



Project

**Environmental Noise Assessment of Proposed Boston Hand Car Wash
Boston Car Park, Wide Bargate, Boston PE21 6SH**

Client

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Summary

Sound Acoustics Ltd has been asked to assess the noise impact of a proposed hand car wash and valeting centre at Boston Car Park, Wide Bargate, Boston PE21 6SH. The site is accessed via the underpass at 51 Wide Bargate and the exit is via Grove Street West.

The site is currently a car park and the proposal would see a number of parking spaces adjacent to John Adams Way turned over to a covered hand wash and valeting service. Cars would use the same entrance and exits points. The site is clearly already used by cars and the only new significant noise sources will be the jet spray and vacuum cleaner. The pump and motor will be housed in a room at the south-east corner of the site. This will maximise distance to sensitive receptors and will be sound insulated as well. The main noise at the washing and valeting point will therefore be the high speed water impact on the car body and the vacuum nozzle. Hand washing and drying will create very little noise.

The location is largely dominated by traffic noise on John Adams Way (A16). This road is busy throughout the day although the ambient noise falls in the evening when there are increased periods of inactivity.

There are residential receptors at Wide Bargate, including the New England Hotel, and on Grove Street West. There is a children's nursery immediately to the south. The design of the site has been carefully considered to maximise distance and screening of the noisiest operations to the receptors.

Background noise levels have been surveyed and this has been compared against the BS4142:2014 rating level. The rating level is generally around 6 to 7 dB below the quieter evening background levels. There is a rating of 3.6 dB above the same background level at the nearest house at the rear of Wide Bargate but this would reduce to 1.4 dB below the background if the proposed portacabin is installed (assuming a minimal 5 dB screening).

The assessment shows that an adverse impact upon the neighbours is not likely. On this basis, it is considered that the proposed car wash operation is acceptable with regard to noise and that planning permission can safely be given for this application.

Keiron Durrant

Principal Consultant

Introduction

We have been asked by the client to carry out a noise survey and prediction assessment to accompany a planning application for a proposed car wash and valeting operation at Boston Car Park, Wide Bargate, Boston PE21 6SH (see Figure 1).

The proposed opening hours are Monday to Saturday 08:00 to 19:30hrs and Sunday & Bank Holidays 09:00 to 18:30hrs.

The site is currently used as a car park and is normally busy. However, Covid restrictions mean that the car park is not currently used as much as before although this is expected to return to normal in the near future. The same could be said for the road network with John Adams Way being the dominant noise source with a large number of HGVs and agricultural vehicles in addition to regular traffic.

The proposal would see a number of parking spaces adjacent to John Adams Way turned over to a covered hand wash and valeting service. Cars would use the same entrance and exits points as the car park. The site is clearly already used by cars and the only new significant noise sources will be the jet spray and vacuum cleaner.

There are residential receptors at Wide Bargate, including the New England Hotel, and on Grove Street West. There is a children's nursery immediately to the south. The design of the site has been carefully considered to maximise distance and screening of the noisiest operations to the receptors (the assessed receptors are also shown on Figure 1).

It is normal that a BS4142:2014 noise survey and assessment accompanies applications of this nature in order to minimise the likelihood of complaints from people within dwellings.

This report details our survey, assessment methodology and assessment outcome.

Assessment Criteria (BS4142:2014)

BS4142:2014 is the British Standard which describes how to rate and assess industrial and commercial sound.

The BS4142:2014 assessment methodology involves applying penalties to the measured or published noise level to allow for tonal noise and other characteristics that are likely to make the noise more annoying and then comparing the resulting rating level to the background noise.

According to the standard, where the specific sound is neither tonal nor impulsive but is readily distinctive above the residual acoustic environment, a penalty of 3 dB can be applied.

Where the specific sound is tonal a penalty of 2, 4 or 6 dB should be applied.

Where the specific sound is impulsive a penalty of 3, 6 or 9 dB should be applied.

Where the specific sound is intermittent and readily distinctive a penalty of 3 dB should be applied.

Where tonal and impulsive characteristics are present the penalties can be added in a linear fashion if they are each likely to affect perception and response. If one is dominant then only a single penalty might be necessary.

The more the rating noise is above the background noise the higher the likelihood of complaint and conversely, the more the rating noise is below the background noise the lower the likelihood of complaint. Where the rating noise does not exceed the background level, this is normally an indication of the specific sound source having a low impact.

