site in order to compliment the automatic logging data obtained at Locations 1-3 and assist in calibrating a subsequent computerised traffic noise model. The results of the supplementary attended noise measurements are shown below in Table 3.

Table 3: Summary of results of supplementary noise measurements (dB)

Location	$L_{Aeq,5min}$
4. In field, 100m from edge of A627	54
5. 50m from raised east site boundary	55 – 58
6. Behind large mound at the north-east of the site, 180m from Thornton Interchange	54 – 56
7. On top of large mound at the north-east of the site, 125m from Thornton Interchange	62 – 65
8. On top of large mound at the northern boundary, 105m from M62 Motorway	65 – 66
9. Behind large mound at the northern boundary, 175m from M62 Motorway	53 – 57
10. In field, 205m from M62 Motorway	49 – 51

- 3.9 The results of the noise survey have been used as a basis for calibrating the computerised traffic noise model for the development site that is described in Section 4.0.
- 3.10 The calculated traffic noise exposure values have been used to determine the type and extent of any noise mitigation measures that are necessary for the proposed development to achieve appropriate noise design criteria. Our outline recommendations for noise mitigation are described in Section 5.0.

4.0 NOISE ASSESSMENT

Computer Noise Model

- 4.1 Noise calculations have been carried out using the CadnaA noise prediction software for daytime (i.e. 07:00 – 23:00 hours) and night-time (i.e. 23:00 – 07:00 hours) periods. The technique uses a 3-dimensional computer model of the topography of the site and the surrounding area as a basis for undertaking automated noise calculations. Geographical data for the development land and surroundings (including ground height data) was provided by Redrow Homes Lancashire.
- 4.2 The noise calculations have been undertaken using the algorithms set out in the Department of Transport Memorandum 'Calculation of Road Traffic Noise' (CRTN) (1988). The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined, but it is stated in the document, that the guidance is equally appropriate to the calculation of traffic noise for land use planning purposes.
- 4.3 It was noted during the site visit and attended noise measurements, that further to the typical attenuation of sound over distance, the topography of the land also provides some natural shielding of road traffic noise at certain parts of the site.
- 4.4 We have considered these factors and used the measured traffic noise levels on the site to calibrate the noise model. Please note however, that for some parts of the site the output of the noise model indicates slightly higher noise levels compared to the results of our supplementary noise measurements. This is due to a number of factors such as the accuracy of the ground contour data provided and the limitations of the CRTN method of calculation. Nevertheless, the computer noise model output generally correlates to the measured propagation of traffic noise levels across the site and provides a robust assessment of likely noise levels for site layout design purposes.
- 4.5 The noise contour plots of the road traffic noise calculations are shown for the open site in Figures 3 and 4 for daytime ($L_{Aeq,16hrs}$) and night-time ($L_{Aeq, 8hrs}$) at 1.5 metres above the ground respectively. These Figures include the masterplan outline of the development superimposed on to each contour plot.
- 4.6 The position, orientation and scale of the buildings proposed on the development are not known at this early stage in the development, therefore the propagation of noise from road traffic will change

significantly for areas towards the centre of the site, such that noise levels in these areas will be much reduced, due to screening from buildings around the perimeter of the site.

- 4.7 The results of these calculations have been used to assess the level of impact from road traffic noise across the development site.

Initial Noise Risk Assessment

- 4.8 Taking into account the size of the site and the noise levels measured near to the motorways, the road traffic noise exposure levels across the proposed development areas of site fall in to, and between, the 'Negligible' to 'Medium' risk categories of ProPG in the daytime and night, with the majority of the site falling into the 'Negligible' category.
- 4.9 Furthermore, these Figures indicate that Phase 1 of the development (which is to be built first) will be exposed to road traffic noise levels in the 'Negligible' risk category, which will reduce further once the rest of the development is built around it.
- 4.10 It is considered that that the site is suitable for residential development, but traffic noise levels in areas nearest to A627(M) Motorways do need to be taken into account and noise mitigation provided where necessary.
- 4.11 Our outline noise mitigation recommendations are described in Section 5.0

5.0 NOISE MITIGATION SCHEME

5.1 Our outline noise mitigation recommendations are described below.

5.1 **Noise Mitigation** Analysis of the indicative masterplan layout indicates that daytime noise levels in the majority of potential gardens of houses will be below 55 dB $L_{Aeq16hr}$, however, traffic noise in some areas near the northern and eastern boundaries of the site will be up to 60 dB $L_{Aeq16hr}$. Therefore, we recommend that the layout is designed such that dwellings should be oriented towards the Motorways and hence have gardens to the rear, screened from traffic noise by the houses themselves. In this way, with minimised gaps between the houses, the roofline of the buildings (with a typical ridge height of around 7 metres for a two-storey dwelling) can act as effective acoustic barrier for the gardens behind.

