

PROPOSED EXTENSION TO CAPITOL PARK, DODWORTH, BARNSELY:

NOISE IMPACT ASSESSMENT

On behalf of:
Capitol Park J37 M1 Ltd

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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Capitol Park J37 M1 Ltd to carry out a noise impact assessment in connection with a proposed planning application for an extension to the existing Capitol Park development at Dodworth, Barnsley, in the form of two large warehouse buildings.
- 1.2 The noise assessment has included:
- i. An inspection of the site and surrounding area;
 - ii. Measurement of background noise levels during a representative 24 hour period;
 - iii. Evaluation of likely noise levels from operation of the proposed warehouse premises;
 - iv. Assessment of the potential operational noise impact on neighbouring residential properties; and,
 - v. Recommendation of appropriate outline noise mitigation measures.
- 1.3 The qualifications and experience of the author of this report are as follows:- BSc (Hons.) in Environmental Science, Institute of Acoustic's Diploma in Acoustics & Noise Control, MSc in Environmental Acoustics. 30 years of experience in monitoring and assessment of environmental noise. Author of papers on environmental noise issues. Fellow of the Institute of Acoustics
- 1.4 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 SITE DESCRIPTION AND PROPOSALS

Site Description

- 2.1 The proposed development land is located to the north-west of the existing Capitol Park site at Dodworth. We understand that the land is allocated in the Local Plan for employment uses. The land is essentially two large fields. One of which extends down towards the M1 motorway to a ground elevation height of approximately 145m in the northernmost area, and the other which is at a higher elevation, attaining over 163m in the south-west area.
- 2.2 The noise climate at the lower field is mainly due to traffic noise from the motorway. The noise climate on the upper field is due to distant motorway noise and, further south, traffic passing on Higham Lane.
- 2.3 There are two dwellings in Higham Lane near to the proposed development, which are Higham Manor (the western property) and Lane Side Farm (the eastern property). It is for these two properties that potential noise impact needs to be assessed, there being no other dwellings in the vicinity of the development proposal (the existing bungalow on the bend of Higham Lane being earmarked for removal as part of the development).

Proposals

- 2.4 The proposed development will form an extension to the existing Capitol Park business park.
- 2.5 The planning application is at outline stage only but the illustrative layout (see Figure 2) shows that the development will comprise two warehouses buildings; a larger one at a higher elevation to the south-east (Unit 2) and the other one slightly smaller and located at a lower level nearer to the motorway (Unit 1). Both Units will have service yards.
- 2.6 The service yard for Unit 2 will be set back from Higham Lane and will be mostly screened (visually and acoustically) from the two dwellings by the corner of the large warehouse building itself. It is considered that acoustic fencing at the western end of this service yard (as described later in this report) would ensure that there would be no significant noise impact from operations in the service yard of Unit 2 on the amenity of local residents.
- 2.7 The service yard for Unit 1 would be on the southern side of the building. This would be at a lower engineered ground level with a retaining wall such that it would be approximately 4-5 metres lower

than the ground height at the curtilage of the grounds of the nearest dwelling (Higham Manor). Therefore, in terms of use of the service yards, the noise assessment has focused on that of Unit 1. An acoustic fence has been proposed near to Higham Manor.

- 2.8 We understand that the outline planning application is for B2/B8 use. As the tenants are not known at this stage there are no details available on any B2 use and it is therefore not possible to carry out a quantitative assessment of noise impact at this juncture. However, instead, the results of the background noise survey have been used, in conjunction with the relevant British Standard, as a basis for recommending appropriate noise design limits for any industrial process or equipment noise. This is a standard approach in such circumstances.
- 2.9 If on the other hand the units are used for warehousing/distribution purposes, as seems more likely given the easy access to the nearby Junction 37 of the M1 motorway, it is possible to carry out a quantitative assessment of HGV movements in the service yard on the basis of calculations, as described later in this report.

