

ABERAVON SERVICE STATION, PRINCES MARGARET WAY, PORT TALBOT:

NOISE IMPACT ASSESSMENT OF PROPOSED HAND CAR WASH

On behalf of:

Motor Fuel Limited

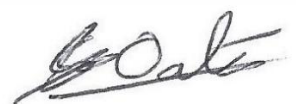
ABERAVON SERVICE STATION, PRINCES MARGARET WAY, PORT TALBOT:

NOISE IMPACT ASSESSMENT OF PROPOSED HAND CAR WASH

Report prepared by:
Hepworth Acoustics Ltd
1st Floor, Aztec Centre
Aztec West
Almondsbury
Bristol BS32 4TD

On behalf of:
Motor Fuel Limited

Report prepared by:
Samuel Oates BSc MSc AMIOA - Consultant



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



CONTENTS

1.0	INTRODUCTION	1
2.0	GUIDANCE & CRITERIA	2
3.0	NOISE SURVEY & ASSESSMENT	4
4.0	SUMMARY & CONCLUSION	8
FIGURE 1: AERIAL VIEW & NOISE SURVEY LOCATIONS		9
FIGURE 2: PROPOSED HAND CAR WASH LAYOUT		10
FIGURE 3: RECOMMENDATIONS		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 proposed planning application for a new hand car wash at the Aberavon Service Station on Princes Margaret Way in Port Talbot (MFG site FS 134).
- 1.2 The location of the site within the context of its immediate surroundings is shown in Figure 1.
- 1.3 The proposals for the new hand car wash are shown in Figure 2, which include a washing area where a jet wash hose will be used as well as a vacuuming area.
- 1.4 We understand that the proposed operating hours of the hand car wash are as follows:
- Monday to Friday: 08:00 - 18:00.
 - Saturday: 09:00 - 18:00.
 - Sunday: 10:00 - 16:00.
- 1.5 The nearest dwellings to the proposed hand car wash facilities are on Western Avenue, to the north and east of the service station as shown in Figure 1.
- 1.6 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of background sound levels on a Sunday morning;
 - Calculation of hand car wash noise levels at the nearest dwellings;
 - Assessment of the potential noise impact at the nearest dwellings; and,
 - Recommendations for noise mitigation measures.
- 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 & CRITERIA

Planning Policy Wales: Edition 10 (Dec 2018)

- 2.1 Planning Policy Wales (PPW) 2018 6.7.7 states that *“To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer.”*

Planning Guidance (Wales), Technical Advice Note (Wales) 11, Noise (Oct 1997)

- 2.2 Technical Advice Note 11 (TAN 11) 8 states that *“Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance.”*
- 2.3 For industrial and commercial developments TAN 11 B17 recommends the use of the appropriate British Standard BS 4142.

British Standard 4142:2014+A1:2019

- 2.4 British Standard 4142:2014+A1:2019, *Methods for rating and assessing industrial and commercial sound* (referred to hereafter as BS 4142), is appropriate guidance for assessing the potential noise impact at residential locations from noise sources such as commercial hand car wash facilities.
- 2.5 BS 4142 requires a ‘rating’ level ($L_{Ar,Tr}$) to be calculated from the operation of the noise source and compared with the background sound level ($L_{A90,T}$) which is measured in the absence of the noise source, evaluated over a 1-hour period for daytime operations and a 15-minute period for night-time operations.
- 2.6 The rating level ($L_{Ar,Tr}$) is based on the ‘specific’ sound level ($L_s = L_{Aeq,Tr}$) attributed to the operating noise source, with ‘character corrections’ added where necessary for sound sources where ‘certain acoustic features can increase the significance of impact’ at the residential locations.
- 2.7 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 of the residential properties.

- 2.8 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the background sound level and the rating level.
- 2.9 Regarding the outcome of the initial estimate, BS 4142 states that:
- Typically, the greater this difference, the greater the magnitude of impact;
 - A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
 - 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.
- 2.10 BS 4142 states that all pertinent factors must be taken into account regarding the context in which the noise occurs, including but not limited to:
- The absolute level of sound.
 - The character and level of the residual sound compared to the character of the specific sound; and,
 - The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will incorporate design measures that ensure good internal and/or outdoor acoustic conditions such as acoustic screening.
- 2.11 The initial numerical assessment and the context are then both taken into account when determining the potential noise impact.