5.2 For the proposed new dwellings themselves, on the basis of the illustrative masterplan layout, we recommend the following outline sound insulation measures, as indicated in Figure 5;

- Any dwellings proposed in the area indicated in Figure 5 would require a higher specification double glazing is installed for exposed habitable rooms, with a sound reduction performance of at least 30 dB $R_w + C_{tr}$;
- Also, for all habitable rooms where sound insulated windows are required, specialist acoustic vents will be necessary instead of standard window frame slot vents, of which various types are commercially available. At this stage we would recommend window frame or wall mounted acoustic vents having an acoustic rating of at least > 40 dB $D_{n,e,w}$.

5.3 Dwellings and rear gardens away from the northern and eastern site boundaries are expected to benefit from a significant degree of screening of road traffic noise by the noise barrier effect of intervening dwellings, and therefore should not require any specific noise mitigation measures.

5.4 The location of Phase 1 of the development is such that it is exposed to low levels of road traffic noise and therefore no special noise mitigation measures are required. Noise levels in garden plots will be below 55 dB $L_{Aeq,16hr}$. For all bedrooms and living rooms, in Phase 1, we recommend standard double glazing of 4mm glass - nominal (10-16mm) cavity - 4mm glass (25 dB $R_w + C_{tr}$).

5.5 It is recommended that our initial recommendations should be reviewed, and revised if necessary, at the detailed design stage.

Planning Condition

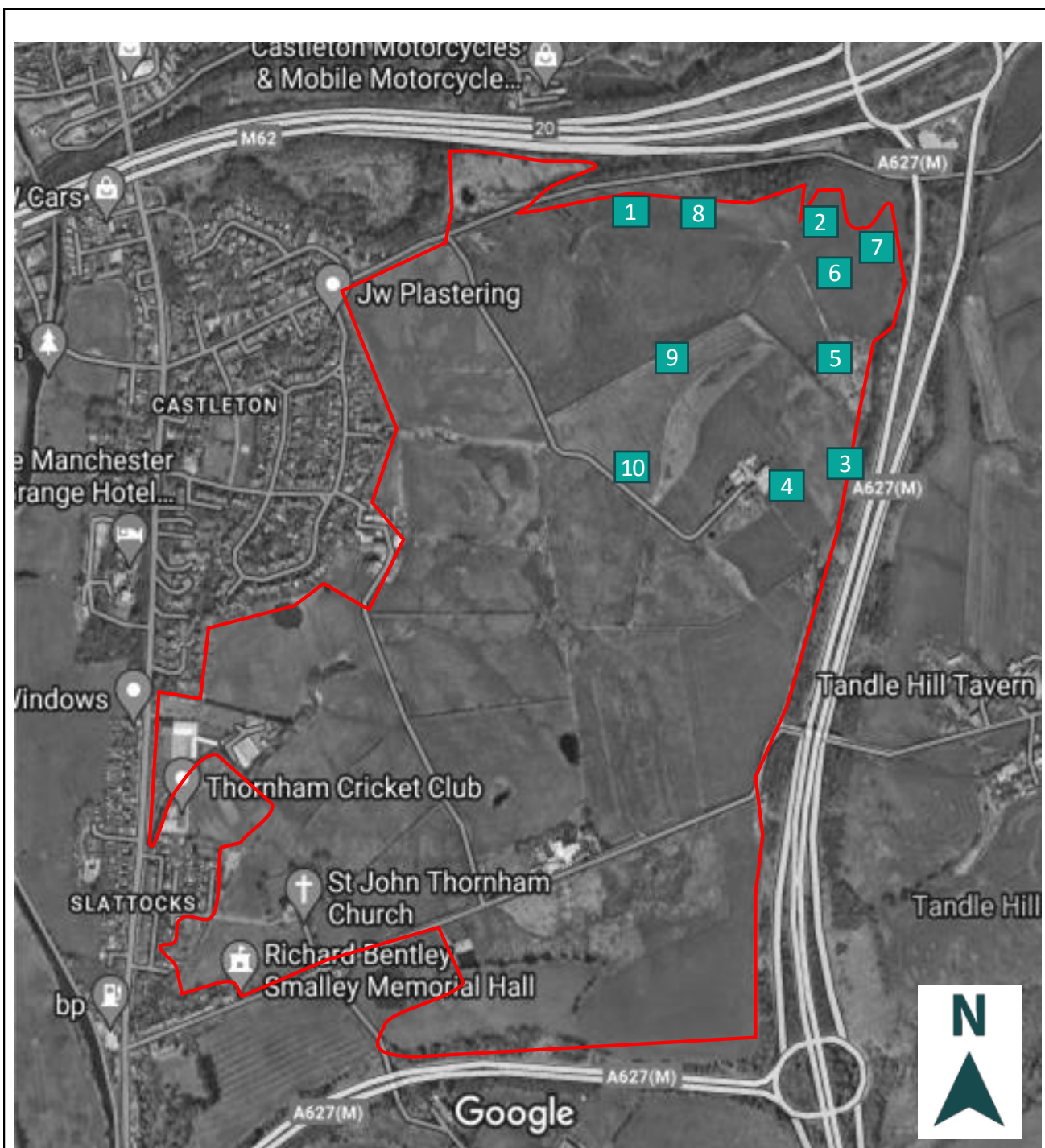
- 5.6 The need to ensure that an adequate scheme of noise mitigation is implemented can be formalised by an appropriately worded planning condition that requires details of a scheme of noise mitigation measures to be submitted to, and agreed by, the Local Planning Authority (LPA).

