

**158-168 MILL STREET, LEEK - PROPOSED CAR PARK
NOISE IMPACT ASSESSMENT**

**On behalf of:
Groundwork Greater Manchester**

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Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PS

On behalf of:
Groundwork Greater Manchester

Report prepared by:
James Shaw MIOA - Senior Consultant



Report checked by:
Paul Bassett BSc MSc FIOA – Technical Director



CONTENTS

1.0	INTRODUCTION	1
2.0	AMBIENT NOISE SURVEYS	2
3.0	NOISE ASSESSMENT	3
4.0	SUMMARY	7
FIGURE 1 – SITE LOCATION & NOISE MEASUREMENT POSITION		8
FIGURE 2 – PROPOSED LAYOUT SKETCH		9
APPENDIX I: NOISE UNITS & INDICES		10
APPENDIX II: NOISE SURVEY RESULTS		12

1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Groundworks Greater Manchester on behalf of Your Housing Group to carry out a noise assessment in connection with a proposed new car park to be built off Mill Street in Leek.
- 1.2 The proposed five space car park will serve the small parade of shops located at the corner of Mill Street and Hamil Drive. Mill Street is a fairly busy road serving Leek town centre and Hamil Drive is a lightly trafficked road leading to a large residential estate. The parade of shops consists of a barbers' shop which is currently closed, a convenience store which opens 07:00-22:00 seven days a week and sandwich shop that opens between 08:00 and 15:00 seven days a week.
- 1.3 The nearest dwellings to the car park are the flats above the parade of shops. There are also dwellings surrounding the site on all sides albeit further away. Currently vehicles accessing the shops often park on the double yellow lined Mill Street and Hamil Drive and it was noted during our site inspection that cars also regularly park on the road to access the takeaway across the road.
- 1.4 The proposed car park will consist of 4 standard spaces and a single disabled bay and will be located at the front of the shops, vehicular access to the car park will be via both Mill Street and Hamil Street.
- 1.5 This noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of ambient noise levels at locations representative of the nearest dwellings during separate visits on a weekend afternoon, evening and weekday morning;
 - Calculation of likely noise levels resulting from worst-case use of the car park; and
 - Assessment of the potential noise impact from use of the car park extension on the nearest dwellings.
- 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 AMBIENT NOISE SURVEYS

- 2.1 Ambient noise surveys were carried out to determine the existing ambient noise climate at locations representative of the nearest dwellings to the car park during key periods.
- 2.2 The noise surveys were carried out at one location representative of the dwellings above the parade of shops as shown in Figure 1.
- 2.3 Two surveys were carried out on Sunday 19th September 2021 covering an afternoon period and an evening period, with one survey carried out on Monday 20th September 2021 covering the morning period. These periods were selected to be representative of the first and last hour of trading of the shops in the parade and a Sunday afternoon representative of typical daytime noise levels.
- 2.4 Weather conditions during the noise surveys were suitable for sound level measurements. Full details of the weather conditions and the equipment used can be seen in Appendix II.
- 2.5 The results of the ambient noise surveys can be seen in full in Appendix II and a summary is shown in Table 1.

Table 1: Summary of Measured Ambient Noise Levels (dB)

Period		$L_{Amax,T}$	$L_{Aeq,T}$		$L_{A90,T}$	
		Range	Range	Logarithmic Mean	Range	Arithmetic Mean
Sunday	Afternoon 17:00-18:30	67-75	60-62	61	49-55	52
	Evening 21:00-22:00	67-75	58-59	58	43-49	46
Monday	Morning 07:00-08:15	69-76	63-64	63	49-58	54

- 2.6 The main source of noise during all surveys was vehicles passing on Mill Street and to a lesser extent those on Hamil Drive.
- 2.7 The results of the ambient noise surveys have been taken into account in the assessment of the potential noise impact from the proposed car park. The noise assessment is described in Section 3.