Reference should be made to the standard for a complete understanding but the assessment section will outline the steps in the BS4142:2014 process relevant to this installation.

Noise Survey

Noise levels were surveyed on Wednesday 2nd December from 17:00 to 19:30hrs using a Norsonics Type 118 meter. The meter was on a tripod and the microphone was at a height of 1.5m for all measurements. The Type 118 meter is fully calibrated to traceable standards every two years by Campbell Associates (last carried out in August 2020). Calibration certificates are available on request. Field calibration was performed before and after the survey and there was no drift in calibration noise levels.

The proposed opening hours of the operation are Monday to Saturday 08:00 to 19:30hrs and Sunday & Bank Holidays 09:00 to 18:30hrs.

The survey period was chosen as it was likely to show the high traffic noise levels in the later afternoon and rush-hour as well as the quieter period in the early evening once the majority of shopping trips and work to home trips were over. The reverse would also be true in the morning but when the site opens in the morning the traffic flows are already likely to be high and increasing.

The following measurements were made at the locations shown on Figure 1 and described below:

North-west corner of the site by the furthest bollard near the New England Hotel and rear of Wide Bargate. The traffic on Wide Bargate and beyond was screened by the buildings (no view of the traffic). It is considered that this position would be representative of the whole of the hotel façade facing the car park as well as the rear of those properties on Wide Bargate and Grove Street West at a similar distance from John Adams Way (the dominant noise source).

17:00 to 17:15hrs: $L_{A90,15mins}$ 54.5 dB, $L_{Aeq,15mins}$ 60.3 dB

18:00 to 18:15hrs: $L_{A90,15mins}$ 53.2 dB, $L_{Aeq,15mins}$ 60.4 dB

19:00 to 19:15hrs: $L_{A90,15mins}$ 51.1 dB, $L_{Aeq,15mins}$ 58.8 dB

During each measurement period members of staff were observed walking up and down the gravel at the side of the hotel. Due to the close proximity of the meter to the gravel the measurement was briefly paused to avoid any interference. In between measurements a person was observed in the car park shouting to attract the attention of someone inside the hotel.

South-east of the site outside a large building on Grove Street West converted into 8 flats; believed to be 34 John Adams Way (for clarity and in case of address error this building faces the exit, has 5 arched windows and an arched door and is immediately adjacent the footpath on John Adams Way). The measurement position was approximately 2 metres in front of the entrance door. The levels are considered to be representative of the front of this house as well as the rear of properties on Wide Bargate close to the road.

17:15 to 17:30hrs: $L_{A90,15mins}$ 53.7 dB, $L_{Aeq,15mins}$ 69.4 dB

18:15 to 18:30hrs: $L_{A90,15mins}$ 52.4 dB, $L_{Aeq,15mins}$ 68.7 dB

19:15 to 19:30hrs: $L_{A90,15mins}$ 49.9 dB, $L_{Aeq,15mins}$ 62.8 dB

It is interesting to note that the drop-off from rush hour to quieter levels is more pronounced here closer to the dominant A16 noise source, which is only approximately 10m away. Upon inspection it became clear that the first position was being influenced by some plant noise at the rear of Wide Bargate and possibly on the hotel as well. At the first position as the traffic noise drops the plant noise has more influence.

Maximum noise levels from traffic were typically around L_{Amax} 65 and 75 dB at the first and second positions respectively.

Based on the above survey it is considered that the lowest background noise should be used in the assessment for all locations as a robust measure i.e. $L_{A90,15mins}$ 49.9 dB.

N.B. L_{A90} is the level exceeded for 90% of the time and reflects the background noise during the measurement duration and is often used for assessing plant noise (see next section). The L_{Aeq} or the equivalent continuous level, can be regarded as an average.

The weather throughout the survey was cold (approximately 5 to 6°C) with no precipitation and little wind movement; possibly reduced by buildings (forecast SW approx. 9mph). The road surface was wet from earlier rain.

BS4142:2014 Noise Assessment

BS4142:2014 requires the sound to be assessed over 15 minutes for night-time and 1 hour for daytime. This location will see daytime operation only.

As there is no car wash operation at the site currently it is not possible to measure any source noise levels. Instead data from a previous project has been used.