3.0 NOISE SURVEY & ASSESSMENT

Background Noise Survey

- 3.1 A background noise survey was carried out between 10:00 and 11:23 on Sunday 18 April 2021. The noise survey locations outside the nearest dwellings are shown in Figure 1 and described below:
- Location A: At the north end of the forecourt next to the boundary with the nearest dwelling on Western Avenue.
 - Location B: On the north-east side of Western Avenue, opposite the service station.
- 3.2 The background noise survey was carried out during the proposed hand car wash operational hours on a Sunday morning, as it is generally a more noise sensitive period than Weekdays and Saturdays and fewer vehicles are likely to be on the road - i.e. providing a more robust basis for the assessment.
- 3.3 Whilst the noise survey was carried out when lockdown restrictions associated with the COVID-19 pandemic were still largely in force, this is not considered to have had a significant effect on the background noise climate during the hours of our visit and any effect is likely to be a reduction in the noise climate due to less activity from public movement.
- 3.4 The measurements were taken in 15-minute periods in 'free-field' conditions, at 1.4 m above local ground height. Calibration checks were carried out both before and after the noise survey with no variance in calibration level.
- 3.5 Weather conditions during the noise survey were suitable for sound level measurements. Full details of the weather conditions and the monitoring equipment used can be seen in Appendix II.
- 3.6 The results of the background noise survey can be seen in full in Appendix II and a summary of the results is shown in Table 1.

Table 1: Range of Sunday Morning Background Noise Levels (dB)

Location	$L_{Aeq,T}$	$L_{A90,T}$
Location A	53-56	45-50
Location B	58-59	47-48

- 3.7 As can be seen by the results in Table1, the noise levels during the Sunday morning were fairly modest, most of the noise being from road traffic on the surrounding roads.

Hand Car Wash Noise Levels

- 3.8 We understand that the proposals are for a new portable 3 kW triple motor vacuum system and a new three phase automatic high pressure pump.
- 3.9 As manufacturer noise data is not available for the proposed new car wash equipment and the equipment is not installed on site in order to measure the operational noise levels, we have based our assessment on measurements that we have taken of similar equipment at other service stations.
- 3.10 The noise levels which serve as a basis for our calculations are as follows: noise from a full pressure hose wash process = 96 dB L_{AE} taken at a reference distance of 5 m, noise from a pressure wash motor in steady operation = 58 dB $L_{Aeq,T}$ taken at a reference distance of 1 m and noise from operation of a commercial portable car vacuum system over a full internal cleaning process = 82 dB L_{AE} taken at a reference distance of 10 m.
- 3.11 We have carried out calculations accounting for the number of customers over the 1-hour daytime assessment period and distance attenuation to the nearest dwellings, using the following equation:

$$L_s = L_{AE} + 10 \log_{10} \left(\frac{N}{T_0} \right) - 20 \log_{10} \left(\frac{r}{r_0} \right)$$

Where L_s is the specific sound level, L_{AE} is the A-weighted sound exposure level, N is the number of events during the reference period, T_0 is the reference period in seconds, r is the distance to the nearest dwellings and r_0 is the reference distance the L_{AE} was measured at.

- 3.12 For the pressure wash motor we have assumed that it would be in steady operation for a period of 4 minutes for each customer cleaning event.
- 3.13 In order to ensure that the nearest dwellings are protected from any unreasonable noise impact we have recommended a 2 m acoustic barrier/screen as indicated in Figure 3. The effect of the recommended acoustic barrier has been taken into account in our calculations of the car wash noise at the nearest dwelling.
- 3.14 The resulting specific sound levels including the effects of acoustic screening are presented in Table 2.

Representative Background Sound Level

- 3.15 In this case, it is considered that the most representative background sound level for the Sunday morning assessment period is the arithmetic mean of the background sound levels measured during the period. The adopted representative background sound levels are therefore 48 dB $L_{A90,T}$ at Location A and 47 dB $L_{A90,T}$ at Location B.

Initial BS 4142 Numerical Assessment

- 3.16 In terms of applicable character corrections, the noise source is neither impulsive nor tonal. However, to account for the intermittent nature of any noise, we have included a +3 dB character correction.
- 3.17 The results of the initial BS 4142 assessment are shown in Table 2.

