

**LEVENSHULME SERVICE STATION, 1081 STOCKPORT ROAD, LEVENSHULME:
NOISE IMPACT ASSESSMENT OF PROPOSED NEW JET WASH BAY**

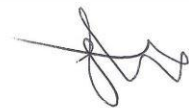
**On behalf of:
Motor Fuel Limited**

**LEVENSHULME SERVICE STATION, 1081 STOCKPORT ROAD, LEVENSHULME:
NOISE IMPACT ASSESSMENT OF PROPOSED NEW JET WASH BAY**

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

On behalf of:
Motor Fuel Limited

Report prepared by:
James Shaw BSc AMIOA – Consultant



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



CONTENTS

1.0	INTRODUCTION	1
2.0	BRITISH STANDARD GUIDANCE	3
3.0	NOISE SURVEY	5
4.0	NOISE ASSESSMENT	6
5.0	SUMMARY & CONCLUSION	9
FIGURE 1 – NOISE SURVEY LOCATION		10
FIGURE 2: PROPOSED SITE LAYOUT		11
APPENDIX I: NOISE UNITS & INDICES		12
APPENDIX II: NOISE SURVEY RESULTS		14

1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Motor Fuel Limited to carry out a noise impact assessment in connection with a planning application for a new jet wash bay at Levenshulme Service Station on Stockport Road in Levenshulme.
- 1.2 Levenshulme Service Station operates 24 hours a day seven days a week. The location of the service station is shown in Figure 1. The service station is located in a broadly residential area and is bounded to the north-east by Cringle Road with the rear gardens of dwellings on Cringle Road facing the service station. The gardens and the service station are separated by a solid 2.5m high concrete panel wall.
- 1.3 To the south of the service station is Stockport Road (A6) a busy route into Manchester City centre with dwellings and other businesses located opposite. Directly to the north is a small area of public open space.
- 1.4 The nearest dwellings to the proposed jet wash bay are the dwellings on Cringle Road as shown in Figure 1.
- 1.5 We understand that the operating hours of the proposed new jet wash bay are between 07:00 - 21:00 daily therefore we have assessed the potential noise impact on nearby dwellings during the early morning on a Sunday.
- 1.6 The proposals include enclosing the jet wash bay with a 3m high clear screen to all sides except the western elevation which will be used for access and egress of vehicles. The layout of the development, including the proposed position of the jet wash bay, is shown in Figure 2.
- 1.7 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of background noise levels during the morning on a Sunday;
 - Assessment of the potential noise impact on the nearest dwellings; and,
 - Recommendation of appropriate noise mitigation measures.

- 1.8 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 BRITISH STANDARD GUIDANCE

- 2.1 British Standard 4142: 2014, 'Methods for rating and assessing industrial and commercial sound' is the appropriate guidance for assessing the potential noise impact from commercial noise sources.
- 2.2 BS 4142:2014 requires a 'rating' level ($L_{Ar,Tr}$) calculated from the operation of the noise source to be compared with the background sound level (L_{A90}) which is measured in the absence of the noise source, evaluated over a 1-hour period for daytime operations and 15-minute period for night-time operations.
- 2.3 The rating level ($L_{Ar, Tr}$) is based on the 'specific' sound level ($L_{Aeq,Tr}$) attributed to the operating noise source, with 'character corrections' added for sound sources where 'certain acoustic features can increase the significance of impact'.
- 2.4 The character correction applied to the specific sound level in order to obtain the rating level can take into account tonality, intermittency, impulsivity and characteristics otherwise distinctive against the prevailing noise climate in the area.
- 2.5 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the background level and the rating level.
- 2.6 Regarding the outcome of the initial estimate, BS 4142:2014 states that:
- i. Typically, the greater this difference, the greater the magnitude of impact;
 - ii. A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - iii. A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and,
 - iv. 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 is does not exceed the background sound level, this is an indication of the specific sound source having low impact, depending on the context.
- 2.7 The initial numerical assessment and the context are then both taken into account when determining the potential noise impact.

2.8 BS 4142: 2014 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including:

- i. The absolute level of sound, including “where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background”
- ii. The character and level of the residual sound
- iii. The sensitivity of the receptor and whether dwellings ... will already incorporate design measures that secure good internal and/or outdoor acoustic conditions

3.0 NOISE SURVEY

- 3.1 Background noise measurements were taken between approximately 07:10 and 09:10 on Sunday 12th January 2020, at a location representative of the nearest dwellings to the north-east of the service station on Cringle Road, as indicated in Figure 1.
- 3.2 The measurements were taken in 15-minute periods in 'free-field' conditions and at a microphone height of approximately 1.5m above the ground. Calibration checks were carried out both before and after the measurement periods with no variance in levels.
- 3.3 Weather conditions at the start of the noise measurement survey were suitable however, during the latter part of the survey there were periods of rain. Full details of the weather conditions and the monitoring equipment used can be seen in Appendix II.
- 3.4 The results of the background noise survey can be seen in full in Appendix II and a summary is shown in Table 1.