3.0 BACKGROUND NOISE SURVEY

Survey

- 3.1 An environmental noise survey has been undertaken to establish the prevailing background noise climate of the area. The survey was carried out by installing two auto-logging sound level meters at the edge of the fields in the vicinity of the dwellings at Higham Manor/Lane Side Farm. The noise survey locations are indicated in Figure 2.
- 3.2 Location 1 was to the north of the dwellings and Location 2 was further south, on the east side of the dwellings.
- 3.3 The noise survey was carried out over a 24 hour period between the afternoon of 12 February 2019 and the afternoon of 13 February 2019, during which noise levels were measured in terms of consecutive 15 minute periods. The survey was carried out during a period of stable dry weather with generally light south-westerly winds.
- 3.4 The noise measurements were carried out using Rion NL-52 and Rion NL-31 'Type 1' integrating sound level meters complying with BS EN 60804:2001 and having current independent calibration certification. Also, acoustic calibration of the sound level meters was checked before and after the noise survey using an acoustic field calibrator and no significant variation in the calibrated noise level occurred.
- 3.5 The noise measurements were carried out in general compliance with BS 7445: 2003 and BS 4142:2014. The noise measurements were taken in 'free-field' conditions and at a microphone height of approximately 1.4m above the ground.

Results

- 3.6 The results of the 24 hour environmental noise survey are presented in chart form in Appendix II. A summary of the measured range of $L_{Aeq}(15 \text{ mins.})$ and $L_{A90}(15 \text{ mins.})$ values is provided in Table 1.
- 3.7 As one would expect, the noise levels measured at Location 1 are slightly higher than those measured at Location 2, because Location 1 was more exposed to the motorway noise. This was noted during our site inspection, although walking further south from Location 2 local traffic noise from Higham Lane becomes increasingly prominent.

Table 1: Summary of range of noise levels measured near dwellings (dB)

Location	Daytime (07:00-23:00)		Night-time (23:00-07:00)	
	L _{Aeq} (15 mins)	L _{A90} (15 mins)	L _{Aeq} (mins)	L _{A90} (mins)
1. North of Dwellings	52 - 61	47 - 58	48 - 58	43 - 56
2. East of Dwellings	49 - 56	44 - 54	45 - 54	39 - 52

3.8 The background noise levels have been used in the assessment of noise impact later in this report.

4.0 RELEVANT NATIONAL PLANNING GUIDELINES & BRITISH STANDARDS

- 4.1 The *National Planning Policy Framework* (NPPF) 2018 states at paragraph 180 that planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects of pollution on health and living conditions i.e. they should 'avoid noise giving rise to significant adverse impacts on health and the quality of life'.
- 4.2 The *Noise Policy Statement for England* (NPSE) 2010 includes three aims:
- 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.
 - 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.
 - 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 are two primary British Standards that provide guidance on environmental noise matters that are relevant to operational noise from the proposed new development at Capitol Park; BS4142:2014 and BS8233:2004. These standards are summarised below.

British Standard 4142: 2014 'Methods for rating and assessing industrial and commercial sound'

- 4.4 BS 4142: 2014 describes methods for rating and assessing sound of an industrial and/or commercial nature, including sound from fixed installations which comprise mechanical and electrical plant and equipment. This requires the sound from a specific source (in L_{Aeq}) to be compared with the existing background sound level (L_{A90}) outside residential locations. The standard also puts weight on the importance of the context in which the sound will occur.
- 4.5 A 'character correction' is added to the specific sound level where 'certain acoustic features can increase the significance of impact' at the residential locations. Penalties ranging from 2 – 9 dB are added where the sound sources are considered tonal or impulsive or 'otherwise are readily distinctive against the residual acoustic environment'.