Table 2: Initial BS 4142 Assessment at the Nearest Dwellings with Acoustic Barrier (dB)

Description	Location A: Garden	Location A: Elevation	Location B: Elevation
Specific sound level ($L_s = L_{Aeq,T}$)	43	43	28
Character correction	+3	+3	+3
Rating level ($L_{Ar,T}$)	46	46	31
Background sound level ($L_{A90,T}$)	48	48	47
Excess of rating level over background sound level	-2	-2	-16
Potential Impact	Low impact	Low impact	Low impact

- 3.18 The outcome of the initial BS 4142 assessment shown in Table 2 indicates that noise associated with operation of the proposed new hand car wash, with the recommended acoustic barrier in place, is unlikely to result in any adverse impact at residential locations.

Recommendations

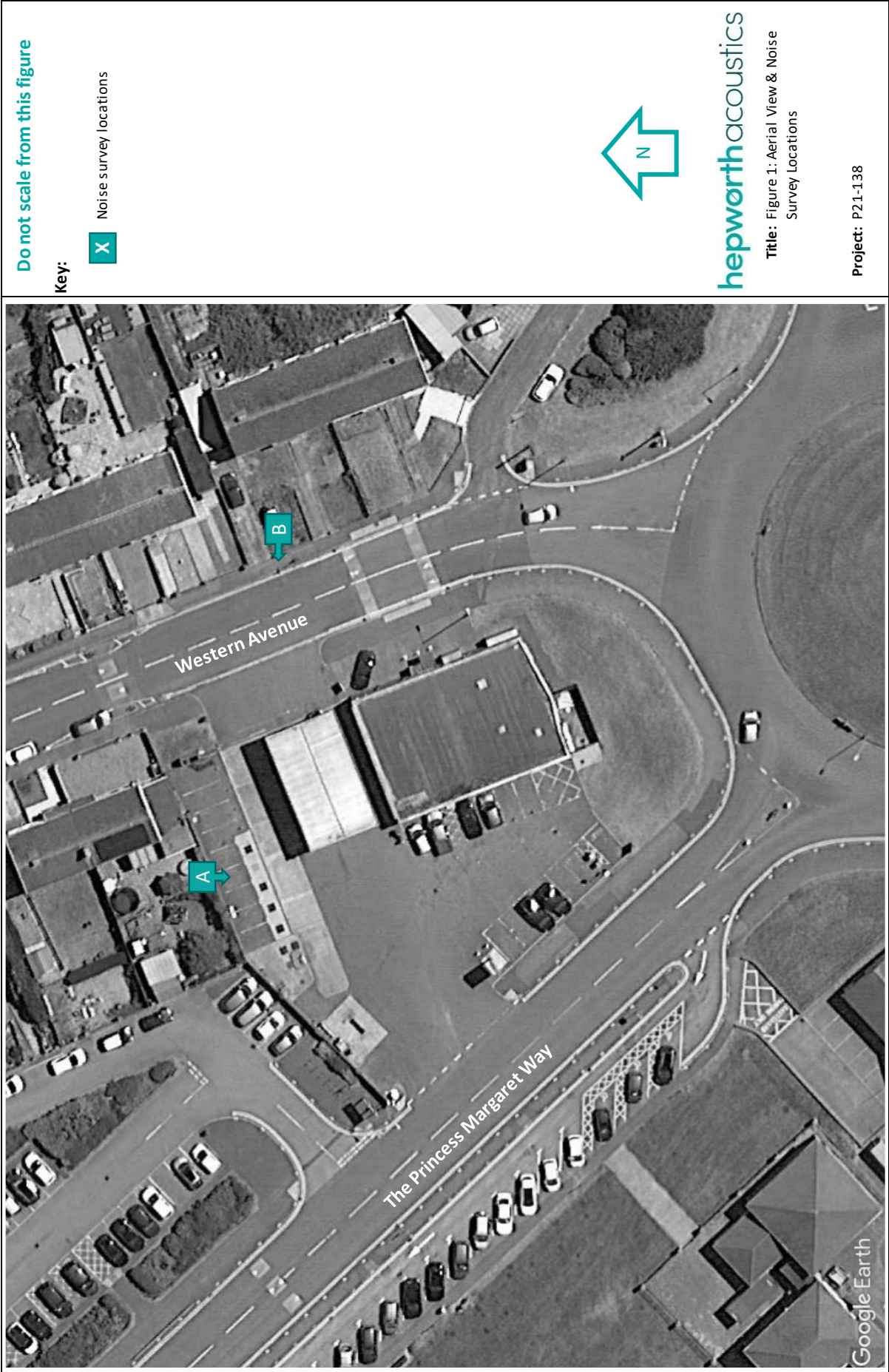
- 3.19 We recommend installing a 2 m high acoustic barrier/screen along the northern side of the vacuuming area as shown in Figure 3.
- 3.20 The acoustic barrier/screen should be a solid construction with no holes or gaps and should have a minimum surface density of 10 kg.m⁻².

