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PROPOSED KIRK MILL HOTEL DEVELOPMENT AT MALT KILN BROW, CHIPPING:

ASSESSMENT & CONTROL OF NOISE IMPACT

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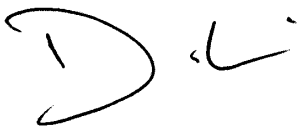


CONTENTS

1.0 INTRODUCTION

1.1 Hepworth Acoustics Limited was commissioned by SCPi Bowland Ltd to carry out a noise impact assessment in connection with a planning application for a proposed new hotel development on land off Malt Kiln Brow, Chipping.

1.2 The noise assessment has included:

- Measuring ambient noise levels at the nearest existing residential locations to the proposed hotel development over a weekend period;
- Evaluating the potential noise impact from car park activities, deliveries/servicing, noise break-out from trading areas and mechanical services plant etc.;
- Recommending noise mitigation measures where appropriate.

1.3 The various noise units and indices referred to in this report are described in Appendix I. All results referred to in the text are rounded to the nearest decibel as fractions of decibels are imperceptible.

2.0 SITE DESCRIPTION AND PROPOSALS

2.1 The site is located on land off Malt Kiln Brow in Chipping as shown in Figure 1. The development will include the Kirk Mill and existing barn buildings as well as the former HJ Berry chair making factory site.

2.2 The nearest dwellings to the proposed development are on Malt Kiln Brow and Church Raike.

2.3 It is proposed to convert the Kirk Mill building into a restaurant/bar on the ground floor and a hotel on the upper floors. The existing barn building will be converted into holiday cottages. The development will also include the erection of new buildings which will comprise a hotel/spa; a wedding venue; a crèche; and a café. There will also be a 96 space car park provided on the site. Figure 2 shows the layout of the proposed development.

3.0 AMBIENT NOISE SURVEY

3.1 A noise measurement survey has been carried out by Hepworth Acoustics Ltd in order to determine the prevailing ambient noise climate of the area. Noise levels were measured at two locations to represent the nearest residential properties. The locations are shown in Figure 1 and described below:-

- Location 1: 2nd floor of Kirk Mill
- Location 2: To the rear of dwellings on Church Raike

3.2 Automatic 5 minute data-logging noise measurements were carried out using two Rion NL-31 'Type 1' sound level meter (s/n: 01120844 & 01120845), between approximately 13:30 hours on Friday 13 June through to 11:30 on Monday 16 June 2014 to measure noise levels over a weekend period. 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 metres above the ground.

3.3 The weather conditions during the noise survey was mainly dry, warm and calm (<2 m/s).

3.4 The dominant noise source during the survey was occasional road traffic on Malt Kiln Brow and noise from running water in Chipping Brook. All nearby dwellings are affected by noise from Chipping Brook.

3.5 The results of the noise surveys are summarised in Table 1 and the full results are shown in Appendix II.

Table 1: Summary of Measured Noise Levels

Location	Daytime	Evening	Night
1	41 – 58 dB $L_{Aeq(5\ min)}$ 40 – 50 dB $L_{A90(5\ min)}$	40 – 67 dB $L_{Aeq(5\ min)}$ 40 – 41 dB $L_{A90(5\ min)}$	40 – 54 dB $L_{Aeq(5\ min)}$ 40 – 43 dB $L_{A90(5\ min)}$
2	49 – 71 dB $L_{Aeq(5\ min)}$ 49 – 52 dB $L_{A90(5\ min)}$	50 – 56 dB $L_{Aeq(5\ min)}$ 49 – 50 dB $L_{A90(5\ min)}$	49 – 61 dB $L_{Aeq(5\ min)}$ 49 – 53 dB $L_{A90(5\ min)}$

4.0 NOISE IMPACT ASSESSMENT

4.1 Whilst British Standard 4142: 1997, 'Method for Rating industrial noise affecting mixed residential and industrial areas' is appropriate to assess noise from any fixed plant or industrial activities at the site, there are no specific standards or guidelines which can be used for assessing general noise from proposed hotel developments as a whole. However, general advice on planning and noise matters is provided in the National Planning Policy Framework 2012. Further guidance is contained in British Standard 8233: 2014, 'Sound insulation and noise reduction for buildings – Code of Practice'. We have referred to these documents, where relevant, in the assessment below.

