

**PROPOSED EXTENSION OF HOURS AT
SHELL PETROL STATION, 761-765 WILMSLOW ROAD, DIDSBURY**

NOISE IMPACT ASSESSMENT

**On behalf of:
Motor Fuel Limited**

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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 to extend the hours of use at Shell Petrol Filling Station (PFS) at 761-765 Wilmslow Road, Didsbury.
- 1.2 The Shell Petrol Station is located on the corner of Wilmslow Road and Grange Lane, shown in Figure 1. Permission was originally granted in January 1995 and the permission was extended in October 1996 to the current trading hours which are 07:00 to 00:00 hours Monday to Saturday and 07:30 to 23:00 hours on Sunday.
- 1.3 An application to allow for 24 hour operation for a temporary 12 month period was submitted in July 2017, however the application was refused due to detrimental impact on residential amenity for dwellings at Viceroy Court, Grange Lane and Lansdowne House due to comings and goings to the site and general activity associated with a 24 hour Petrol Filling Station and convenience store. No noise assessment accompanied the application.
- 1.4 Therefore, this noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of background noise levels for a representative period of the night-time on a weekday;
 - Calculation of the potential forecourt activity noise levels at the nearest dwellings;
 - Assessment of the potential noise impact at the nearest dwellings to BS 4142.
- 1.5 Viceroy Court buildings are the closest dwellings to the PFS at approximately 20 metres from the forecourt to the south and approximately 25 metres to the east. Dwellings on Grange Lane are further away from the forecourt at approximately 40m to the northeast. Lansdowne House is a similar distance to the west on the other side of the busy Wilmslow Road.
- 1.6 This report is an update of the previous report following comments from the Environmental Health Officer.
- 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

NPPF:2021

- 2.1 Paragraph 185 of the National Planning Policy Framework (NPPF) 2021 states that planning policies and decisions should *“ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;”*

NPSE:2010

- 2.2 The Noise Policy Statement for England (NPSE) 2010, which is referred to in NPPF, includes three aims:
- i. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
 - ii. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
 - iii. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

BS 4142:2014+A1:2019

- 2.3 British Standard 4142:2014+A1:2019, ‘Methods for rating and assessing industrial and commercial sound’ is the appropriate guidance for assessing the potential noise impact at residential locations from commercial sources.
- 2.4 BS 4142 requires a ‘rating’ level ($L_{A,r,T,r}$) calculated from the operation of the noise source to be compared with the background sound level ($L_{A90,T}$) which is measured in the absence of the noise source. The noise is evaluated over a 1-hour period for daytime operations (i.e. 07:00 - 23:00 hours) and 15-minute period for night-time operations (i.e. 23:00 - 07:00 hours).

- 2.5 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"* when present at residential locations.
- 2.6 The acoustic character correction, where necessary, is applied to the specific sound level in order to obtain the rating level and can take into account tonality, intermittency, impulsivity and characteristics otherwise distinctive against the prevailing noise climate in the area.
- 2.7 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the rating level and the background sound level.
- 2.8 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 +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; 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.
- 2.9 BS 4142 also states in respect of background sound levels that *"it is important to ensure that values are reliable and suitably represent the particular circumstances and periods of interest... the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods"*.
- 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.

Manchester City Council Planning & Noise Technical Guidance 2022

- 2.12 Manchester City Council Planning & Noise Technical Guidance 2022 provides guidance for assessing the potential impact from commercial development on residential dwellings. The guidance states “*BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises*” and that new developments “*where possible prevent ‘noise creep’*” with the design objective being:

“The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.”

- 2.13 However, it should be noted that this criterion does not allow for the consideration of the context of the noise which is an important factor in a BS4142 assessment.

3.0 ENVIRONMENTAL NOISE SURVEY

- 3.1 An environmental noise survey was carried out at a location that is representative of the nearest dwellings at Viceroy Court. The noise measurement location is shown in Figure 1.
- 3.2 The assessment of potential noise impact associated with vehicle movements on the forecourt has been carried out for a weekday night-time period when the background sound levels can be expected to be at their lowest during the proposed hours of business, and therefore the potential noise impact would be at its highest.
- 3.3 An attended noise survey was carried out on Wednesday/Thursday 17/18 May 2023 between approximately 23:00 hours and 01:00 hours.
- 3.4 The noise measurements were taken in consecutive 15-minute periods in ‘free-field’ conditions and at a microphone height of approximately 1.4 m above the ground. Calibration checks were carried out both before and after the measurement period with no variance in levels noted. Frequency analysis was also carried out.
- 3.5 The weather conditions during the noise survey were considered acceptable for the purposes of the survey and subsequent assessment.
- 3.6 The results of the noise survey are summarised in Table 1, the full results along with details of the equipment used and the weather conditions during the survey are shown in Appendix II.