- 4.6 BS 4142 states that if the rated sound level exceeds the L_{A90} background sound level by around 10 dB or more it *'is likely to be an indication of significant adverse impact'*. An excess of around 5 dB over the background sound level is *'likely to be an indication of an adverse impact'* but not amounting to a significant adverse impact.
- 4.7 The lower the rating level is relative to the measured background sound level, the less likely it *'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'*.
- 4.8 BS 4142 also states in respect of background sound levels that *"that values are reliable and suitably represent the particular circumstances and periods of interest... the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods"*. From the background noise survey data, we recommend that (erring on the low side of the range) the representative background noise levels are taken to be 58 dB L_{A90} in the daytime, 50 dB L_{A90} in the evening and 35 dB L_{A90} at night.
- 4.9 BS4142 requires noise impact to be assessed over a 1 hour period in the daytime and over a 15 minute period at night.
- 4.10 The quantitative BS4142 analysis is an 'initial assessment' and relevant contextual factors also need to be taken into account.

British Standard 8233: 2014 'Guidance on sound insulation and noise reduction for buildings'

- 4.11 BS8233 provides some general guidance on sound insulation of buildings and some more specific guidance on certain types of buildings. Noise from industrial type buildings is discussed only in general terms but some more specific guidance is given on acoustic design criteria (i.e. acceptable noise levels) for dwellings. Whilst the latter guidance is aimed at proposed new residential development it is useful for putting noise levels discussed later in this report into context.
- 4.12 The acoustic design criteria recommended for inside dwellings in BS8233 for daytime periods (07:00 – 23:00 hours) and night-time periods (23:00 – 07:00 hours) are summarised in Table 2:

Table 2: BS8233 recommended acoustic design criteria inside dwellings

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 $L_{Aeq,8hr}$

- 4.13 The equivalent outdoor noise levels, assuming windows to be partially open for ventilation, are approximately 15dB higher.
- 4.14 BS8233 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”..
- 4.15 BS 8233 also states that, “*where development is considered necessary or desirable ... the internal target levels [i.e. those in Table 2 of this report] may be relaxed by up to 5dB and reasonable internal conditions still achieved*”.
- 4.16 For outdoor amenity spaces such as private gardens and patios, BS8233 states that in the daytime ‘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’.

5.0 ASSESSMENT OF NOISE IMPACT & OUTLINE NOISE MITIGATION

Industrial Use (B2)

- 5.1 As the tenants of the proposed buildings are not known at this stage there are no details available on any B2 use and it is therefore not possible to carry out a quantitative assessment of noise impact at this juncture. However, as is the standard approach in such circumstances, the results of the background noise survey have been used, in conjunction with the methodology of British Standard 4142:2014, as a basis for recommending appropriate noise design limits for any industrial process or equipment noise.
- 5.2 As described in Section 4, the relevant British Standard for the assessment and control of industrial noise is British Standard 4142: 2014 'Methods for rating and assessing industrial and commercial sound'.

Unit 1

- 5.3 From consideration of the chart of the results of the background noise survey at Location 1 we consider that the representative background noise values for Higham Manor (for Unit 1), as defined by BS4142, are as follows:

Daytime (07:00-19:00) 55 dB L_{A90}

Evening (19:00-23:00) 50 dB L_{A90}

Night (23:00-07:00) 44 dB L_{A90}

- 5.4 This means that, in order to ensure low noise impact at the nearest dwelling, the BS4142 noise Rating Level from industrial operations (i.e. including any penalties for the noise characteristics) would need to be controlled to no higher from than the representative background noise levels stated above. For the avoidance of doubt, the BS4142 rating level limits are shown in Table 3:

Table 3: Recommended industrial noise design limits at Higham Manor

Period	BS 4142 Noise Rating Level
Daytime (07:00-19:00)	55 dB L _{Ar} , 1 hour
Evening (19:00-23:00)	50 dB L _{Ar} , 1 hour
Night-time (23:00-07:00)	44 dB L _{Ar} , 15 mins

5.5 Depending on the type of industrial use of the building it may be necessary for the tenant to implement physical and/or management measures in order to control noise emissions to within the values in Table 3. Such noise mitigation measures may involve one or more of the following :-

- Selection of low-noise items of machinery;
- Location of noisier plant/activities away from the south elevation of the building;
- Housing of noisier machinery/processes within plant rooms;
- Sound insulation of relevant parts of the building;
- Localised noise control works for specific items of machinery;

5.6 In addition, taking into account the relatively low values in Table 3, we would suggest that all fixed mechanical plant should be located inside the building and not in the yard.