4.2 In terms of the potential noise impact of the proposed hotel development it is considered that the following issues need to be assessed:-

- noise associated with use of the car park;
- noise associated with the external areas of the wedding venue and crèche;
- noise break-out associated with use of the restaurant bar and wedding venue;
- noise associated with deliveries/servicing;
- noise from mechanical services plant for ventilation, refrigeration, etc.

4.3 Likely noise levels from the development have been calculated for the nearest dwellings to the noise sources and compared with the existing noise levels.

Customer Car Parking

4.4 The site layout shows 96 car parking spaces on the eastern part of the site. Cars manoeuvring at low speeds in car parks generate low levels of noise but higher levels can be generated (albeit briefly) from car doors being closed and engines being started. In order to determine the likely car park noise levels outside the nearest dwellings, calculations have been undertaken based on typical SEL (sound exposure level) values from vehicle activities that we have measured previously in car parks, as shown in Table 2.

Table 2: Summary of Measured Car Parking Noise at 10 metres

Source	SEL	L_{Amax}
Vehicle engine start and pull away	71	65
Door/Boot closure	69	72

4.5 A SEL is the total sound energy generated by one discrete noise event normalised to a 1 second duration. The approach of using SEL values for discrete events is useful for calculating equivalent noise levels (L_{Aeq}) over a longer period.

4.6 For a worst case assessment we have assumed that during a busy daytime/evening peak hour period each car parking space will be occupied - i.e. for each parking space we have assumed that one car departs and one car arrives during the hour.

4.7 During the night (i.e. after 23:00 hours), we have assumed a worst-case one hour period with up to half the spaces used. At this off-peak time, it can be assumed that the customers will park in spaces that are as close as possible to the car park entrance (i.e. for convenience, security, etc).

4.8 For the car park, the equivalent 1 hour noise levels have been calculated from the SEL values as follows:

$$L_{Aeq\ (T)} = SEL + 10 \log N - 10 \log T$$

where $L_{Aeq\ (T)} = L_{Aeq}$ over time period T
$SEL_{\ average}$ = 'Sound Exposure Level'
N = Number of events in time period T
T = Time period in seconds, (i.e. 3600s for a 1 hr period)

4.9 The calculated vehicular noise levels associated with the car park outside the nearest dwellings are shown in Table 3. The calculations take into account distance attenuation only.

Table 3: Calculated Car Park Noise Levels (dB)

Location	Daytime / Evening	Night-time	
	$L_{Aeq,1hr}$	$L_{Aeq,1hr}$	L_{Amax}
Dwellings on Malt Kiln Brow	39	36	50
To rear of dwellings on Church Raike	48	45	60

4.10 For the nearest dwellings the calculated L_{Aeq} noise levels from the car park are below the lowest existing ambient noise levels (L_{Aeq}) and background noise levels (L_{A90}) that were measured in the daytime, evening and at night.

4.11 The calculated L_{Amax} noise levels at all locations are within the range of the measured maxima at night.

External Areas

4.12 The proposed wedding venue and crèche will have external areas. The most significant source of noise from external areas will be customers talking, and from the crèche (Kids Club) it is raised voices from children at play.

4.13 The proposed crèche will operate during daytime hours only, however we understand the proposed wedding venue could operate until late at night (02:00 hours).

4.14 The site layout shows that these external areas have been located on the northern boundary, as far away as possible from the nearest dwellings. However some elevated dwellings will have a line of sight to the external areas.

Wedding Venue

4.15 For the purposes of this assessment, we adopted source noise levels of 71 dB L_{Aeq} and 84 L_{Amax} at a distance of 3 metres from a group of 20 customers based on noise levels measured previously by Hepworth Acoustics.

4.16 We have calculated the likely worst case noise levels assuming 80 customers in the external area during the daytime and 20 at night, all talking at the same time and the calculations have only taken into account distance attenuation (i.e. no screening has been taken into account). The calculated noise levels associated with the wedding venue external areas outside the nearest dwellings are shown in Table 4.

