

**PROPOSED NEW BUILDING AT
OUR LADY'S RC HIGH SCHOOL, BLACKLEY:**

**NOISE ASSESSMENT FOR CONTROL OF NOISE
FROM MECHANICAL SERVICES EQUIPMENT**

On behalf of:

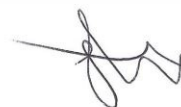
Kilhey Consultancy Limited

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FROM MECHANICAL SERVICES EQUIPMENT**

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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Kilhey Consultancy to carry out a noise assessment in connection with a proposed planning application for a new teaching building at Our Lady's RC High School in Blackley in north Manchester.
- 1.2 The school is a five form entry high school with a 900 pupil capacity located in an 'education village' that also includes Northridge High school which shares the same site, as well as Meade Hill School to the east. The surrounding area is broadly residential in character with dwellings to the west and south, and with open fields to the north and the M60 motorway some 500m away. The location of site is indicated in Figure 1.
- 1.3 The proposals are for the construction of a new building in the south west part of the site, currently occupied by playing fields and a temporary OASP building which provides alternative provision teaching.
- 1.4 The proposed new two storey building will provide a total of 1034sq meters for permanent alternative provision classrooms on the ground floor as well as general teaching classrooms and a library on the first floor. The ground floor will also include a new dining hall and small kitchen for the purposes of reheating food from the main kitchen. The proposed new building layout is shown in Figure 2.
- 1.5 The purpose of this assessment is to determine appropriate noise limits at the nearest dwellings for any new externally mounted plant (or flues, etc) associated with the reheat kitchen and any air handling units proposed. It is understood that any such plant will operate in the daytime only.
- 1.6 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of environmental noise levels on the site during a daytime period; and,
 - Determination of appropriate design limits for the control of plant noise.
- 1.7 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

- 2.1 An ambient noise survey has been carried out by Hepworth Acoustics at a location representative of the nearest dwellings to the new kitchen. The noise measurement location is indicated in Figure 1
- 2.2 The noise measurements are representative of the background noise levels at the nearest dwellings to the south on Howden Road, some 70m to the south of the proposed kitchen location. Attended measurements were taken between 10:55 and 12:40 on Friday 22nd January 2021
- 2.3 Measurements were taken in 15-minute sample periods at approximately 1.4m above local ground level and in free-field conditions. The calibration of the sound level meter was checked with a field acoustic calibrator before and after the survey with no variance noted.
- 2.4 The measured 15-minute values are considered to be representative of the corresponding 1-hour values in line with BS 4142.
- 2.5 The results of the noise survey are summarised in Table 1 and the full results are shown in Appendix II. Noise levels at both locations were primarily attributed to distant road traffic noise and some local traffic on Boothroyd Road which passes the site to the west.

Table 1: Range of Measured Noise Levels (dB)

Location	Daytime	
	L _{Aeq,15mins}	L _{A90,15mins}
Howden Road	52-54	50-52

- 2.6 With the current government restrictions in response to the ongoing Covid-19 pandemic, it is likely that the background noise levels measured during our survey were lower than during normal conditions. Therefore, our assessment presents a worst-case scenario in the case of using the data as a basis for specifying noise limits for mechanical plant relative to the background noise.

3.0 NOISE ASSESSMENT

- 3.1 British Standard 4142:2014, 'Methods for rating and assessing industrial and commercial sound' describes methods for rating and assessing sound of an industrial nature including;
- fixed installations which compromise mechanical and electrical plant and equipment;
- 3.2 BS 4142 requires the 'rating' sound level ($L_{Ar,Tr}$) for the operation to be compared with the background sound level (L_{A90}) in the absence of the operational noise.
- 3.3 With regard to the background sound level, BS 4142 states that *"it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."*
- 3.4 The rating level ($L_{Ar,Tr}$) is derived based on the 'specific' ($L_{Aeq,Tr}$) sound level attributable to the plant in operation, corrected as necessary for the 'residual' sound level, and with a 'character correction' added for any sound sources which give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment, at residential locations.
- 3.5 The BS 4142 penalties for noise characteristics are summarised in Table 2.

