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MANCHESTER ROAD, MIDDLETON -

INITIAL NOISE CONSTRAINTS ASSESSMENT

On behalf of:

Redrow Homes Lancashire

Report No: P19-263-R01v1
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CONTENTS

1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Redrow Homes Lancashire to carry out an initial noise impact assessment in connection with a future planning application for residential development on land off Manchester Road, Middleton. The purpose of the initial noise survey and assessment is to inform the constraints plan and the design of the development.

1.2 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;
- Preparation of a computerised noise model of the development land and surrounding area, using the noise measurements to calibrate the model;
- Assessment in outline terms of the potential impact of road traffic noise on the development land;
- Recommendation of appropriate mitigation measures.

1.3 The proposed development site is shown in Figure 1.

1.4 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. The site is bounded to the east by the A627 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.

1.5 The main significant source of noise on the proposed residential development land is traffic noise from the M62 and A627(M) Motorways. Therefore, traffic noise surveys have been carried out to quantify this noise.

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 ROAD TRAFFIC NOISE SURVEY

2.1 Due to the size of the site noise monitoring using unattended auto-logging instrumentation was carried out over a 24 hour period at three locations on the boundaries close to the motorways with some supplemental attended noise measurements. All measurement locations are shown in Figure 1.

2.2 The auto-logging noise measurements comprised consecutive 5-minute measurements carried out using one Rion NL-52 'Class 1' and two NL-31 'Type 1' sound level meters (s/n: 0976221, 01120844 & 01120845), between approximately 14:00 hours on Monday 18 June and 14:00 hours Tuesday 19 June 2019. Calibration checks were carried out both before and after the measurement periods with no variance in levels noted. The noise measurements were taken in 'free-field' conditions and at a microphone height of approximately 1.5 m above the ground.

2.3 The supplemental attended noise measurements were undertaken on the site at a number of locations around the site in order to compliment the automatic logging data and assist in calibrating the computer noise model. The attended noise measurements were carried out using a Rion NL-52 'Class 1' and Brüel and Kjær 2250 'Type 1' sound level meters (s/n: 00242747 & 3011706) between approximately 11:30 and 14:00 hours on Tuesday 19 June 2019.

2.4 Calibration checks were carried out both before and after the measurement periods with no variance in levels noted. The noise measurements were taken in 'free-field' conditions and at a microphone height of approximately 1.5 m above the ground. Octave band frequency analysis was also carried out.

2.5 Weather conditions during the monitoring period was warm in the daytime (17-18^{o}C), mild at night (~10^{o}C) and dry with a light south to south westerly breeze (<3 m/s).

2.6 Charts showing the results of the automated traffic noise monitoring survey are shown in Appendix II and the findings are summarised in Table 1.

Table 1: Road traffic noise exposure levels (dB)

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

2.7 Short-term peaks of noise at night were in the range 59 – 81 dB L_{Amax} at Location 1, 57 – 75 dB L_{Amax} at Location 1 and 74 – 87 dB L_{Amax} at Location 3.

2.8 The attended noise measurements carried out to supplement the automatic logging data are summarised below in Table 2.

Table 2: Summary of results of attended 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

2.9 These measurements have been used to calibrate the noise model set out in Section 3.0.

3.0 CALIBRATION OF NOISE MODEL

3.1 Noise calculations have been carried out using the CadnaA noise prediction software for daytime (07:00 – 23:00 hours) and night-time (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 site and surroundings (including ground height data) was provided by Redrow Homes Lancashire.

3.2 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.

3.3 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 screening from the road traffic noise at certain parts of the site.

3.4 We have considered these factors and used the measured site noise levels 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 our attended 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 corelates to the propagation of noise levels across the site and provide sa robust assessment of likely noise levels for site layout design purposes.

3.5 The contour plots of the road traffic noise calculations are shown for the open site in Figures 2 and 3 for daytime ($L_{Aeq\ 16hrs}$) and night-time ($L_{Aeq\ 8hrs}$) at 1.5 metres above the ground respectively.

3.6 The results of these calculations have been used to assess the level of impact from road traffic noise across the development site in Section 4.0 and recommend outline noise mitigation measures in Section 5.0.