Context

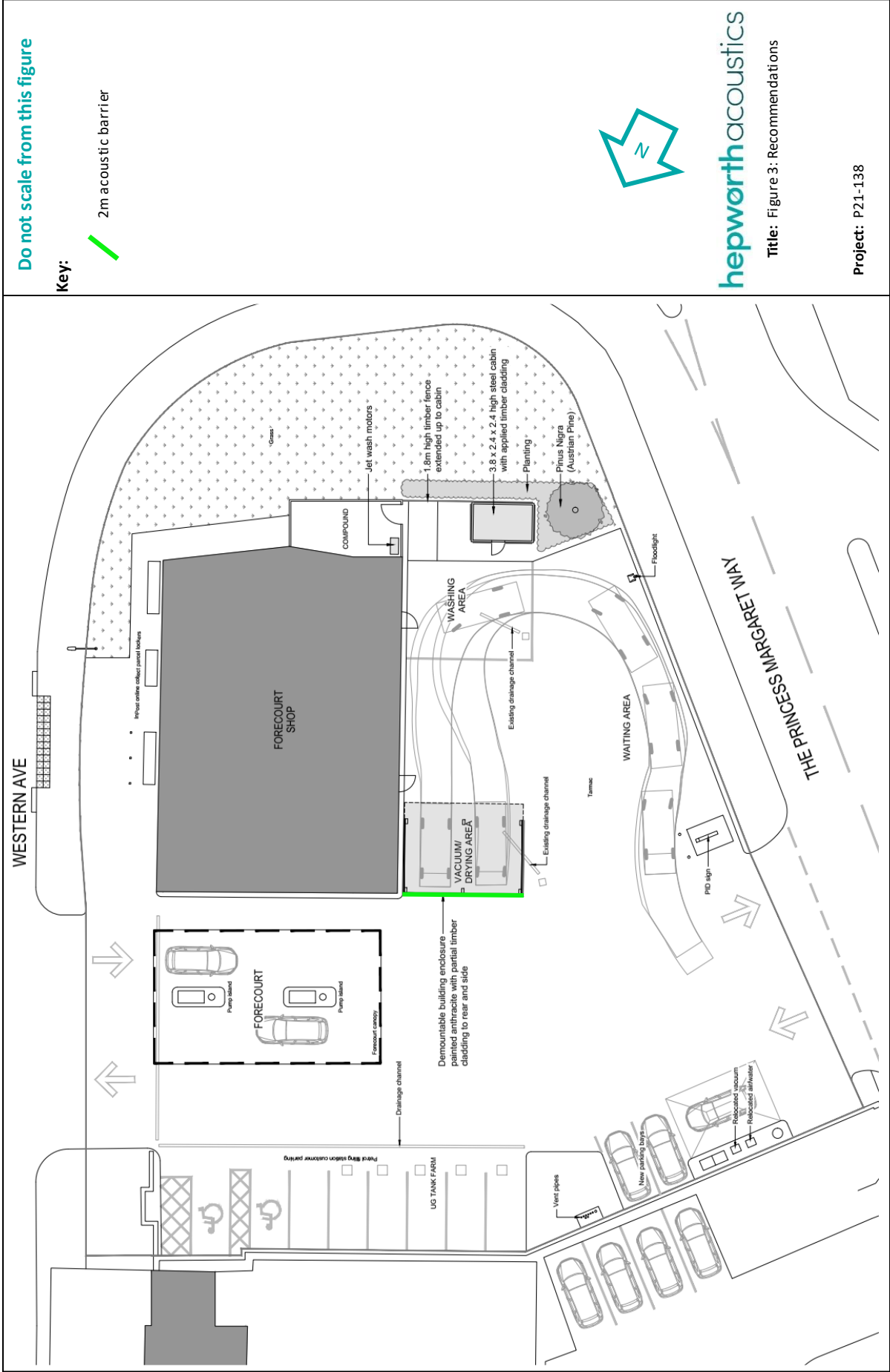
- 3.21 In this case, it is considered that there are no relevant contextual factors which would alter the outcome of the initial numerical BS 4142 assessment.
- 3.22 As such, it is considered that the hand car wash operations would not result in any unreasonable or adverse noise impact on the amenity of local residents.