Table 4: Calculated Wedding Venue External Area Noise Levels (dB)

Location	**Daytime / Evening**	**Night-time**	
	$L_{Aeq,1hr}$	**$L_{Aeq,1hr}$**	**L_{Amax}**
Dwellings on Malt Kiln Brow	46	40	53
To rear of dwellings on Church Raike	47	41	54

4.17 For the nearest dwellings the calculated L_{Aeq} noise levels from the external area are below the lowest existing ambient noise levels (L_{Aeq}) and background noise levels (L_{A90}) that were measured in the daytime, evening and at night.

4.18 The calculated L_{Amax} noise levels at all locations are within the range of the existing measured maxima at night.

Crèche (Kids Club)

4.19 We adopted a noise level of 79 dB L_{Aeq} for 1 child shouting at 1 metre based on noise levels measured previously by Hepworth Acoustics. Obviously the amount of noise generated by children will vary,

however, our calculations represent a likely worst case scenario as they assume 10 children shouting at the same time.

4.20 The calculated noise levels associated with the crèche external area outside the nearest dwellings are shown in Table 5.

Table 5: Calculated Crèche External Area Noise Levels (dB)

Location	**Daytime**
	$L_{Aeq,1hr}$
Dwellings on Malt Kiln Brow	47
To rear of dwellings on Church Raike	46

4.21 The calculated L_{Aeq} noise levels from the crèche external area are within the range of existing ambient (L_{Aeq}) noise levels that were measured in the daytime, outside the nearest dwellings.

Noise Break-out from trading areas

4.22 The proposed restaurant bar and wedding venue have been assessed on the basis that they will have similar trading noise levels to those measured previously by Hepworth Acoustics at comparable premises (shown in Table 6). We understand that proposals for the restaurant bar are to have no background music and will close at 23:00 hours. We have assumed that live music could be present between 20:00 and 02:00 hours in the wedding venue during events.

Table 6: Adopted Trading Noise Levels (dB)

Description	Octave band centre frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Busy weekday evening	67	72	73	79	79	75	66	82
Busy evening during live music (DJ)	89	89	84	86	87	80	73	89

4.23 For the purposes of assessing the potential impact of trading noise break-out from the restaurant bar, the busy weekday trading noise levels (without background music) have been adopted as the source noise levels. For the purposes of assessing the potential impact of trading noise break-out from the wedding venue, the busy evening trading noise levels (with live music) have been adopted as the source noise levels.

4.24 We understand all existing windows are to be retained and that secondary glazing will be installed through-out the Kirk Mill building. There will also be areas of glazed roof in both the restaurant bar and wedding venue.

4.25 We have calculated the potential resulting noise levels outside the nearest dwellings using the adopted trading noise levels. The calculations assume that windows will be slightly open (to allow the space to be naturally ventilated) in the restaurant bar, and for the wedding venue the sound insulation performance of the proposed windows (when closed) and glazed roof areas, which will be the main acoustic weaknesses in the building envelopes, along with distance attenuation.

4.26 Our calculations indicate that the adopted noise control criterion for trading area noise break-out will be achieved subject to the following recommendations:

- The seals around the existing windows (which are to be secondary glazed) must be replaced with effective seals such that they become airtight.

- The inner window of the secondary glazed system must be formed of a double glazed window of 10mm glass 12-20mm cavity 6mm glass, with a minimum cavity of 150mm to the existing window.
- We recommend that the windows in the wedding venue are un-openable.
- There must be no 'straight through' type ventilation openings from trading areas. Any ventilation ducts must be fitted with suitable in-line attenuators.
- The glazed roofs of both the restaurant bar and wedding venue, as well as all windows in the wedding venue must be formed of double glazed units of minimum 10mm glass 12-20mm cavity 6mm glass.

4.27 The requirement to adequately control the impact of noise transmission from the restaurant bar and the wedding venue on the nearest dwellings can be ensured with an appropriate planning condition requiring a scheme of noise control measures to be submitted and approved by the local planning authority.