4.0 ACOUSTIC DESIGN CRITERIA FOR PROPOSED NEW DWELLINGS

Acoustic Design Criteria

4.1 The National Planning Policy Framework (NPPF), which was last updated in February 2019, provides some general guidance to local authorities on taking noise into account in planning policies and decisions. This includes guidance that local authorities should 'avoid noise giving rise to significant adverse impacts on health and quality of life' as a result of new development.

4.2 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.

4.3 There is useful established national guidance for acoustic design goals for residential development set out in BS 8233: 2014, *Guidance on sound insulation and noise reduction for buildings*, which carries the full weight of an adopted British Standard. The design criteria recommended in BS8233 for daytime periods (07:00 – 23:00 hours) and night-time periods (23:00 – 07:00 hours) are summarised in Table 3:

Table 3: BS 8233:2014 recommended acoustic design criteria

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

4.4 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.

4.5 The ProPG initial site noise risk assessment criteria are shown in Table 4.

Table 4: ProPG Stage 1: Initial Site Noise Risk Assessment Criteria

Time of Day	Negligible	Low	Medium	High
Daytime (0700-2300 hrs)	<50 dB	50 – 60 dB	60 – 70 dB	>70 dB
Night-time (2300-0700 hrs)	<40 dB	40 – 50 dB	50 – 60 dB	>60 dB

4.6 Table 4 sets out the relevant noise level criteria that define the element of risk of noise impact on proposed residential development land, ranging from 'Negligible' to 'High'.

4.7 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 3 of this report.

4.8 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_{Amax} values and these can be highly variable and unpredictable such that for design purposes it is usual to take into account the findings of research described in WHO *Community Noise Guidelines* that states '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'.

4.9 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} inside living rooms and bedrooms, 40 dB L_{Aeq} inside dining rooms; and
- Night-time noise levels not exceeding 30 dB L_{Aeq} and generally not exceeding 45 dB L_{Amax} in bedrooms (i.e. no more than 10-15 times per night).

4.10 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 $L_{Aeq,T}$ with an upper guideline value of

55 dB $L_{Aeq,T}$ 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 2014 version of 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 in gardens may be acceptable. Nevertheless, for this proposed residential development, we have adopted an acoustic design criterion of within 55 dB $L_{Aeq(16\ hours)}$ for private rear gardens of the new dwellings as far as is practicable.

Initial Noise Risk Assessment

4.11 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 site areas fall in to, and between, the 'Negligible' to 'Medium' risk categories of ProPG in the daytime and night.

4.12 It is considered that traffic noise levels do not impose any significant constraints to residential development of the sites, but traffic noise levels in areas nearest to M62 and A627 Motorways do need to be taken into account and noise mitigation provided where necessary.

4.13 Our outline noise mitigation recommendations are described in Section 5.0.

5.0 OUTLINE NOISE MITIGATION MEASURES

5.1 The preliminary illustrative masterplan shown in Figure 4 indicates that the majority of proposed development parcels will be located well away from Motorway noise such that it is considered that no noise mitigation measures are likely to be warranted.

5.2 However, some noise mitigation measures will be necessary for dwellings along the northern and eastern boundaries of the development land.

5.3 Acoustic Screening for Gardens

5.4 We would recommend that the orientation of dwellings along the northern and eastern boundaries is considered such that rear gardens will be screened by the dwellings themselves.

Sound Insulation of Dwellings

5.5 The glazing specification will depend on the distance of houses from the Motorways, the 'angle of view' towards the roads, the size of the windows, and which windows benefit from any screening provided by other houses, etc., so only outline guidance can be given at this stage.

5.6 Windows of standard well-sealed thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB $R_w + C_{tr}$. Therefore, where traffic noise levels exceed 60 dB LAeq,16hr during the daytime and/or 55 dB LAeq,8hr and/or 70 dB LAmax at night, higher specification glazing will be necessary.

5.7 We calculate that for dwellings at least 15m back from site boundary with the Motorways, standard thermal double glazing (i.e. 4mm glass – nominal cavity – 4mm glass) and standard slot vents would provide adequate sound reduction.

5.8 On the basis of the illustrative layout, any dwellings proposed in the area indicated in Figure 4 would require a higher specification double glazing is installed for exposed habitable rooms, with a sound reduction performance of at least 30 dB Rw+ Ctr.

5.9 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 Dn,e,w.

Planning Condition

5.9 If necessary, the implementation of an adequate scheme of noise mitigation measures for the residential development can be ensured by the use of an appropriately worded planning condition in the usual way.