Table 1: Summary of Range of Measured Background Noise Levels (dB)

Location	L _{Aeq,15 mins}	L _{A90,15 mins}
Cringle Road	62-66	48-59

- 3.5 The main contribution to the noise climate during the background noise survey was road traffic noise from the A6 as well as vehicles arriving and departing the service station.

4.0 NOISE ASSESSMENT

Jet Wash Noise Levels

- 4.1 As there is currently no data available regarding estimated jet wash customer numbers, we have evaluated the likely worst case (in terms of potential noise impact) number of jet wash customers over an hour daytime period.
- 4.2 It typically takes around 5 minutes for a customer to arrive in a bay, use the jet wash and vacate the bay for the next customer, on this basis we have assumed that each jet wash bay could be used a maximum of once every five minutes.
- 4.3 Therefore, we have assumed that the jet wash bay would be used a maximum of 12 times during a one-hour period in the daytime. It should be noted that these estimates are very high customer numbers to account for a worst-case and real-world numbers are likely to be significantly lower, particularly early on a Sunday.
- 4.4 We have measured jet wash noise levels at similar service station sites which have been adopted as source noise levels for the proposed jet wash bay for this development. The jet wash noise levels we have used were measured at 10m from a jet wash pressure hose during its use. The resulting level is given as an SEL value which is the noise level from the entire jet wash operation normalised to one second which allows the period L_{Aeq} noise level to be readily calculated for different numbers of events.
- 4.5 The noise level at 10m for 12 jet wash uses over a one-hour period is 70 dB $L_{Aeq,1hr}$. Taking into account the distance attenuation between the jet wash bay and the nearest dwellings, the resulting daytime noise level is 63 dB $L_{Aeq,1hr}$. However, this does not take into account the noise shielding effect of the enclosure proposed around the jet wash bay.
- 4.6 The proposals in Figure 2 indicate that the jet wash bay will be constructed with screens around three sides of the bay. Assuming the construction of the bay screens are sealed, have sufficient mass and are a height of 3m as detailed in the plan, we have calculated that the resulting acoustic screening of the jet wash noise at the nearest dwellings would be -19 dB. As jet wash noise does not have any significant low frequency noise associated with it, we have taken the screening attenuation at 1kHz.
- 4.7 Therefore the resulting jet wash noise level at the nearest dwellings is 44 dB $L_{Aeq,1hr}$.

- 4.8 Due to the weather conditions in the latter part of the noise measurement survey we have adopted the lowest background noise level measured prior to the start of any rain which was 48 dB L_{A90} .
- 4.9 In terms of applicable character corrections, the noise source is neither impulsive nor tonal. However, due to the intermittent nature of the noise, we have included a +3 dB character correction to account for this.
- 4.10 The results of the initial BS 4142 assessment are shown in Table 2.

Table 2: Initial BS 4142 Assessment at Nearest Dwellings (dB)

Description	Assessment
Specific source level at assessment location ($L_{Aeq,T}$)	44
Character correction	+3
Rating level ($L_{Ar,T}$)	47
Background level ($L_{A90,T}$)	48
Excess of rating level over background level	-1
Likelihood of impact	Initial assessment indicates a likelihood of low impact, depending on context

- 4.11 The outcome of the initial BS 4142:2014 assessment shown in Table 2 indicates that there is unlikely to be any adverse noise impact resulting from use of the proposed jet wash bays during the daytime.

Context:

Relevant factors to be considered:

Specific Sound Level v Residual Sound Level – The specific sound level of 44 dB L_{Aeq} from the proposed use of the jet wash is generally more than 13 dB(A) lower than the existing (residual) L_{Aeq} noise levels due to road traffic noise from the A6.