4.0 SUMMARY & CONCLUSION

- 4.1 Hepworth Acoustics Ltd was commissioned by Motor Fuel Limited to carry out a noise impact assessment in connection with a proposed planning application for a new hand car wash at the Aberavon Service Station on Princes Margaret Way in Port Talbot (MFG site FS 134).
- 4.2 The assessment has been based on the results of a background noise survey carried out during a sensitive period on a Sunday morning, and calculations of car wash activities based on real world in-situ measurements of car wash equipment at other sites.
- 4.3 The potential noise impact from the hand car wash operations has been assessed based on the BS 4142:2014+A1:2019 methodology.
- 4.4 We have recommended a 2 m high acoustic barrier/screen to provide acoustic screening between the hand car wash operations and the nearest dwelling.
- 4.5 The assessment shows that, with the acoustic barrier in place, there will be no adverse noise impact on the amenity of the nearest residents.







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 pressure values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that the human response to sound most closely follows a logarithmic relationship. 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 (at the threshold of hearing) to 120 dB (at the threshold of pain).

Due to the logarithmic nature of decibels, when two sounds of the same level are combined together, the total sound level is (under normal circumstances) 3 dB higher than each of the individual sound levels e.g. 60 dB plus 60 dB = 63 dB. In terms of perceived 'loudness', a 3 dB(A) variation in sound level is a relatively small (but nevertheless just noticeable) change. An increase in sound level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in sound 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' the frequency spectrum appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using a mathematical filter called the 'A' weighting, which is built into sound level meters. Sound 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 Relevant Sound & Vibration 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 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 various indices used in this report, along with other relevant terms are described below.

$L_{Aeq,T}$ This is the A-weighted 'Equivalent Continuous Sound Level' which is an average of the total sound pressure measured over a specified time period. In other words, $L_{Aeq,T}$ is the level of a steady sound which has the same total (A-weighted) sound pressure as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for most forms of environmental noise.

L_{Amax} This is the 'Maximum A-weighted Sound Level' that was measured during the monitoring period. L_{Amax} used in this report refers throughout to L_{Amax} measured using the fast time weighting of the sound level meter, $L_{Amax,f}$.

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

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 $L_{Aeq,T}$ value for a given time period if the number of noise events is known.

$L_{A,T}$ This is an A-weighted value most commonly used in BS 4142 assessments, which is the sound level of the noise source under assessment, at the assessment location, evaluated over the reference assessment period (T_r) and includes numerical adjustments for the characteristic features of the sound.

Appendix II: Noise Survey Results

Date	Sunday 18 April 2021
Equipment	Rion NA-28 'Class 1' sound analyser (S/N: 00960036) Rion NC-74 'Class 1' sound calibrator (S/N: 00430648) Kestrel 2500 Portable Weather Meter (S/N: 2556870) Tripod
Weather	Dry, ~10°C with low winds <2 m.s ⁻¹ and low cloud coverage

Noise Survey Results

Time		Measured Noise Levels (dB)			Comments
Start	End	L _{Amax}	L _{Aeq,T}	L _{A90,T}	
Location A					
10:00	10:15	73.4	53.1	45.3	Road traffic noise. Distant noise of waves on the beach. Some bird noise. Some occasional noise from the fuel pumps on the forecourt. Some noise from small aircraft passing overhead.
10:36	10:51	79.2	55.6	49.5	Road traffic noise. Distant noise of waves on the beach. Some bird noise. Some occasional noise from the fuel pumps on the forecourt. Some noise from customer using the air pump on their tyres.
11:07	11:23	73.4	55.7	49.8	Road traffic noise. Distant noise of waves on the beach. Some bird noise. Some occasional noise from the fuel pumps on the forecourt.
Location B					
10:16	10:35	74.2	57.6	47.1	Road traffic noise. Distant noise of waves on the beach. Some bird noise. Some occasional noise from the fuel pumps on the forecourt. Some noise from a passing helicopter. Some dog barking. Idling car next to measurement position paused out.
10:51	11:06	79.9	59.1	47.7	Road traffic noise. Distant noise of waves on the beach. Some bird noise. Some occasional noise from the fuel pumps on the forecourt.