6.0 SUMMARY AND CONCLUSION

6.1 The impact of road traffic noise has been assessed for the proposed outline residential development on land off Manchester Road, Middleton.

6.2 The assessment has included automated measurement of road traffic noise levels at appropriate locations on the site over a 24-hour period and attended measurements.

6.3 Noise modelling calculations have also been carried out using specialist software of the propagation of road traffic noise on the proposed development site.

6.4 Appropriate acoustic design criteria have been adopted from BS 8233:2014 that will ensure the protection of residential amenity. However, 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, and suitable outline measures have been described in this report.

6.5 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
x - Noise Measurement Position
- Site Boundary

N

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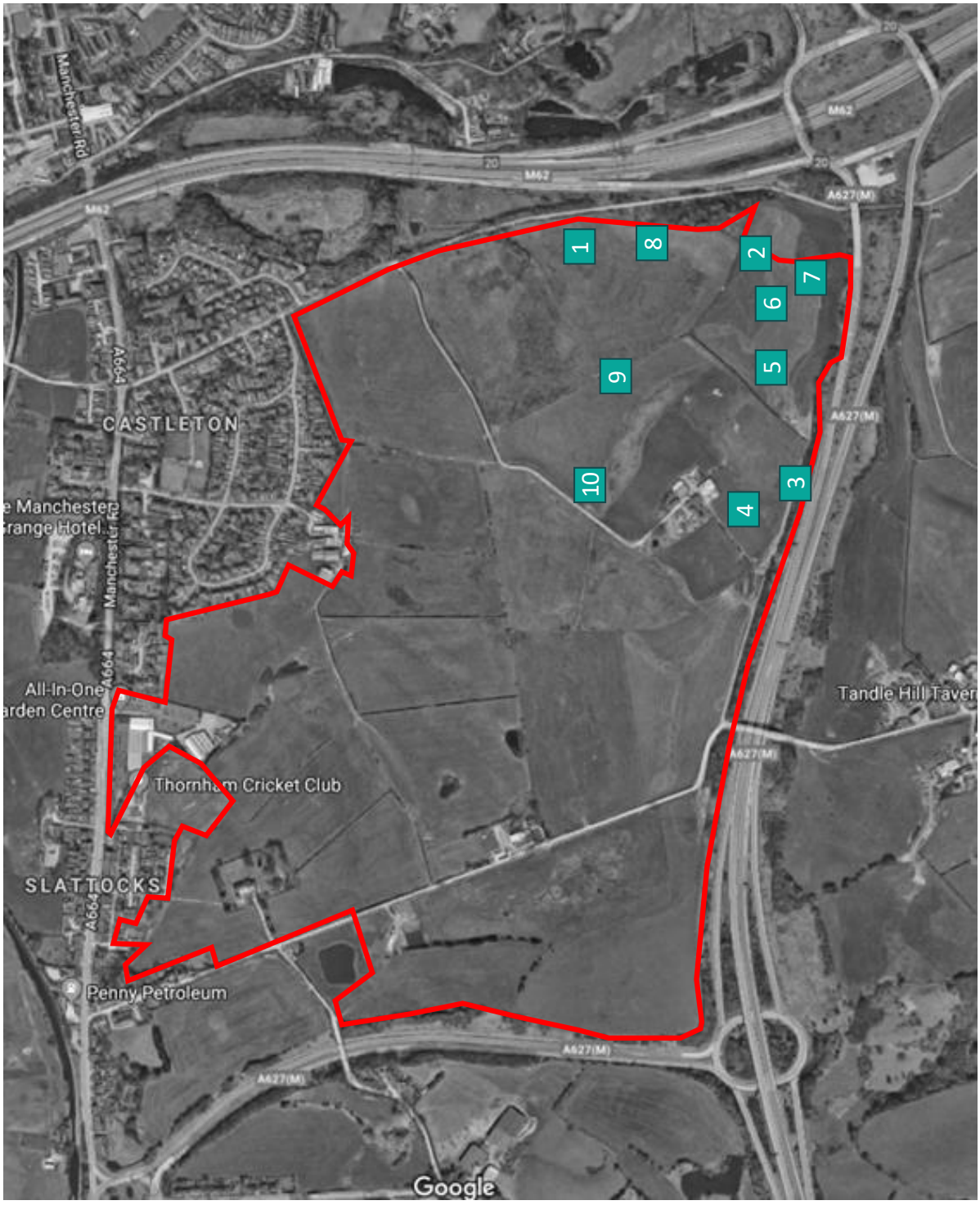
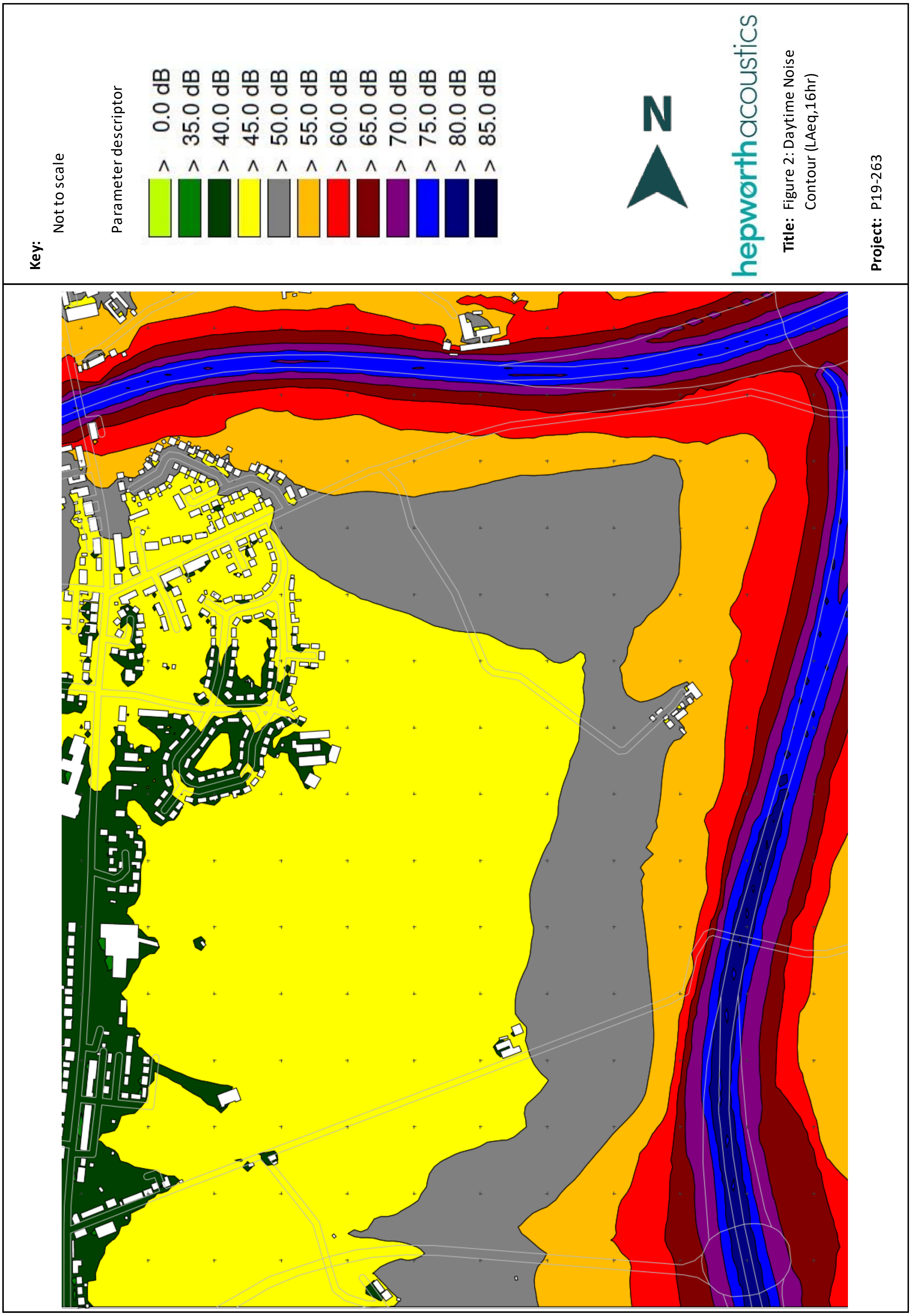
Title: Figure 1: Site Location & Noise Measurement Positions