We assessed a similar site in Ipswich in 2013 and stated the following in the report:

The typical process starts with a jet spray wash for around 1 to 2 minutes, followed by a hand wash for around 5 minutes and a quick jet spray rinse and finishes with a Hoover of the inside of the vehicle for around 4 or 5 minutes. The typical process lasts for approximately 10 to 15 minutes per vehicle. The noisiest activity is the jet spray at around $L_{Aeq,2mins}$ 71 dB at 7 metres but this lasts for only a short duration.

Survey notes indicated a level for the vacuum of at least 10 dB less than the jet spray but this was not measured either because the jet spray was dominant or possibly as the vacuum could not be measured accurately due to traffic noise.

On this basis it is considered reasonable to assume a vacuum level for the Ipswich site of no greater than L_{Aeq} 61 dB at 7m. Reviewing reports by other consultants for similar applications this is likely to be an over estimation.

The client intends to house the motors/compressors of the equipment in acoustic enclosures. This was not the case at the above site. We considered that the enclosure of the compressor and the vacuum motor in appropriate housings will lower the sound by at least 5 dB in each case. The enclosure specification will be discussed at the end of the report.

A review of literature on the internet revealed a case study of a car wash assessment carried out by Cirrus Research (www.cirrusresearch.co.uk/blog/2018/03/cirrus-helping-to-stop-residents-getting-in-a-lather-over-car-wash-case-study). This shows jet spray levels of L_{Aeq} 70 to 74 dB at 7.5m from the un-housed jet wash equipment. The levels are very similar to those measured at Ipswich by ourselves. Following acoustic measures which included pvc curtains and an acoustic

enclosure for the motor the levels were predicted to reduce by a minimum of 10 dB. Therefore our estimate of 5 dB is considered robust.

The jet spray and the vacuum area are in different locations (different ends of the covered area) but are considered to be the same distance as far as the hotel is concerned. Clearly these are at different distances from the other receptors and there will be a distance correction applicable in all cases. There will also be screening from the canopy/spray panels to the hotel and to the nursery due to the brick wall around the property. For a robust assessment it is assumed that line of site is just removed and this leads to a correction of -5 dB. The appropriate distances from the receptors are as follows together with the predicted distance attenuation, -5 dB screening correction (where applicable) and resultant level:

Jet Spray (66 dB)

New England Hotel 1st Floor = 37m. Attenuation = $20\text{Log}_{10}(7/37) = -14.5 \text{ dB} + -5 \text{ dB} = 46.5 \text{ dB}$

Rear of Wide Bargate = 19m. Attenuation = $20\text{Log}_{10}(7/19) = -8.7 \text{ dB} = 57.3 \text{ dB}$

Grove Street West = 72m. Attenuation = $20\text{Log}_{10}(7/72) = -20.2 \text{ dB} = 45.8 \text{ dB}$

Nursery = 40m. Attenuation = $20\text{Log}_{10}(7/40) = -15.1 \text{ dB} + -5 \text{ dB} = 45.9 \text{ dB}$

Vacuum (56 dB)

New England Hotel 1st Floor = 37m. Attenuation = $20\text{Log}_{10}(7/37) = -14.5 \text{ dB} + -5 \text{ dB} = 36.5 \text{ dB}$

Rear of Wide Bargate = 39m. Attenuation = $20\text{Log}_{10}(7/39) = -14.9 \text{ dB} = 41.1 \text{ dB}$

Grove Street West = 52m. Attenuation = $20\text{Log}_{10}(7/52) = -17.4 \text{ dB} = 38.6 \text{ dB}$

Nursery = 23m. Attenuation = $20\text{Log}_{10}(7/23) = -10.3 \text{ dB} + -5 \text{ dB} = 40.7 \text{ dB}$

Assuming up to 4 vehicles per hour the jet spray (assumed 3 minutes) and the vacuum (assumed 5 minutes) would be on for approximately 12 minutes and 20 minutes respectively. Engine noise would be of very short duration and is not included in the assessment nor is hand washing and drying activities.