Table 2: Summary of BS 4142 Character Corrections

Noise Character	Correction (dB)				
Tonality	Audibility Correction	Not tonal 0	Just audible +2	Clearly perceptible +4	Highly perceptible +6
Impulsivity	Audibility Correction	Not impulsive 0	Just audible +3	Clearly perceptible +6	Highly perceptible +9
Intermittency	Audibility Correction	Not Intermittent 0	Readily distinguishable against residual acoustic environment +3		
Other	Audibility Correction	N/A 0	Readily distinguishable against residual acoustic environment +3		

- 3.6 The potential character/feature corrections for tonality, impulsivity and intermittency shown in Table 3 are additive, and therefore significant corrections can be applicable in worst-case situations.
- 3.7 An initial estimate of the impact of the noise under consideration is determined by subtracting the background level from the rating level. BS 4142 states that:

- Typically, the greater this difference, the greater the magnitude of the impact
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background level, the less likely it is that the operation 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, depending on the context.

3.8 Furthermore para 3.6.1.5 of the Manchester City Council document, "Planning & Noise Technical Guidance" dated December 2015 states that "development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location".

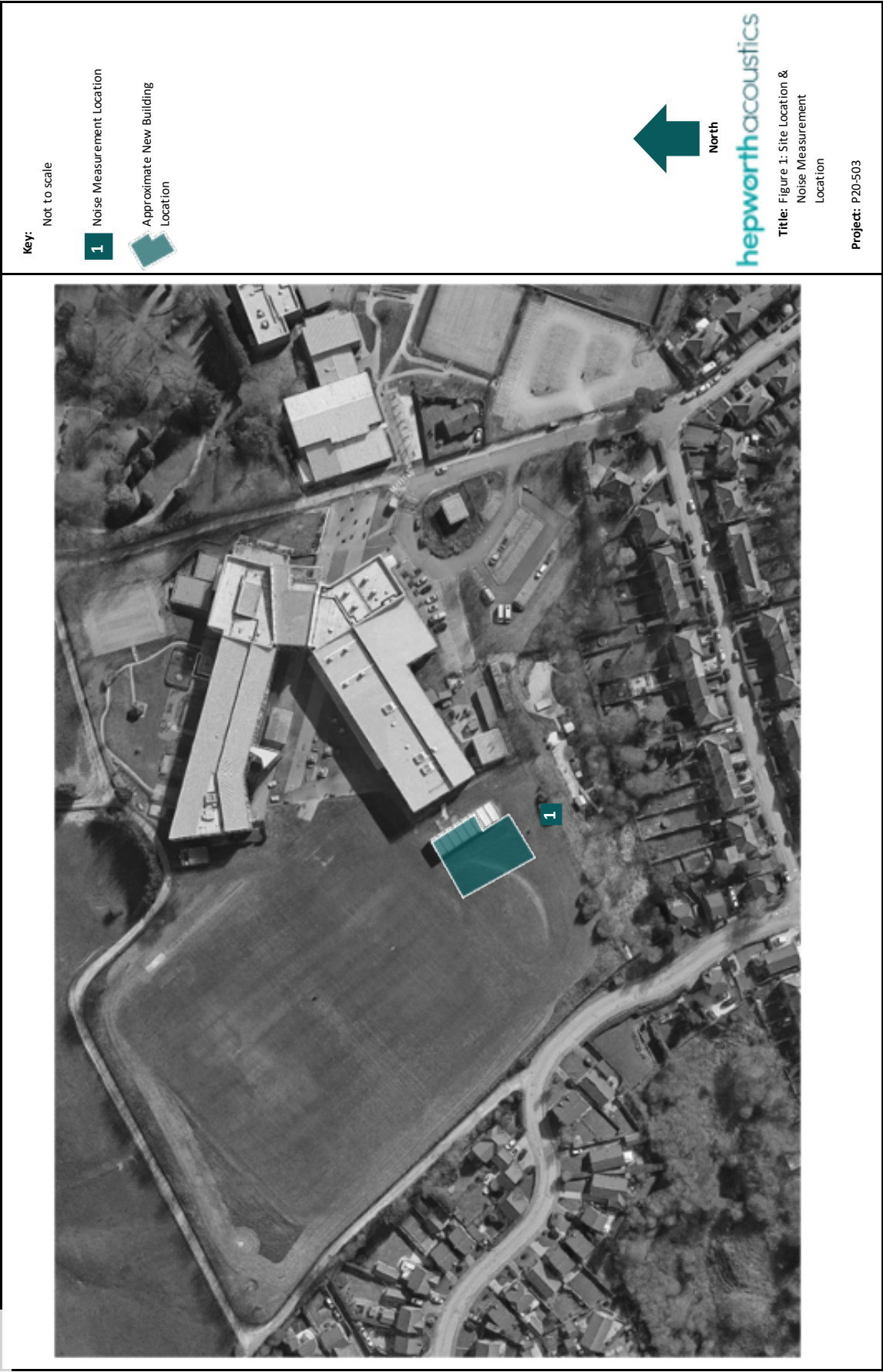
3.9 Therefore, the appropriate criterion for plant noise at this development would be to control the BS 4142 rating level from any proposed new plant associated with the new kitchen and any air handling units to 5 dB below the existing typical background noise level (L_{A90}) at the nearest dwellings. We have adopted the most regularly occurring background noise level (the mode) from the results of our noise survey at the site as the basis for determining the recommended plant noise design limit at the nearest dwelling on Howden Road. The mean average of the background noise levels measured at the nearest dwellings was found to be 51 dB L_{A90} . The noise design limit is therefore 46 $L_{A_{r,Tr}}$ as shown in Table 3.