Recommendations

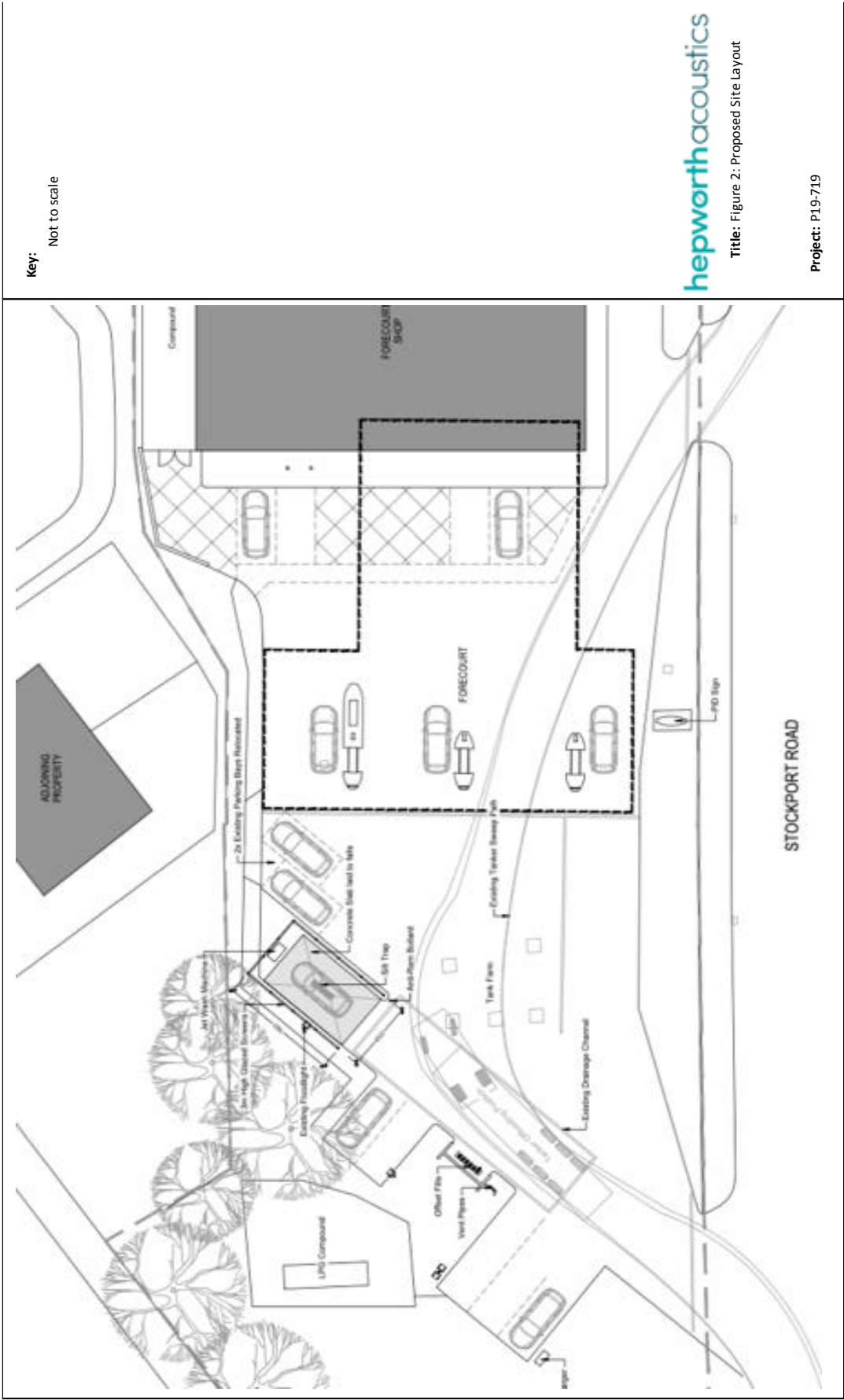
- 4.12 As our assessment has included acoustic screening proposed by the proposed jet wash bays screens, we recommend that the screening is constructed of a solid material with a minimum area density of 10kg/m² with no holes or gaps and a minimum height of 3m, to ensure that the jet wash noise levels are in line with those predicted in the assessment.
- 4.13 Nevertheless, in order to minimise noise, we would make the following recommendations:

- Car radios should be turned off during hand usage of the jet wash.
- Idling of vehicles should be kept to a minimum. Engines should be turned off when stationary.

5.0 SUMMARY & CONCLUSION

- 5.1 Hepworth Acoustics Ltd was commissioned by Motor Fuel Limited to carry out a noise impact assessment in connection with a planning application for a new jet wash bay at Levenshulme Service Station on Stockport Road in Levenshulme.
- 5.2 The assessment has included measurement of background noise levels at a location representative of the nearest dwelling.
- 5.3 The results of the noise survey have been used in conjunction with jet wash noise levels measured at other service stations to calculate and assess the potential noise impact from the jet wash bay with respect to BS 4142:2014.
- 5.4 Taking into account the screening provided by the proposed wash bay screens, the assessment indicates that there would be no unacceptable noise impact on the nearest dwellings.





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: Noise Survey Results

Date(s): Sunday 12th January 2020

Equipment: B&K 2250 'Type 1' sound analyser (serial no. 3011706) with tripod and calibrator

Weather: Dry (period of rain in second hour of the survey), cold (2-3°C) and calm (2-3m/s)
Overcast (7-8 Okta)

All levels in dB(A)

Location 1:

Time		Measured Noise Levels (dB)				Comments
Start	End	L _{Amax}	L _{A10}	L _{Aeq}	L _{A90}	
07:13	07:28	74.0	66.8	62.4	49.5	Road traffic on Stockport Road. Vehicles arriving departing service station.
07:28	07:43	75.2	67.1	62.8	48.3	Road traffic on Stockport Road. Vehicles arriving departing service station.
07:43	07:58	79.4	67.1	62.8	48.9	Road traffic on Stockport Road. Vehicles arriving departing service station.
07:58	08:13	74.2	67.6	64.0	53.8	Aircraft passing overhead. Road traffic on Stockport Road. Vehicles arriving departing service station
08:13	08:28	73.4	67.7	63.5	54.4	Road traffic on Stockport Road. Vehicles arriving departing service station.
08:28	08:43	75.5	67.8	63.6	53.4	Road traffic on Stockport Road. Vehicles arriving departing service station.
08:43	08:58	76.4	69.4	65.8	55.6	Aircraft passing overhead. Road traffic on Stockport Road. Vehicles arriving departing service station
08:58	09:13	74.0	68.6	64.8	53.7	Road traffic on Stockport Road. Vehicles arriving departing service station