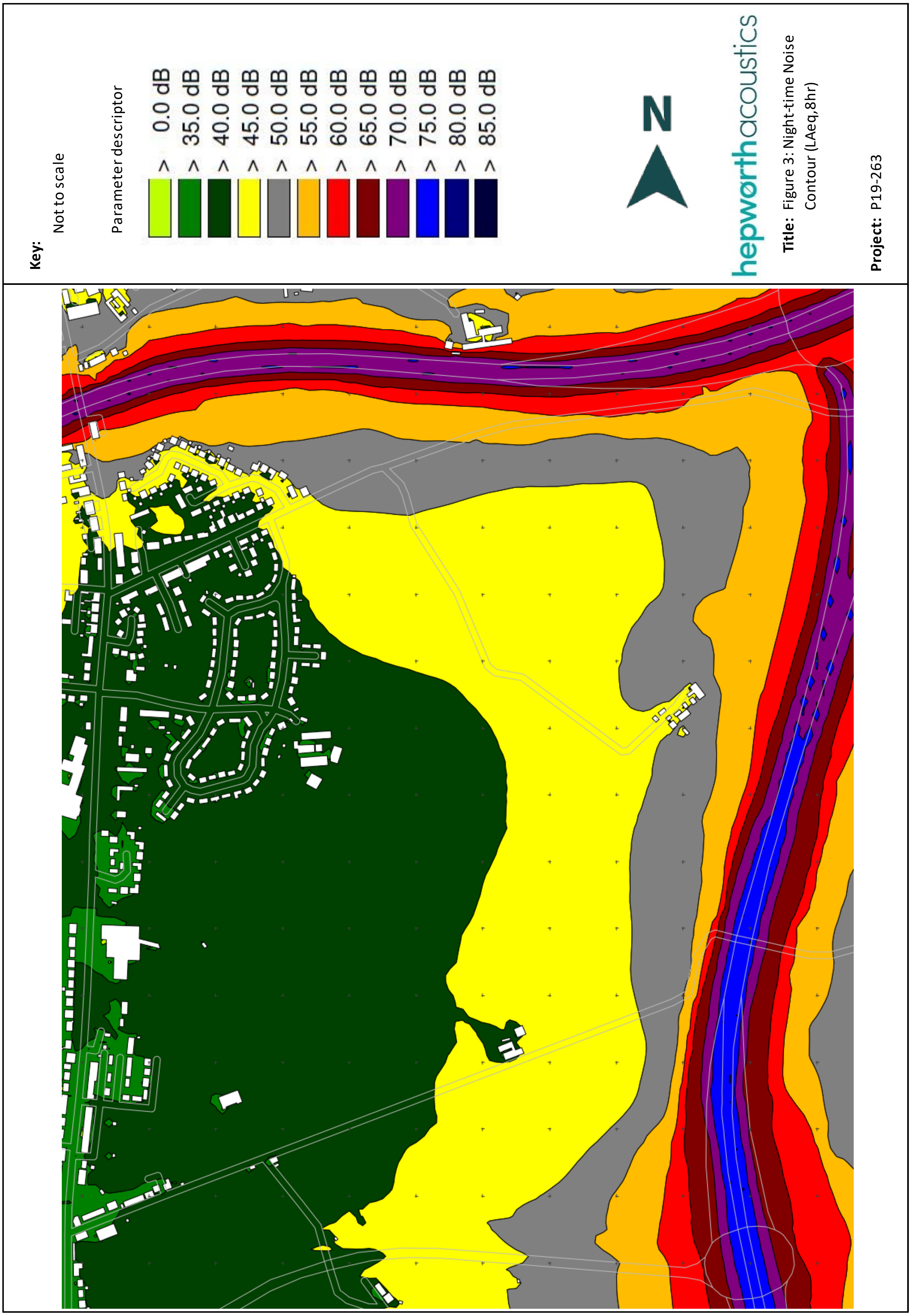
Project: P19-263





Title: Figure 2: Daytime Noise Contour (LAeq,16hr)

Project: P19-263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> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB
N
Title: Figure 3: Night-time Noise Contour (LAeq,8hr)
Project: P19-263


Key:
Not to scale
- Site Boundary
- Proposed Development Parcels
- Area requiring enhnaced acoustic glazing
N
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Title: Figure 4: Preliminary Illustrative Masterplan
Project: P19-263
M62
THORNHAM NEW ROAD
MANCHESTER ROAD
A627 (M)
ST JOHN'S CE VA PRIMARY SCHOOL
ST JOHN THORNHAM CHURCH

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.