3.0 NOISE ASSESSMENT

- 3.1 There are no specific standards or guidelines available for assessing noise from a car park.
- 3.2 The National Planning Policy Framework (NPPF) 2021 provides some general guidance to local authorities on taking noise into account in planning policies and decisions. This includes guidance that local authorities should *'aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'*. However, there is as yet no specific guidance on acoustic assessment/design criteria relevant to this development provided in the NPPF, nor in the more recently issued Planning Practice Guidance 'Noise'.
- 3.3 Also, whilst there is a general British Standard on noise BS 8233: 2014, *'Guidance on sound insulation and noise reduction for building's* and there are specific standards or guidelines for construction noise e.g BS 5228: 2014 *'Code of practice for noise and vibration control on construction and open sites'* as well as industrial/commercial noise e.g. BS 4142 *'Methods for rating and assessing industrial and commercial sound'*. none of these are relevant for the proposed car park extension.
- 3.4 Therefore, a pragmatic approach must be adopted taking into account calculation of likely noise levels from use of the car park, the context of the prevailing noise climate, the times and likely pattern of use.
- 3.5 As the existing main source of noise around the site is road traffic, we would recommend that to minimise potential noise impact from the proposed car park, noise levels from customer vehicles is controlled to be no more than the existing ambient (dB L_{Aeq}) noise levels.
- 3.6 Cars manoeuvring at slow speeds within car parks do not generate significant levels of noise and will not be readily distinctive from the existing noise climate, but higher noise levels are produced, albeit briefly, by closing of car doors and car engines starting up and vehicles initially pulling off.
- 3.7 We have undertaken calculations based on typical noise levels from vehicles manoeuvres and doors/boots being closed that Hepworth Acoustics have measured at similar sites. These measurements were carried out at a distance of 10 metres from the vehicle.
- 3.8 It is also necessary to evaluate this noise over an appropriate time period. Daytime noise is usually assessed over the whole daytime period (i.e. 07:00-23:00) and night-time noise over the whole night

period (i.e. 23:00-07:00) or typically over the proposed hours of use, or for an hourly period. For a 'worst case' assessment we have used an hourly period.

Calculation of Car Park Noise

- 3.9 To ensure a robust set of data on which to base the assessment, we have assumed each of the five spaces, including the disabled space will be used six times in each hour for a total of 30 two-way movements per hour, it should be borne in mind these numbers are likely to be much lower, especially during the late evening and early morning. This data set therefore represents a worst case scenario. For clarity, the two-way vehicle trip rates used in this assessment are summarised below in Table 2.

Table 2: Two-way Vehicle Store Trip Rates

Time Period	Store Arrivals and Departures for five spaces (two-way total)
Monday - Friday	
07:00-08:00	30
Sunday	
17:00-18:00	30
21:00-22:00	30

- 3.10 The dwellings most exposed to potential noise impact from customer car parking would be those located above the parade of shops. In order to determine the likely car park noise levels outside this dwelling, calculations have been undertaken based on typical L_{AE} (sound exposure level) levels from vehicle activities that we have measured previously in car parks, as shown in Table 3.

Table 3: Summary of Measured Car Parking Noise at 10m

Source	L_{AE} (dB(A))
Vehicle noise upon arrival/departure (e.g. engine ignition, manoeuvring into/out of space)	71
Door/Boot closure	69

- 3.11 For each two-way trip, we have assumed two vehicle noise events (one upon arrival and one upon departure) and four door/boot closures (i.e. two upon arrival and two upon departure).

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

3.13 For the car park, the equivalent one hour noise levels have been calculated from the L_{AE} values as follows:

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

where $L_{Aeq(T)} = L_{Aeq}$ over time period T

$L_{AE \text{ average}}$ = 'Sound Exposure Level'

N = Number of events in time period T

T = Time period in seconds, (i.e. 3600s for a 1 hr period)

3.14 Taking into account the hourly number of vehicles and distance attenuation to the nearby dwellings the calculated noise levels associated with the car park are shown in Table 4.

3.15 In order to assess the predicted car parking noise levels, the measured ambient noise levels are also shown. We have assumed that the noise level measured on Sunday afternoon is representative of what would be measured on a weekday afternoon.