Unit 2

5.7 Unit 2 would be nearer to the dwellings but the nearest elevation would be the blank gable end and the service yard would be mostly screened by the corner of the building itself. However, the background noise climate was found to be slightly lower on the east side of the dwellings than to the north. From consideration of the chart of the results of the background noise survey at Location 2 we consider that the representative background noise values for Lane Side Farm (for Unit 2), as defined by BS4142, are as follows:

Daytime (07:00-19:00) 50 dB L_{A90}

Evening (19:00-23:00) 47 dB L_{A90}

Night (23:00-07:00) 41 dB L_{A90}

5.8 This means that, in order to ensure low noise impact at the nearest dwelling, the BS4142 noise Rating Level from industrial operations (i.e. including any penalties for the noise characteristics) would need to be controlled to no higher than the values shown in Table 4:

Table 4: Recommended industrial noise design limits at Lane Side Farm (dB)

Period	BS 4142 Noise Rating Level
Daytime(07:00-19:00)	55 dB L_{Ar} , 1 hour
Evening (19:00-23:00)	50 dB L_{Ar} , 1 hour
Night-time(23:00-07:00)	44 dB L_{Ar} , 15 mins

- 5.9 Therefore, taking into account the limits as set out Table 4 and the proposed location of Unit 2 it is likely that an industrial tenant would need to implement the types of noise mitigation measures that were outlined above in order to safeguard residential amenity.

Warehouse Use (B8)

- 5.10 We understand that in all likelihood the proposed new buildings would be used for warehousing (i.e. B8 use) which is considered below.

Unit 1

- 5.11 Generally, noise levels inside modern warehousing buildings are modest, typically within the range 65 – 75 dB L_{Aeq} . Such noise from within the Unit 1 building would not be expected to give rise to any unacceptable noise impact at the nearest dwellings. However, there is more potential for noise impact from use of the service yard.
- 5.12 If the warehouse was of a typical modern design with dock loading bays, lorries would enter the service yard and simply reverse in to the loading bays. All loading/unloading would then be carried out from within the building. In this way the only significant noise would be the arrival and departure of each lorry and the sound of it reversing into position at the loading bay.
- 5.13 We have calculated the likely noise level at the nearest dwelling on the basis of 10 HGV movements in an hour in/out the service yard and reversing into the loading bays. Initially calculations were undertaken in the absence of any acoustic screening, and on this basis the calculated noise level is 55 dB $L_{Aeq(1\text{ hr})}$ at Higham Manor. For a pro-rata 15-minute period at night the noise level would be 55 dB $L_{Aeq(15\text{ mins.})}$. The sound of HGV movements on the site would also fall under the scope of BS4142:2014. Therefore, if an acoustic feature penalty of 5 dB is applied to the calculated 'specific' noise level to take into account the character of the sound, the resulting BS4142 Rating level is 60 dB L_{Ar} .
- 5.14 This value is above the limits recommended in Table 3 for Unit 1. The initial BS4142 assessment would be 'adverse impact' in the daytime and 'significant adverse impact' in the evening and night.

However, a specialist acoustic fence is proposed as part of the outline application, the details of which would be a reserved matter. Therefore, this needs to be taken into account. The proposed location of the acoustic fence is at the top of the slope 2m from the boundary of the grounds of Higham Manor.

- 5.15 We have considered a range of possible noise barrier heights and the calculated noise reductions are as follows:

3m height	10 dB(A) noise reduction to patio, 5 dB(A) to first floor level
3.5m height	11 dB(A) noise reduction to patio, 8 dB(A) to first floor level
4m height	13 dB(A) noise reduction to patio, 9 dB(A) to first floor level
4.5m height	14 dB(A) noise reduction to patio, 11 dB(A) to first floor level
5m height	15 dB(A) noise reduction to patio, 12 dB(A) to first floor level

- 5.16 As one would expect, the higher the noise barrier fence, the greater the sound reduction will be.