Table 1: Summary of Noise Levels Measured (dB)

Location	$L_{Aeq,15\text{ min}}$	$L_{A90,15\text{ min}}$
Adjacent to Viceroy Court	54 – 58	36 – 46

- 3.7 During survey, the noise climate of the area was dominated by road traffic on Wilmslow Road including regular buses, which operate throughout the night.
- 3.8 The ambient sound levels ($L_{Aeq,T}$) were similar before and after closure of the petrol station (i.e. 58 dB before midnight and 57 dB immediately after midnight. The background sound levels did reduce however this was due to the diurnal nature of road traffic than trading or operation of fixed plant at the petrol station.
- 3.9 The mode of the background sound levels between 23:53 and 01:11 hours is 37 dBA. This value has been adopted as an appropriate noise design limit in our assessment described in Section 4.0.

4.0 NOISE ASSESSMENT

- 4.1 This assessment is based on annual average customer transactions for the proposed extension period, derived from similar Motor Fuel Limited petrol station sites. The customer numbers for each hour are shown in Table 3 overleaf.
- 4.2 In order to determine the likely forecourt noise levels outside the nearest dwellings, calculations have been undertaken based on typical 'sound exposure level' (SEL or L_{AE}) measurements carried out by Hepworth Acoustics for similar activity at ten other filling station forecourts nationwide, as shown in Table 2.

Table 2: Summary of Measured Forecourt Activity Noise at 5 metres (dB)

Description	L_{AE}
Vehicle Arriving, Park, Door/Open Close	72
Vehicle Door/Open Close, Ignition, Depart	73
Fuel Pump	68

- 4.3 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 since it allows calculation of 'equivalent continuous noise levels' ($L_{eq,T}$) over a longer period.
- 4.4 For assessment purposes, it has been taken that, for each projected customer, the vehicle will arrive, a door will be opened/closed, a fuel pump will operate for 90-seconds, the vehicle door will again be opened/closed and the vehicle will depart.
- 4.5 An overall specific sound level has been calculated based on the above parameters from the L_{AE} values:

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

where $L_{Aeq,T} = L_{Aeq,T}$ over time period T

L_{AE} 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)

- 4.6 The specific sound levels outside the nearest dwellings have then been calculated with allowances for the attenuation of sound over distance and any screening attenuation. The distances from the forecourt to the apartments in Viceroy Court are 20 to 28 metres away.

- 4.7 In terms of applicable character corrections, the noise source is neither impulsive nor tonal. However, a correction of +3 dB has been added to account for the intermittent nature of the noise to obtain the BS 4142 rating level. From the above, the results are shown in Table 3:

Table 3: BS 4142 Initial Assessment of forecourt activities at Viceroy Court (dB)

Time	No. of Customers	Calculated Rating level	Background sound level	Difference
00:00 – 01:00	2	33	37	-4
01:00 – 02:00	1	30	37	-7
02:00 – 03:00	1	30	-	-
03:00 – 04:00	1	30	-	-
04:00 – 05:00	1	30	-	-
05:00 – 06:00	7	39	-	-
06:00 – 07:00	22	44	-	-

- 4.8 The calculated BS 4142 noise rating levels from the forecourt activities shown in Table 3 are 4 to 7 dB below the representative background sound levels for the start of the night outside the nearest dwellings. In terms of the initial BS 4142 assessment this indicates low impact.
- 4.9 Given the low likely customer numbers using the forecourt over the night-time period the rating levels are expected to remain below the background sound levels and although forecourt activity increases over the last hour of the night ambient/background sound levels will also increase due to the diurnal nature of road traffic. Nevertheless, context in which the noise occurs has been set out below.
- 4.10 The EHO queried the background sound survey period used in the assessment. As set out in BS4142 the start of the night is considered more important for “sleep purposes”. There will also be more potential activity on the forecourt at these times than in the middle of the night. It is not considered likely that background sound levels measured on a Sunday night into a Monday morning would be significantly lower certainly not 4 to 7 dB below which would be the required drop in noise level to change the outcome of the assessment.

Context

- 4.11 BS 4142 states that all pertinent factors should be taken into account, which include the absolute level of the noise and the character and level of the residual noise.