Conclusion

- 5.7 Subject to the recommendations for noise mitigation measures made above we conclude that potential noise impact from road traffic would not result in any unacceptable harm to residential amenity by reason of noise disturbance.
- 5.8 Furthermore, 'significant adverse impacts' would be avoided and 'adverse impacts' would be mitigated/minimised, bringing the development in line with the aims of the Noise Policy Statement for England (NPSE) 2010.

6.0 SUMMARY

- 6.1 The impact of road traffic noise has been assessed for a proposed residential development on land at Stakehill, Rochdale.
- 6.2 The assessment has included the measurement of road traffic noise levels over a 24 hour weekday period at appropriate locations on the site.
- 6.3 The ProPG Initial Site Noise Risk Assessment indicates the development land is of 'Negligible' to 'Medium' risk from the adverse effects of road traffic noise during the day and at night.
- 6.4 Appropriate acoustic design criteria have been adopted from BS 8233:2014 that will ensure the protection of residential amenity from road traffic on the nearby Motorways.
- 6.5 To achieve the adopted design criteria it will be necessary to implement a scheme of noise mitigation measures in localised parts of the development areas. The recommendations include enhanced sound insulation of windows and provision of acoustically treated ventilation where necessary.
- 6.6 The noise mitigation measures will need to be reviewed and detailed when a definitive housing layout and house type drawings are available. At this stage, we consider that the implementation of an adequate scheme of noise mitigation measures for the development can be ensured by the use of an appropriately worded planning condition.

**Key:**

Not to scale

- Noise Measurement
Position

- Site Boundary

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Title: Figure 1: Site Location &
Noise Monitoring
Positions