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' (L_w), and is a single figure quantity of R, the laboratory measured Sound Reduction Index.

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.

L_{Aeq} 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, LAeq 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.

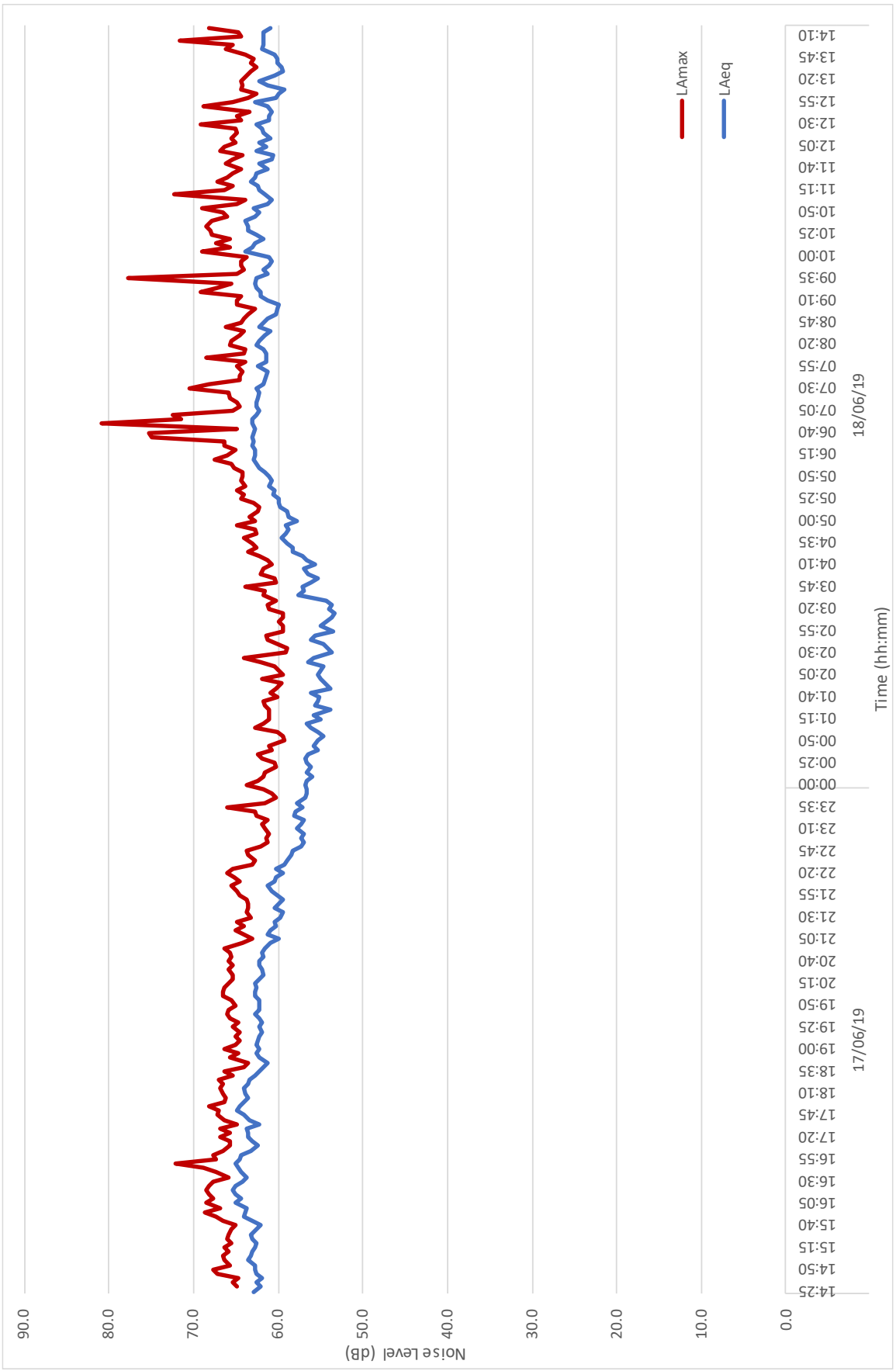
L_{Amax} This is the maximum A–weighted noise level that was recorded during the monitoring period.