- 4.12 It is also contextually relevant that the closest dwelling (the apartments at Viceroy Court) are positioned side-on with gable end facing the forecourt, such that there are no windows opening into habitable rooms overlooking the forecourt.
- 4.13 In this regard, it is of great significance that the existing hourly $L_{Aeq,T}$ residual ambient sound levels are 19 – 33 dB higher than the predicted rating noise level based on assessment of each individual hour of the proposed night-time operational hours. Consequently, night-time operational noise will not give rise to any appreciable increase in the prevailing ambient noise.
- 4.14 It is also of note that the character of the residual noise, which is due to road traffic, is similar to forecourt vehicular activity noise. Also, the residual noise, attributable mostly to the Wilmslow Road traffic, is of a relatively significant level, to the extent that it substantially dilutes the potential impact of the proposed night-time use of the forecourt.

Car washing and Compressed Air Facilities

- 4.15 The EHO raised concerns about the potential use of the car washing and compressed air facilities during the proposed extension of hours. These facilities are not proposed to be permitted during the extension hours. We understand that this is possible as the equipment can be activated/de-activated in store or by the use of automatic timers.

Control of Noise from Public Address System

- 4.16 The EHO has requested that potential noise from use of a Public Address (PA) system is considered in the assessment. It is understood that the proposed PA system is only for use in emergencies at the store/PFS and will not be used to communicate with customers on the forecourt. Therefore, it is recommended that the use of the PA system for emergencies only is formalised by an appropriately worded planning condition. This will ensure that there will be no unacceptable noise impact.

Planning Condition

- 4.17 The need to ensure that an adequate scheme of noise mitigation measures (i.e. restrict use of car washing/compressed air facilities, emergency use only of PA system) is implemented for the proposed development can be formalised by an appropriately worded planning condition.

Conclusion

- 4.18 Given the 'low' impact indicated by the BS 4142 initial numerical assessment and all the contextual points mentioned above, it is considered that the noise impact of the proposed 24-hour operation of the service station will be low at all nearby residential locations and will not lead to any appreciable loss of amenity at neighbouring residences by way of noise.
- 4.19 The predicted noise impact is also below the Manchester City Council criteria as set out within their planning guidance document.
- 4.20 It is recommended that the restriction of use of the car washing facilities and the compressed air is controlled by an appropriately worded planning condition.
- 4.21 Furthermore, 'significant adverse impacts' would be avoided and any 'adverse impacts' would be mitigated/minimised, bringing the development in line with the aims of the Noise Policy Statement for England (NPSE) 2010.

5.0 SUMMARY

- 5.1 The impact of noise has been assessed for the proposed extension of hours at the Shell Petrol Filling Station, 761-765 Wilmslow Road, Didsbury.
- 5.2 A survey has been carried out to measure prevailing noise levels outside the nearest dwellings during the potential most sensitive period i.e. a weekday night-time.
- 5.3 The potential noise impact from the proposed extension of hours for forecourt trading operations has then been assessed.
- 5.4 This updated report considers the comments raised by the Environmental Health Officer at Manchester City Council.
- 5.5 Based on the outcome of the assessment, a 'low' impact categorisation in accordance with BS 4142 has been demonstrated and the scheme avoids giving rise to any adverse/significant adverse noise impacts in line with NPPF. Therefore, there is no reason with respect to noise why the proposed extension of forecourt trading hours should not be granted planning permission, in line with relevant guidelines and policy.

Key:

Not to scale

- Noise Measurement Position



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Title: Figure 1: Site Location & Noise Measurement Position

Project: P23-149



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.

$L_{Aeq,T}$ 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, $L_{Aeq,T}$ 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_{AFmax} This is the maximum A-weighted noise level that was recorded during the measurement period in terms of 'Fast' time weighting.

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

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 SEL 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):	Wednesday/Thursday 17/18 May 2023
Equipment	B&K 2260 'Type 1' sound analyser (serial no. 2467016) with tripod and associated calibrator
Weather	Dry, mild ~10°C, clear skies and calm <3 m/s

All levels in dB(A)

Location : Viceroy Court

Time		Measured Noise Levels (dB)			Comments
Start	End	L_{AFmax}	$L_{Aeq,T}$	$L_{A90,T}$	
23:04	23:19	81.3	58.4	45.8	Regular road traffic on Wilmslow Road
23:20	23:35	77.6	56.5	40.8	
23:38	23:53	71.7	57.8	40.8	
23:53	00:08	74.7	57.0	37.2	
00:08	00:23	71.1	57.0	37.4	
00:23	00:38	69.2	54.6	37.0	
00:41	00:56	71.6	53.5	36.4	
00:56	01:11	68.6	53.7	36.8	