Project: P22-220

**Key:**

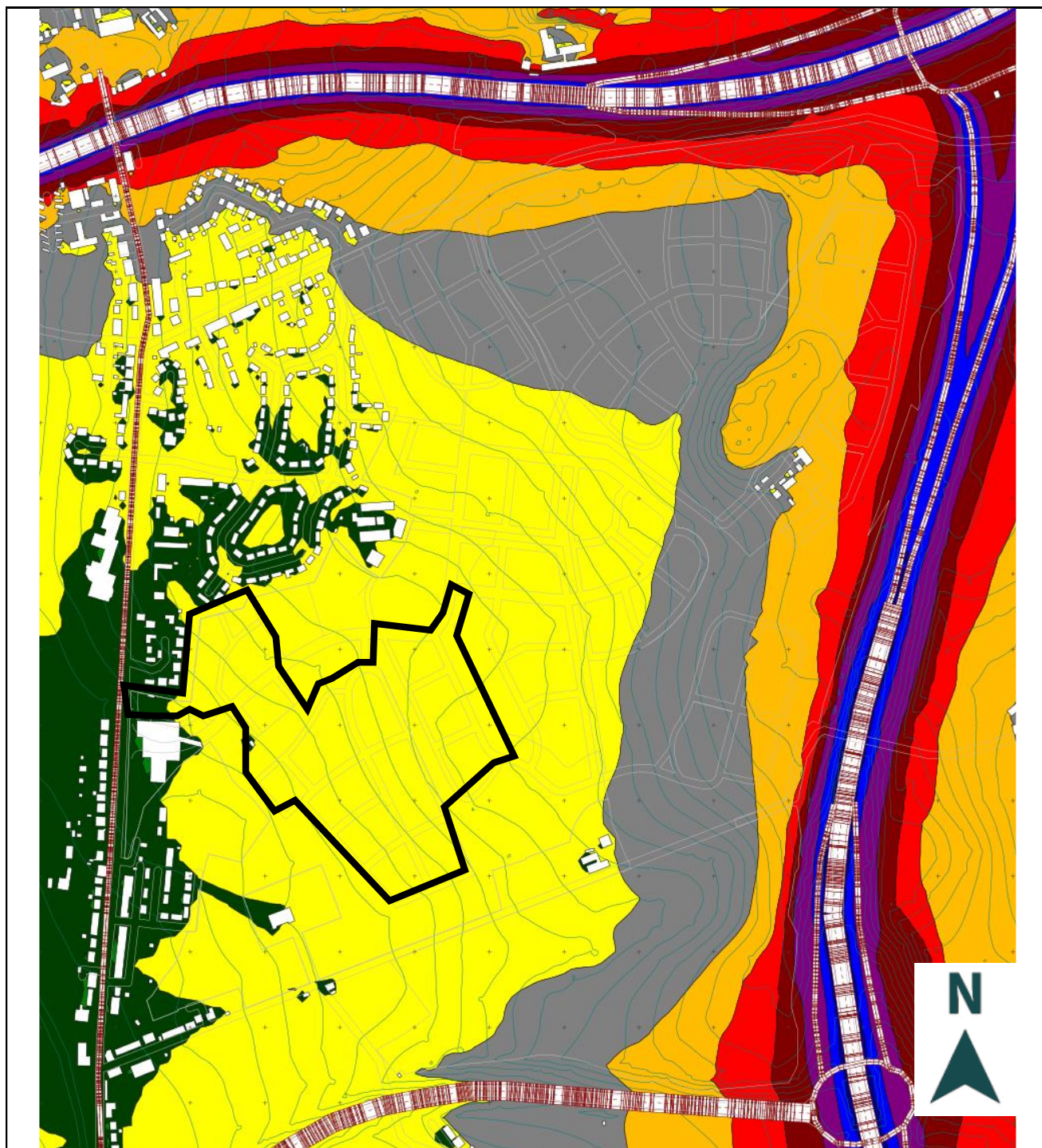
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 - Phase 1