Deliveries/Servicing Noise

4.28 Deliveries will be made regularly to the various commercial buildings on the development. At this stage there are no details of the number of vehicles etc. However, due to the location and size of the development we assume there will be no HGV vehicles servicing the site. Instead we anticipate deliveries being by smaller commercial vehicles. Noise impact from these types of deliveries is not significant compared to articulated HGV deliveries. Nevertheless we recommend that deliveries are restricted to daytime (07:00 to 23:00) hours only. Therefore protecting the amenity of the nearest dwellings. We also recommend that any vehicle mounted refrigeration units are turned off when on site.

Building Services Equipment Noise

4.29 Some items of mechanical ventilation and refrigeration equipment will be required for the proposed development. There may also be some building services equipment (e.g. external chiller units) required.

Currently, there are no details available of the equipment that would be installed. However, in order to safeguard residential amenity, it will be necessary to install this mechanical services equipment in appropriate locations and, where necessary, incorporate noise control measures in the design and specification of the plant. It is usual for this detailed design matter to be addressed by an appropriately worded planning condition.

4.30 For design purposes appropriate noise control criteria need to be adopted. These criteria need to take into the prevailing noise climate of the area and guidance on noise criteria in relevant British Standards such as BS 41421 and BS82335.

4.31 British Standard 4142 "Method for rating industrial noise affecting mixed residential and industrial areas" is the appropriate standard to determine noise limits for fixed items of plant associated with the proposed retail development outside the nearest dwellings.

4.32 BS 4142 requires the noise from the equipment (in L_{Aeq}) to be compared with the background noise level (L_{A90}). A 5 dB 'acoustic feature' correction is added for equipment which gives rise to intermittent peaks of noise, or discrete tones, to obtain the 'Rating Level'. The standard requires plant noise in the daytime to be assessed over a 1 hour period, and any plant running at night over a 5 minute period.

4.33 BS 4142 states that if the rated noise level exceeds the L_{A90} background noise level by around 10 dB or more then 'complaints are likely'. An excess of around 5 dB over the background noise level is considered as being 'of marginal significance'. Where the noise rating level is at least 10dB(A) below background, BS 4142 states that this is positive indication that 'complaints are unlikely'.

4.34 Therefore, we recommend that plant noise be controlled to a noise rating level of no more than the existing background levels.

4.35 On this basis our recommended noise limiting criteria for mechanical services plant from the development are set out in Table 7.

Table 7: Recommended Fixed Plant Noise Rating Level Limits

Location	**Day** (0700-2300 hrs)	**Night** (2300-0700 hrs)
Dwellings on Malt Kiln Brow	40 dB $L_{Aeq(1\ hr.)}$	40 dB $L_{Aeq(5\ min.)}$
Dwellings on Church Raike	49 dB $L_{Aeq(1\ hr.)}$	49 dB $L_{Aeq(5\ min.)}$

4.36 Designing and installing mechanical services equipment to achieve the criteria recommended in Table 7 will ensure the protection of residential amenity.