- 5.17 Thus, for the example of a 3m high acoustic fence, the BS4142 Rating Level would be reduced to 50 dB L_{Ar} on the patio of Higham Manor and 55 dB L_{Ar} at first floor level. In terms of the initial BS4142 assessment this would equate to 'low' impact in the daytime, 'adverse impact' in the evening and 'significant adverse impact' at night.

- 5.18 For the example of a 5m high acoustic fence, the BS4142 Rating Level would be reduced to 45 dB L_{Ar} on the patio of Higham Manor and 48 dB L_{Ar} at first floor level. In terms of the initial BS4142 assessment this would equate to 'low' impact in the daytime and evening, and 'adverse' at night. However, these are outdoor noise levels whereas at night one would expect residents to be inside their dwellings, in which case the noise impact at night would be lower. The 'specific sound level' would also be well within the daytime values of 50-55 dB L_{Aeq} that are recommended for gardens in BS8233:2014, and within the 30 dB L_{Aeq} value recommended at night inside bedrooms.

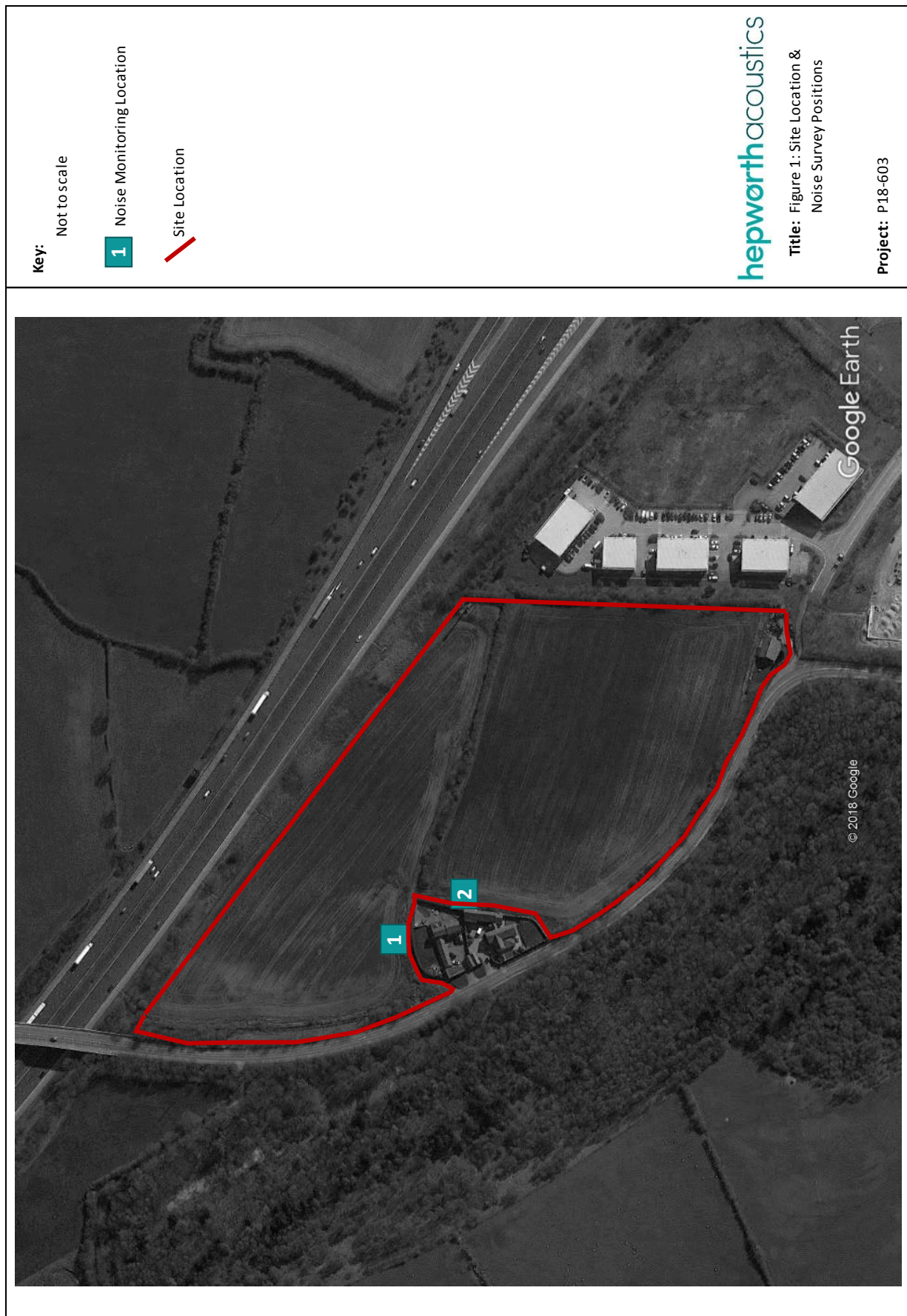
- 5.19 Noise mitigation will need to be subject to detailing and discussions with the Local Planning Authority.