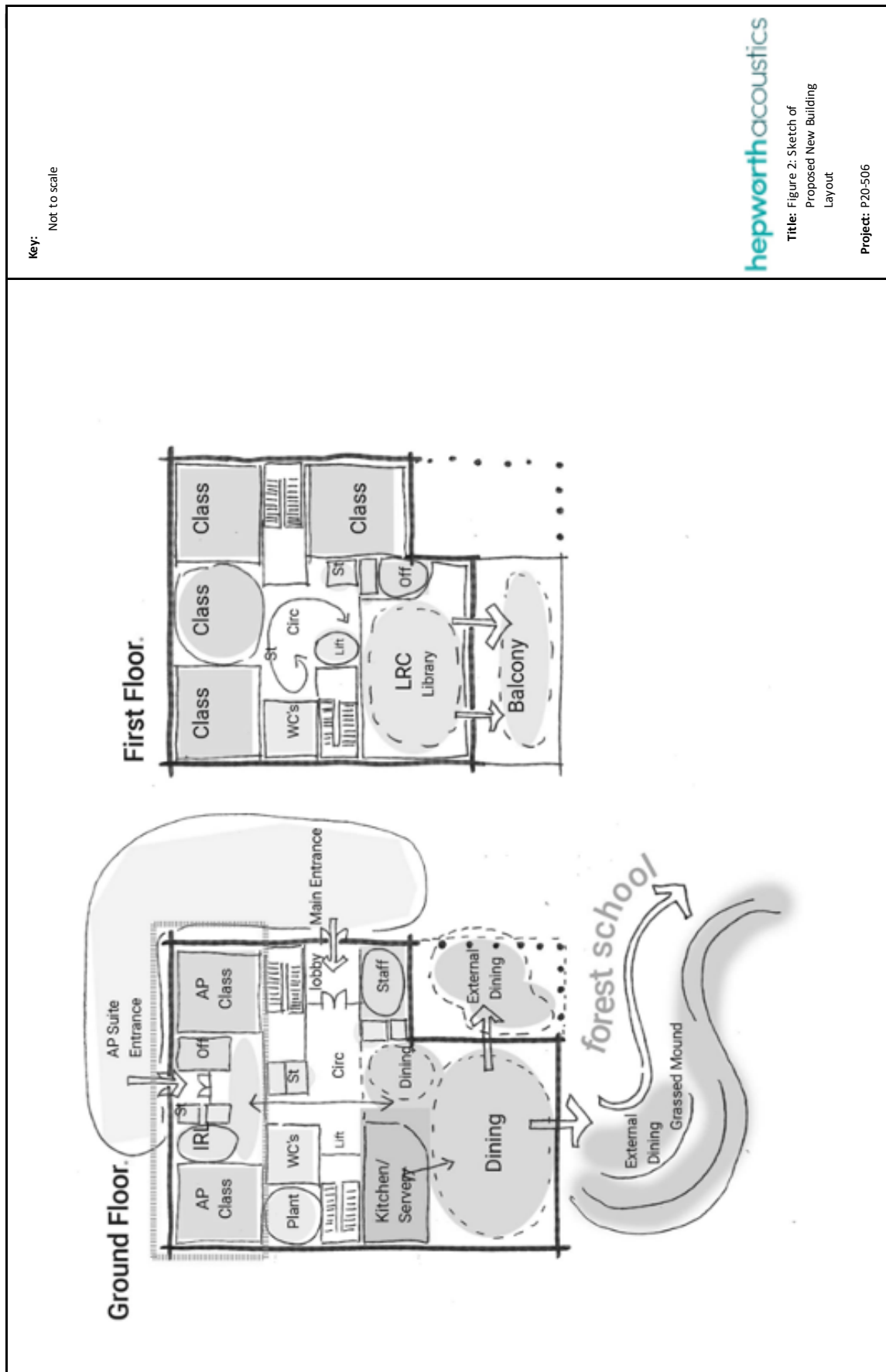
Table 3: Recommended Plant Noise Limit (dB)