Title: Figure 2: Proposed Site Masterplan

Project: P22-220

**Key:**

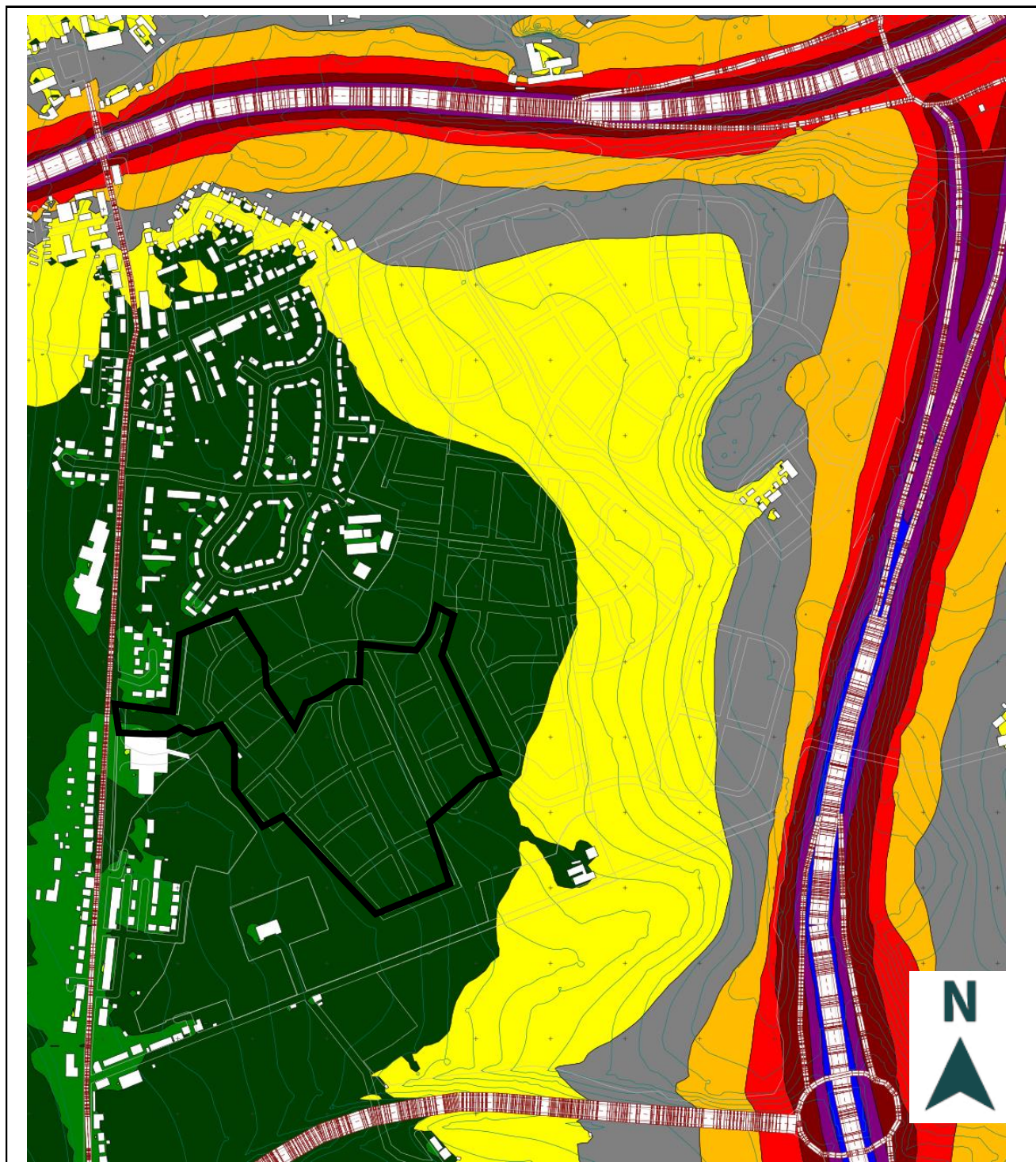
Not to scale

 > 35.0 dB	 > 60.0 dB
 > 40.0 dB	 > 65.0 dB
 > 45.0 dB	 > 70.0 dB
 > 50.0 dB	 > 75.0 dB
 > 55.0 dB	 > 80.0 dB
	 > 85.0 dB

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Title: Figure 3: Daytime Noise
Contour (LAeq,16hr)

Project: P22-220

**Key:**

Not to scale

	> 35.0 dB		> 60.0 dB
	> 40.0 dB		> 65.0 dB
	> 45.0 dB		> 70.0 dB
	> 50.0 dB		> 75.0 dB
	> 55.0 dB		> 80.0 dB
			> 85.0 dB

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Title: Figure 4: Night-time
Noise Contour (LAeq,8hr)

Project: P22-220

**Key:**

Not to scale

- upgraded acoustic
glazing & ventilation

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Title: Figure 2: Outline Noise
Mitigation Scheme**Project:** P22-220