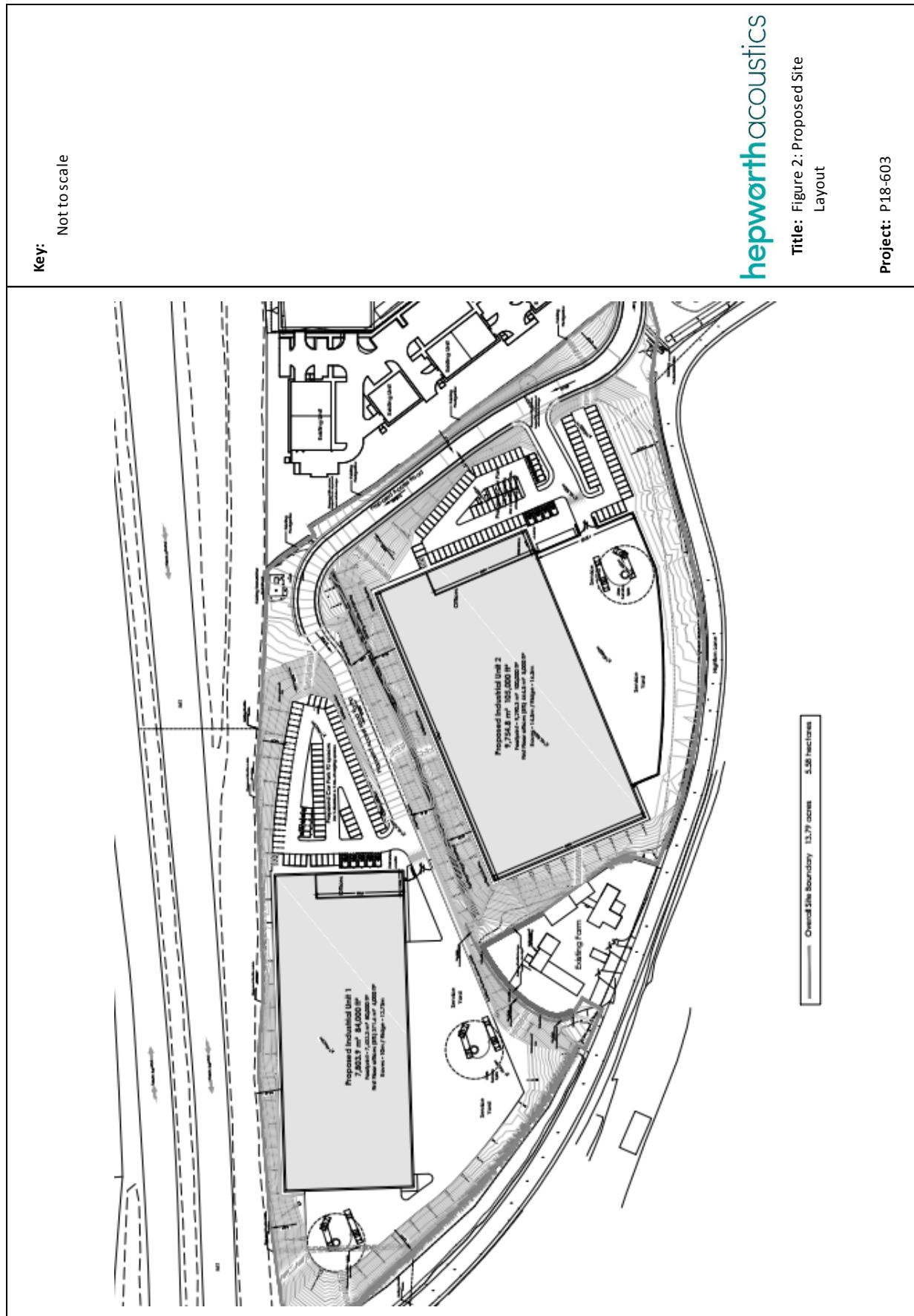
Unit 2

- 5.20 The Unit 2 warehouse would be nearer to the dwellings than Unit 1 but the nearest elevation would be the blank gable end. The construction/material details of the building will be a matter for detailed design (i.e. at reserved matters stage) and at that time the sound insulation properties of the gable end will need to be fully considered as part of the design.
- 5.21 The service yard of Unit 2 would be mostly screened from Lane Side Farm by the corner of the building itself. However, we recommend that an acoustic fence is installed at the westernmost end of the Unit 2 service yard in order to fully protect Lane Side Farm, particularly the outdoor amenity area in the southern corner of the property. At this stage we would envisage an acoustic barrier of at least 3 metres in height but this would be a matter for detailed design.
- 5.22 For outline planning applications the usual approach of ensuring that appropriate noise mitigation measures are detailed and implemented is by way of a condition that requires a detailed scheme of noise mitigation to be submitted to, and approved by, the Local Planning Authority at reserved matters stage.

6.0 SUMMARY AND CONCLUSION

- 6.1 The impact of operational noise has been assessed for the proposed B2/B8 commercial development which would form an extension to Capitol Park at Dodworth. The proposed development is currently at outline planning application stage only but the proposal is for two warehousing buildings.
- 6.2 The development land is allocated in the Local Plan for employment use and is located between the M1 motorway to the north and Higham Lane to the south.
- 6.3 The site is located away from major residential areas but there are two houses in Higham Lane (Higham Manor and Lane Side Farm) which need to be protected from potential noise.
- 6.4 A 24 hour environmental noise survey has been carried out near to the houses in order to quantify the prevailing background noise climate of the area.
- 6.5 An initial BS4142 assessment has been carried out which indicates that noise mitigation is necessary for the service yard of Unit 1 in the form of a noise screening barrier to protect residential amenity at Higham Manor, and the possible location of an acoustic fence is included in the illustrative layout drawings. An acoustic fence is also recommended for the western end of the service yard of Unit 2 in order to fully protect residential amenity at Lane Side Farm.
- 6.6 Noise mitigation measures will need to be detailed at reserved matters stage but provision of such measures can be ensured at this outline planning stage by an appropriate condition in the usual way.





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.