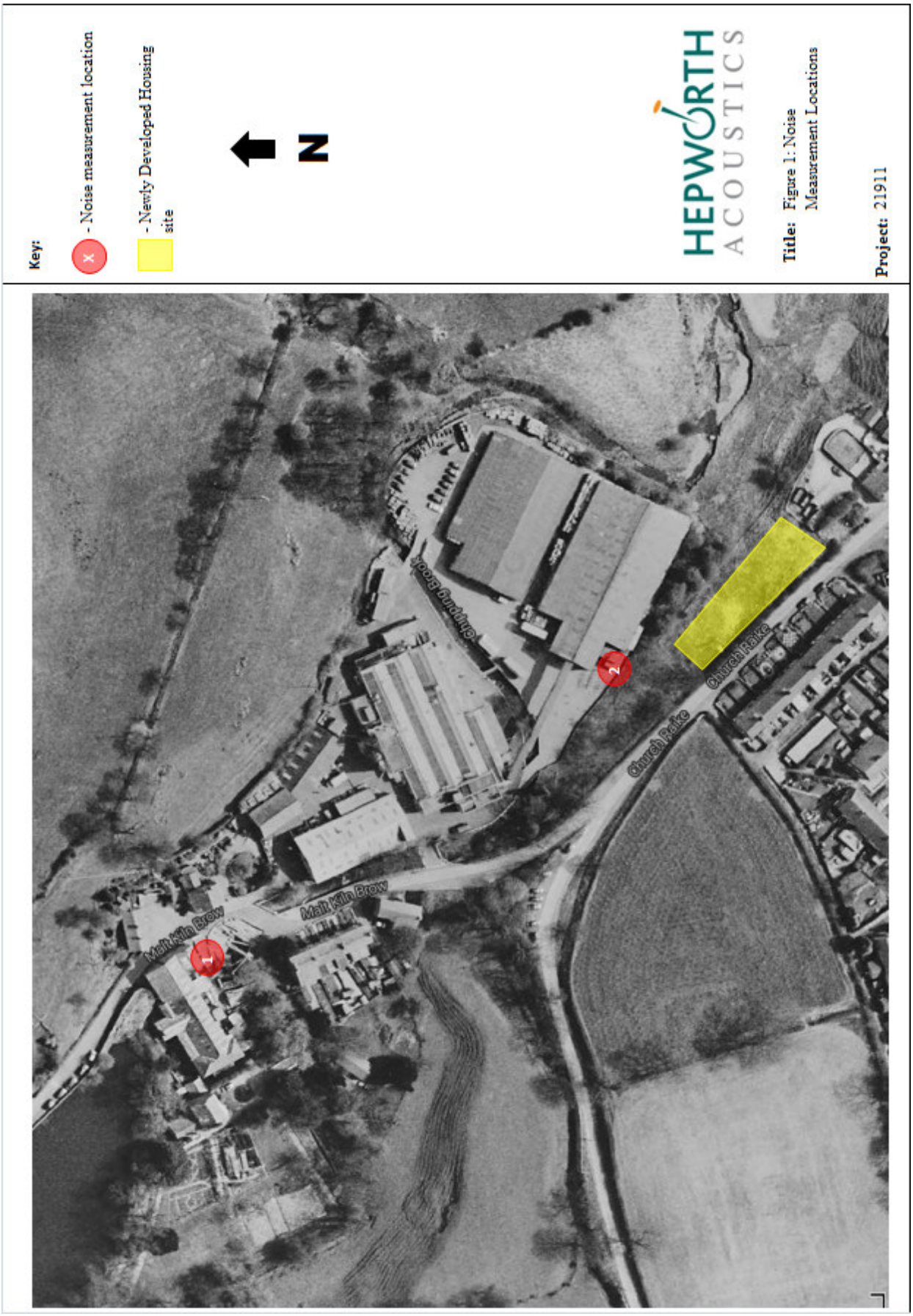
5.0 SUMMARY AND CONCLUSIONS

5.1 The potential noise impact of a proposed hotel development at Chipping has been assessed. This has involved carrying out baseline noise monitoring surveys and evaluating potential noise impacts.

5.2 The potential noise impacts of the proposed hotel development have then been assessed taking into account noise from car parking, break-out from the restaurant bar, spa and wedding venue. Noise from the external areas of the wedding venue & crèche, as well as servicing activities and mechanical services noise have also been considered.

5.3 Where necessary, recommendations have been made to minimise the potential for noise impact associated with the proposed hotel development on nearby dwellings such as, the recommendation of restricting the delivery times and improving the sound insulation of trading areas.