Table 5: Comparison of Calculated Car Parking Noise and Existing Noise Levels (dB L_{Aeq})

Time Period	Existing Ambient Noise Level, dB L_{Aeq} ,	Calculated Car Park Noise Level dB $L_{eq,1hr}$	Difference
Monday - Friday			
07:00-08:00	63	57	-8
Sunday			
17:00-18:00	61	57	-4
21:00-22:00	58	57	-1

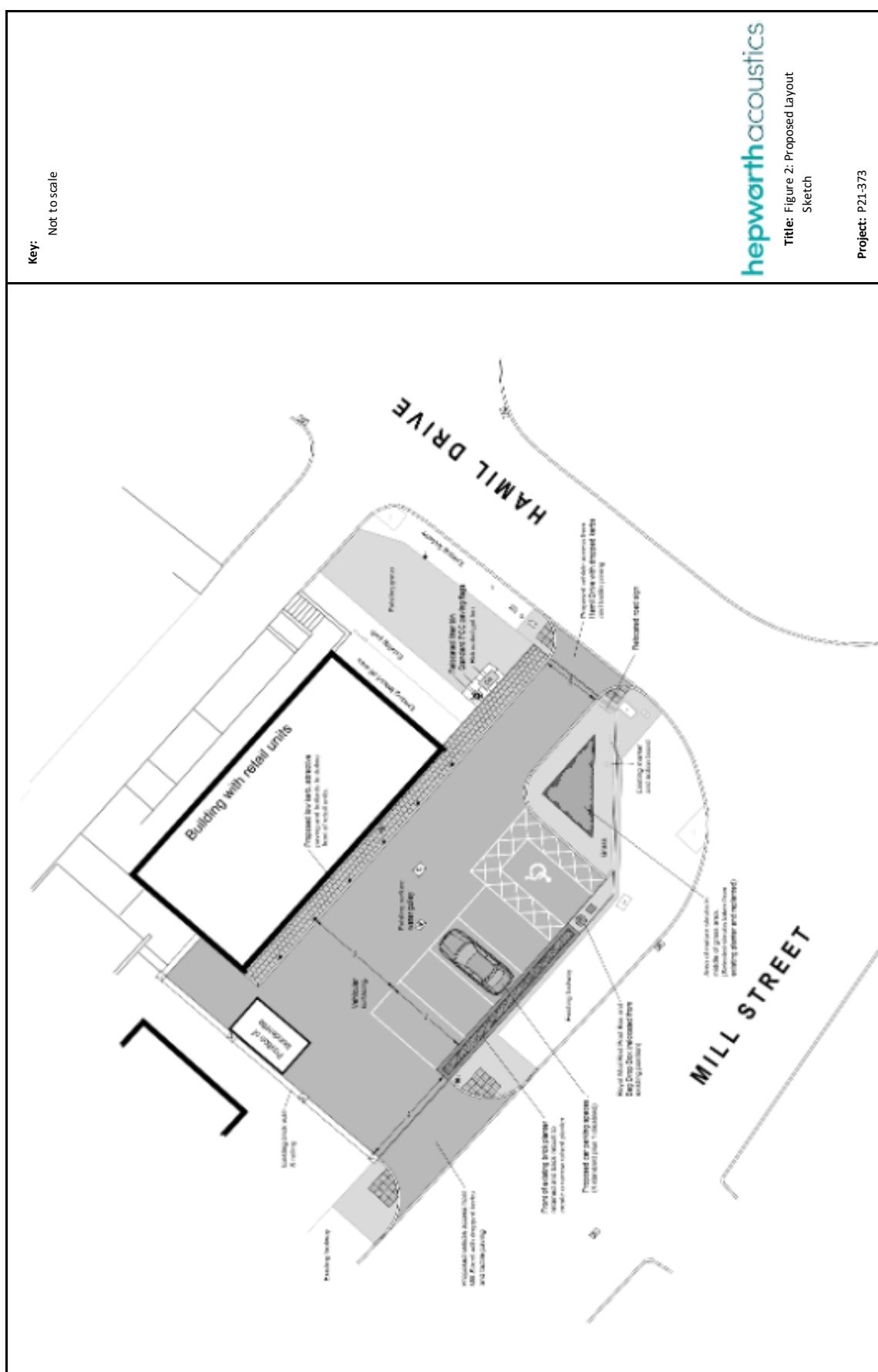
3.16 The calculated car park noise levels as shown in Table 4 are below the existing noise levels during all periods. The corresponding increases in noise will be limited to less than 3 dB. Under normal circumstances a 3 dB change is the minimum perceptible change in noise. As such, the proposals will result in no perceptible change in noise outside the nearest dwellings.