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, L_{Aeq} 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.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

Appendix II: Ambient Noise Survey Results

Date(s): 12th-13th February 2019

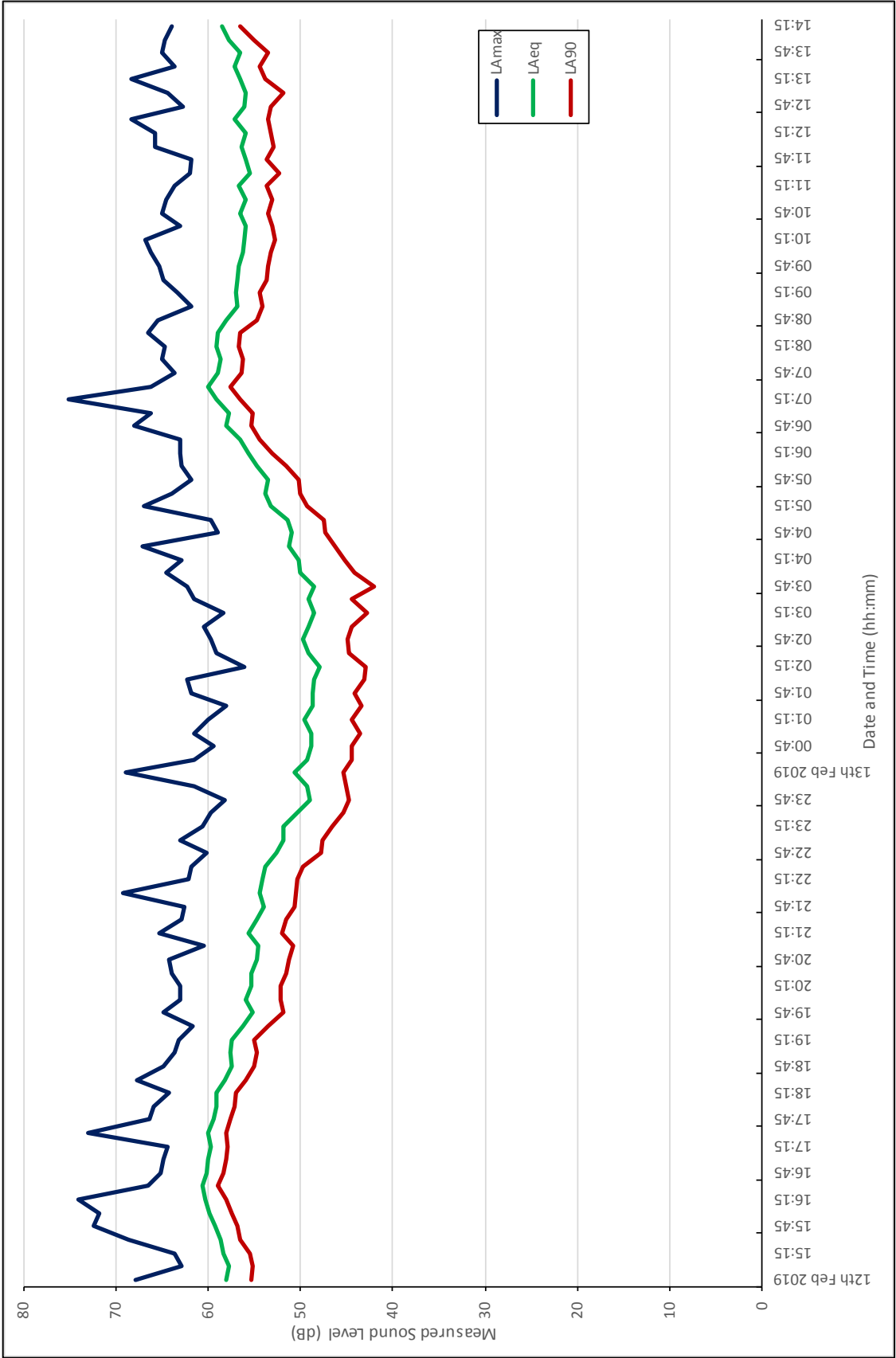
Equipment: Rion NL-52 'Type 1' sound analyser (serial no. 02554023) with outdoor kit,
Rion NL-31 'Type 1' sound level meter (serial no. 01120845) with outdoor kit
and Rion NC-74 calibrator (serial no.35046807)

Weather: (From observations on-site & forecast) Dry and generally light SW breeze, mild
in daytime, cold at night.

All levels in dB(A)

See following Charts

Location 1:



Location 2