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

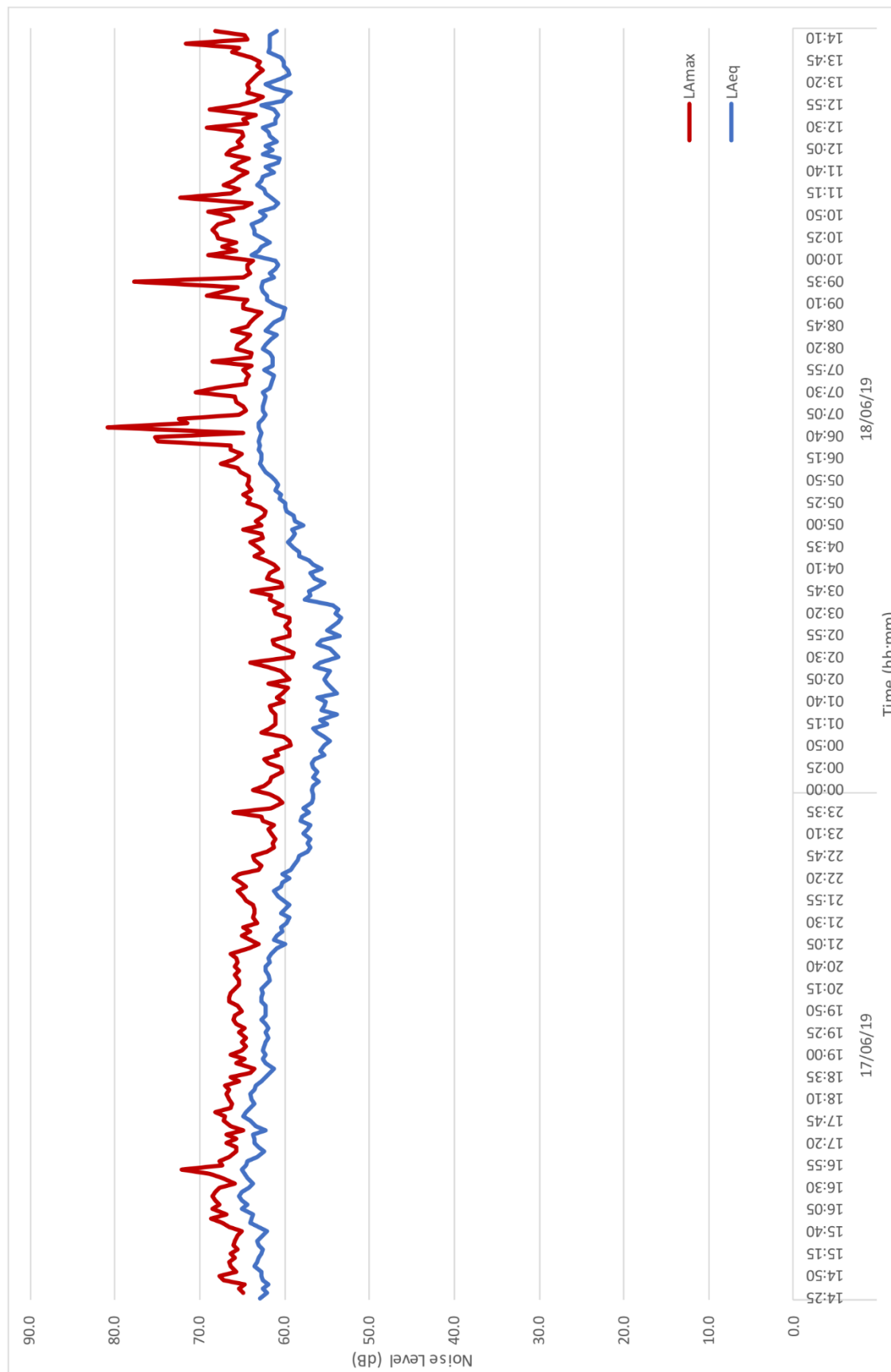
- C_{tr} This is an A-weighted urban traffic noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to take into account different source spectra such as low frequency sound.
- R This is the 'Sound Reduction Index' as measured in a laboratory, and is a measure of the sound insulation properties of an building element in a stated frequency band.
- R_w This is the 'Weighted Sound Reduction Index', and is a single figure quantity of R , the laboratory measured Sound Reduction Index.
- $D_{n,e,w}$ This is the weighted element normalized level difference as measured in a laboratory, and is a measure of the sound insulation properties of small building elements such as ventilators.
- $L_{Aeq,T}$ This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, $L_{Aeq,T}$ is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
- L_{AFmax} This is the maximum A-weighted noise level that was recorded during the measurement period in terms of 'Fast' time weighting.