- 3.17 Despite the above, to ensure noise levels are kept to a minimum by customers, we would recommend that signs should be clearly displayed to remind customers of the nature of the residential area.

4.0 SUMMARY

- 4.1 Hepworth Acoustics Ltd was commissioned by Groundwork Greater Manchester on behalf of Your Housing Group to carry out a noise assessment in connection with a proposed new car park structure to be built on Mill Street in Leek.
- 4.2 The potential noise impact from use of the proposed car park has been assessed at the nearest dwellings.
- 4.3 The assessment has included carrying out noise surveys of the prevailing noise climate in the area, calculations of likely noise levels resulting from use of the car park, and evaluation of the likely noise impact.
- 4.4 The predicted noise levels from use of the car park extension are low in absolute terms and within the prevailing noise climate and character of the area. There will be no perceptible increase in noise.
- 4.5 On this basis, it is concluded that use of the proposed car park extension would not result in an adverse noise impact on the amenity of people living nearby.





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.
- L_W This is the Sound Power Level and is a Logarithmic measure of the sound power as a relation to the threshold of hearing.
- L_{WA} This is the A-weighted 'Sound Power Level' and is a Logarithmic measure of the sound power as a relation to the threshold of hearing.
- L_{AE} This is the A-weighted 'Sound Exposure Level' which is used for measuring discrete noise events. Essentially it is a measure of the sound energy of the whole noise event normalised to a period of 1 second. The L_{AE} value can be used to calculate the actual L_{Aeq} value for a given time period if the number of noise events is known.

Appendix II: Noise Survey Results

Date(s):	Sunday 19 th & Monday 20 th September 2021
Equipment:	Brüel & Kjær 2250 'Type 1' sound analyser (serial no. 3011706) with tripod and calibrator
Weather:	Sunday – Dry, mild (~15-16°C), clear skies and calm (<2 m/s) Monday – Dry, cold (~7-8°C), overcast and misty and calm (<2 m/s)

All levels in dB(A)

Sunday Afternoon

Time		Measured Noise Levels (dB)			Comments
Start	End	L _{Amax}	L _{Aeq}	L _{A90}	
17:00	17:15	71.6	60.9	52.6	Pedestrians at shop, birdsong, vehicles on Mill Street
17:15	17:30	68.5	60.8	54.7	Birdsong, vehicles on Mill Street & Hamil Drive
17:30	17:45	72.1	61.6	52.2	Birdsong, vehicles on Mill Street
17:45	18:00	71.6	61.4	53.4	Pedestrians, vehicles on Mill Street & Hamil Drive
18:00	18:15	74.6	59.6	49.5	Vehicles on Mill Street & Hamil Drive
18:15	18:30	67.5	61.1	50.9	Vehicles on Mill Street & Hamil Drive

Sunday Evening

Time		Measured Noise Levels (dB)			Comments
Start	End	L _{Amax}	L _{Aeq}	L _{A90}	
21:00	21:15	66.6	58.3	45.3	Vehicles on Mill Street & Hamil Drive
21:15	21:30	69.4	59.4	47.6	
21:30	21:45	69.6	58.0	48.8	
21:45	22:00	68.4	57.7	43.2	

Monday Morning

Time		Measured Noise Levels (dB)			Comments
Start	End	L _{Amax}	L _{Aeq}	L _{A90}	
07:02	07:17	75.6	64.0	54.3	Vehicles on Mill Street & Hamil Drive
07:17	07:32	71.7	62.6	49.1	
07:32	07:47	71.3	63.3	50.3	
07:47	08:02	71.0	63.0	56.7	
08:02	08:17	69.4	64.0	58.0	