5.4 Additionally, the combined noise rating levels for design of mechanical services equipment have been recommended, and are based on the lowest measured background noise levels measured around the site, and the guidance given in BS4142.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- Newly Developed Housing site
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HEPWORTH ACOUSTICS
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Project: 21911
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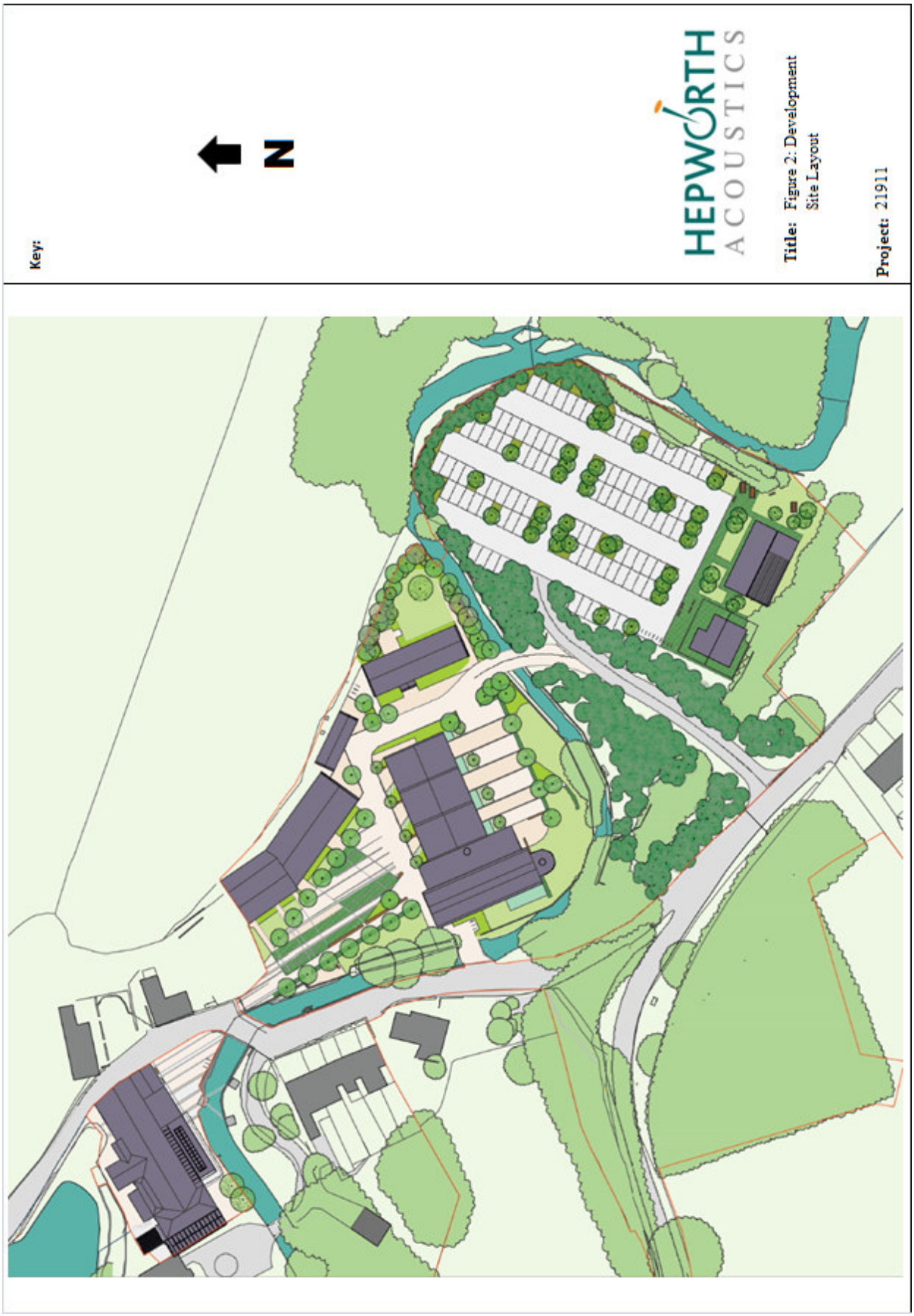
Malt Kiln Brow
Chipping Brook
Church Path
Church Path
1
2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Appendix I – Noise Units and Indices

a) Sound Pressure Level and the decibel (dB)

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 120 dB (threshold of pain).

b) 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 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) A-weighting

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 dB LA.

d) Glossary of Terms

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

L_{eq} This is the 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{eq} is the level of a continuous noise which has the same total energy as the real fluctuating noise, measured over the same time period.