Appendix II: Noise Survey Results

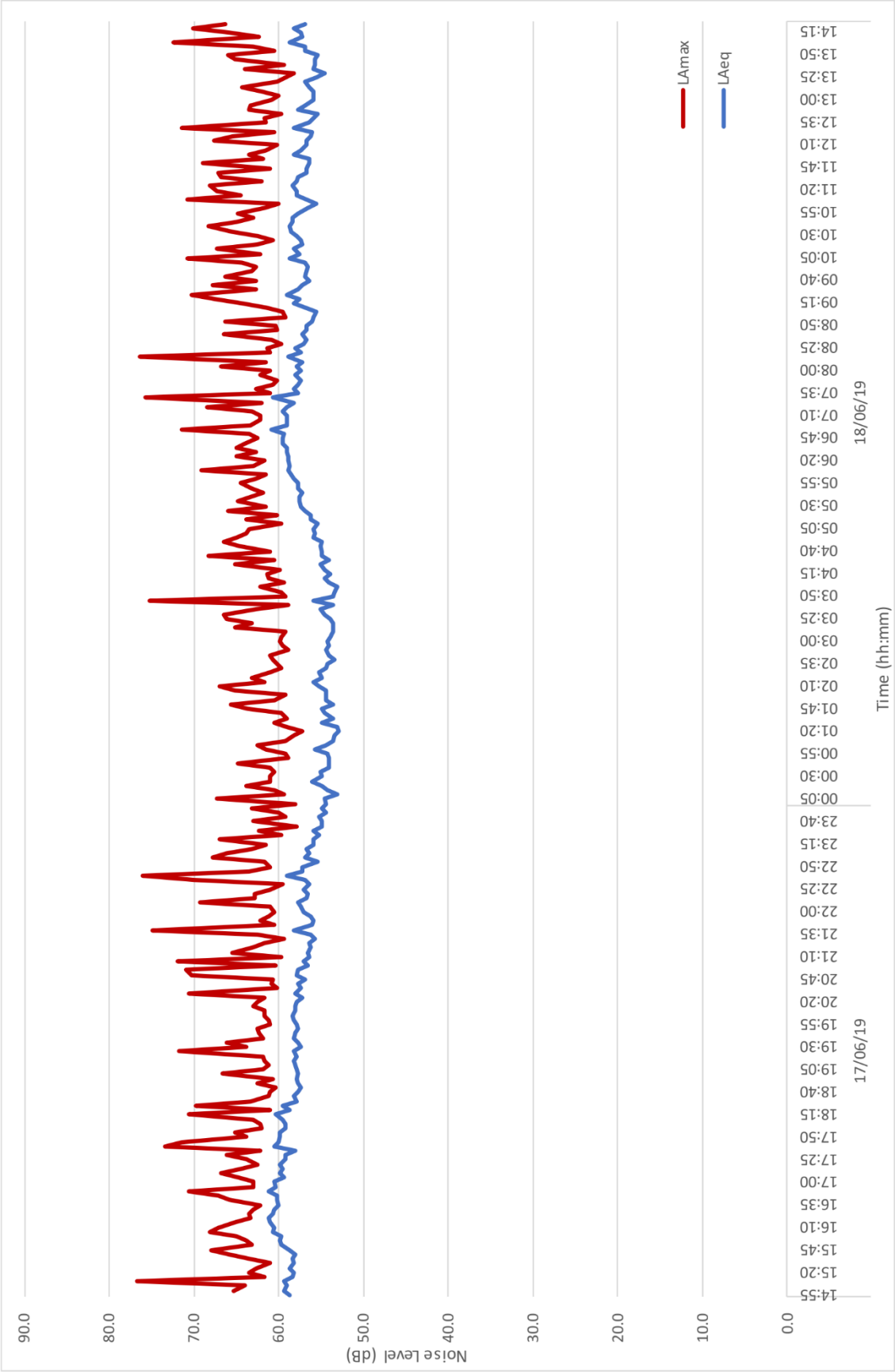
Date(s):	Monday/Tuesday 18/19 June 2019
Equipment	Rion NL-52 'Class 1' & NL-31 'Type 1' sound level meters (s/n: 0976221, 01120844 & 01120845) all weather kits, poles and windshields B&K 2250 'Type 1' (s/n: 3011706), Rion NL-52 'Class 1' sound level meters (s/n: 00242747) with tripods and calibrators
Weather	Daytime – Dry & warm (17-18°C) with a light S to SW breeze (<3 m/s) Night-time – Dry and mild (~10°C) with a light breeze (<3 m/s)

All levels in dB(A)

Location 1: 60m south of M62 Motorway



Location 2: 90m from Thornton Interchange



Location 3: At east site boundary 18m from edge of A627