Appendix II: Noise Survey Results

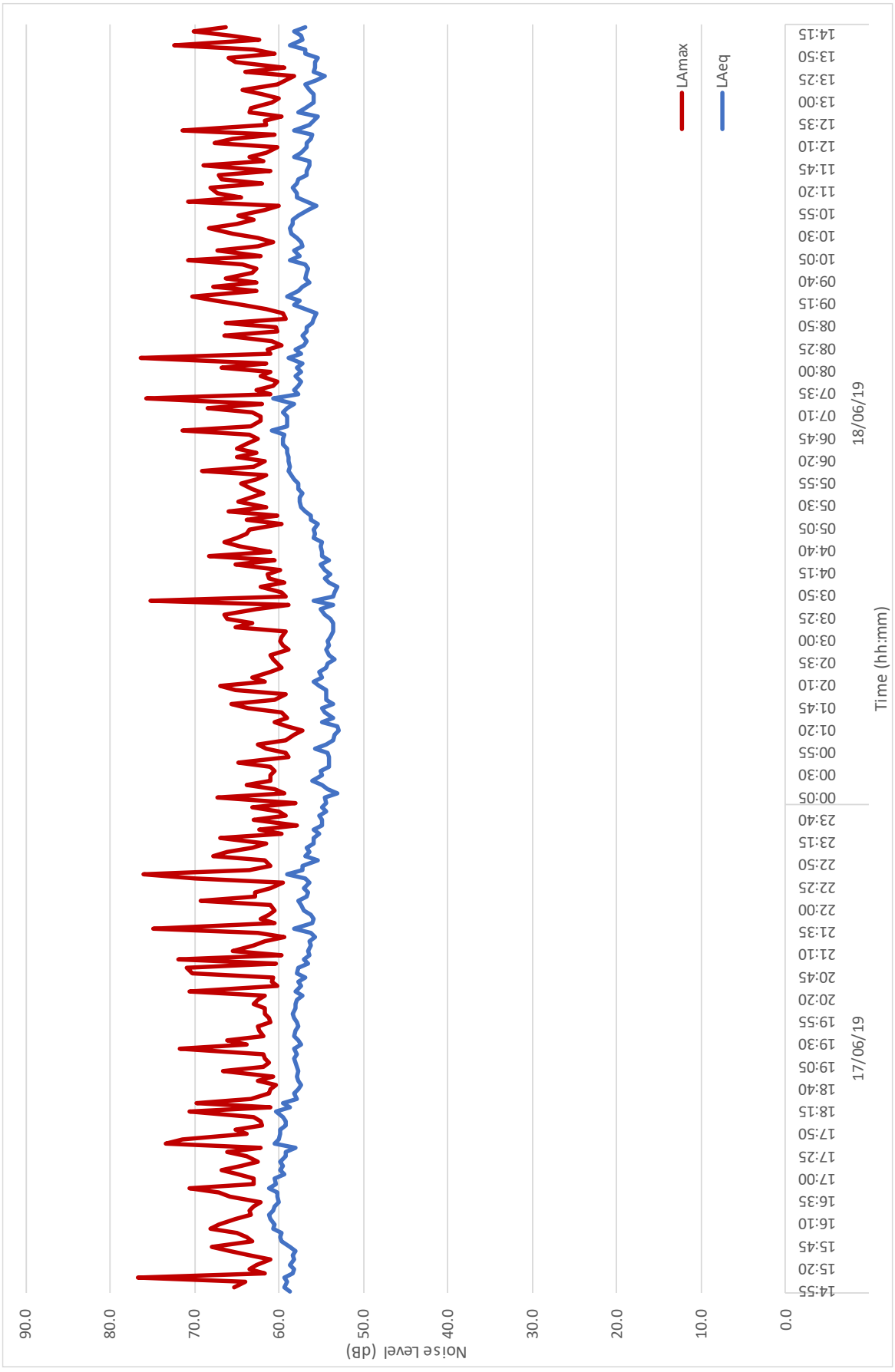
Date(s):	Monday/Tuesday 18/19 June 2019
Equipment:	Rion NL-52 'Class 1' & NL-31 'Type 1' sound level meters (s/n: 0976221, 01120844 & 01120845) all weather kits, poles and windshields B&K 2250 'Type 1' (s/n: 3011706), Rion NL-52 'Class 1' sound level meters (s/n: 00242747) with tripods and calibrators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