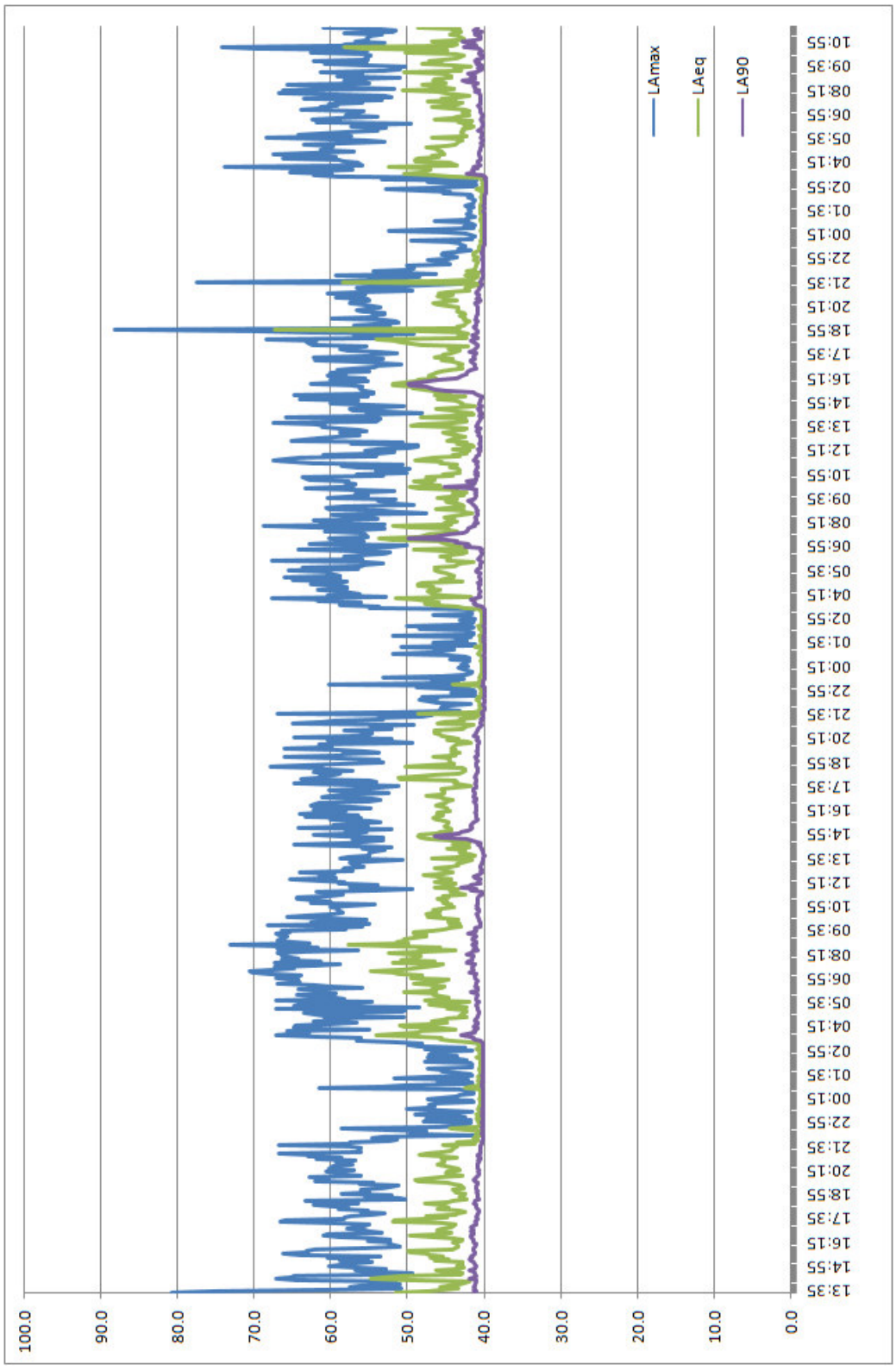
L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

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 – Results of Ambient Noise Surveys

Dates:	Friday to Monday 13 - 16 June 2014
Equipment:	2 Rion NL-31 'Type 1' (s/n: 01120844 & 01120845), calibrator, tripod, all weather kit
Weather:	Mainly dry (light rain showers Saturday afternoon) warm and calm (<2 m/s)
Results:	All noise levels shown are in dB(A)

Location 1: 2nd floor Kirk Mill



Location 2: To the rear of dwellings on Church Raike