Location	Recommended Noise Design Limit for new Plant ($L_{A_{r,Tr}}$)
Outside dwellings on Howden Road	46

4.0 SUMMARY

- 4.1 Hepworth Acoustics Ltd was commissioned by Kilhey Consultancy to carry out a noise assessment in connection with a proposed planning application for new teaching building at Our Lady's RC High School in Blackley. Specifically, the noise assessment was required in connection with control of the environmental noise impact of any new mechanical services equipment proposed as part of the new development.
- 4.2 An attended baseline noise survey has been carried out at a location representative of the nearest dwellings on Howden Road.
- 4.3 No precise details of the plant/equipment are available at this stage, and so an appropriate noise design limit has been determined based on the results of the noise survey in line with BS 4142 and Manchester City Council planning noise guidance. This can be used as a basis for a planning condition if necessary and should be fully taken into account in subsequent detailed design of any new mechanical services plant required as part of the proposed new development. It should however be straight-forward to ensure that plant noise is adequately controlled to within the recommended limit.





Appendix II: Noise Survey Results

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: Noise Survey Results

Date: Friday 22nd January 2021
 Equipment: B&K /2250 'Type 1' sound analyser (serial no. 3011706) with tripod and calibrator
 Weather: Dry, cold (~5-6°C), sunny with clear skies with light south westerly breeze(2-4 m/s)

All levels in dB(A)

Location 1: Howden Road

Time		Measured Noise Levels (dB)				Comments
Start	End	L _{Amax}	L _{A10}	L _{Aeq}	L _{A90}	
10:55	11:10	58.3	53.0	51.8	50.4	Distant road traffic, bird song
11:10	11:25	65.9	54.6	53.2	51.6	Distant road traffic, birdsong. dog barking
11:25	11:40	68.5	55.9	54.1	51.8	Distant road traffic, birdsong, police helicopter overhead
11:40	11:55	58.3	54.0	52.6	50.9	Distant road traffic, bird song, passing road traffic
11:55	12:10	65.8	54.8	53.3	51.3	Distant road traffic, bird song
12:10	12:25	57.8	53.6	51.9	50.1	Distant road traffic, bird song, passing road traffic
12:25	12:40	67.4	55.6	54.0	52.2	Distant road traffic, birdsong. dog barking