Using the noise data corrected by distance and screening (where applicable) an overall hourly noise level can be worked out using the following calculation:

$$L_{Aeq,1hr} = 10\text{Log}_{10}(((10^{(L1/10)} \times T1) + (10^{(L2/10)} \times T2))/60 \text{ minutes})$$

Where:

L1 & L2 is the noise level of the jet spray and vacuum respectively

T1 & T2 is the duration in minutes of the jet spray and vacuum respectively

Entering the noise data of the jet wash and vacuum and their respective durations into the calculation we get:

New England Hotel

$$L_{Aeq,1hr} = 10\log_{10}(((10^{(46.5/10)} \times 12) + (10^{(36.5/10)} \times 20))/60 \text{ minutes})$$

$$L_{Aeq,1hr} = 40.2 \text{ dB}$$

Rear of Wide Bargate

$$L_{Aeq,1hr} = 10\log_{10}(((10^{(57.3/10)} \times 12) + (10^{(41.1/10)} \times 20))/60 \text{ minutes})$$

$$L_{Aeq,1hr} = 50.5 \text{ dB}$$

Grove Street West (34 John Adams Way)

$$L_{Aeq,1hr} = 10\log_{10}(((10^{(45.8/10)} \times 12) + (10^{(38.6/10)} \times 20))/60 \text{ minutes})$$

$$L_{Aeq,1hr} = 40.0 \text{ dB}$$

Nursery

$$L_{Aeq,1hr} = 10\log_{10}(((10^{(45.9/10)} \times 12) + (10^{(40.7/10)} \times 20))/60 \text{ minutes})$$

$$L_{Aeq,1hr} = 40.7 \text{ dB}$$

As the motor and compressor will be enclosed it is not considered that the noise will be particularly tonal or impulsive but it is accepted that it may be of a character that could draw attention. As such it is considered appropriate to apply a penalty of 3 dB.

The BS4142 assessment is as follows:

New England Hotel

Specific sound level = $L_{Aeq,1hr}$ 40.2 dB

Acoustic feature correction = +3 dB

Rating level = $L_{Aeq,1hr}$ 43.2 dB

Background sound level = $L_{A90,15min}$ 49.9 dB

Excess of rating over background level = -6.7 dB

The assessment indicates a low likelihood of adverse impact at the receptor.

Rear of Wide Bargate

Specific sound level = $L_{Aeq,1hr}$ 50.5 dB

Acoustic feature correction = +3 dB

Rating level = $L_{Aeq,1hr}$ 53.5 dB

Background sound level = $L_{A90,15min}$ 49.9 dB

Excess of rating over background level = 3.6 dB

The assessment indicates a potential but small impact at the receptor.

Grove Street West (34 John Adams Way)

Specific sound level = $L_{Aeq,1hr}$ 40.0 dB

Acoustic feature correction = +3 dB

Rating level = $L_{Aeq,1hr}$ 43.0 dB

Background sound level = $L_{A90,15min}$ 49.9 dB

Excess of rating over background level = -6.9 dB

The assessment indicates a low likelihood of adverse impact at the receptor.

Nursery

Specific sound level = $L_{Aeq,1hr}$ 40.7 dB

Acoustic feature correction = +3 dB

Rating level = $L_{Aeq,1hr}$ 43.7 dB

Background sound level = $L_{A90,15min}$ 49.9 dB

Excess of rating over background level = -6.2 dB

The assessment indicates a low likelihood of adverse impact at the receptor.

Uncertainty: the assessment is considered to have some uncertainty. The on-time of the processes is considered robust and representative of busier periods. Therefore at opening hour and in the evening the levels may be less. If only 2 vehicles were washed in the opening and terminal hours the level would drop by 3 dB (N.B. a doubling or halving results in a 3 dB increase or decrease in level). This would make the assessment at the rear of Wide Bargate 0.6 dB above background which would be indicative of low likelihood of complaint. Any changes

in throughput are unlikely to effect the other 3 locations as these are comfortably predicted to have low impact being around 6 to 7 dB below background.

The context here is important as there is a busy A-road directly next to the rear of Wide Bargate with average levels of up to $L_{Aeq,15mins}$ 69 to 70 dB. This is the dominant noise source with predicted level from the car wash being around 19 dB lower at $L_{Aeq,1hr}$ 50.5 dB. Clearly despite the assessment methodology showing a small impact there is a much louder noise source directly adjacent.

It should be noted that the client intends to install a portacabin between the site and the nearest house on Wide Bargate. This would add a usefull amount of screening. Assuming line of sight is removed, this will be -5 dB resulting in a rating level of $L_{Aeq,1hr}$ 48.5 dB which is 1.4 dB below the background $L_{A90,15min}$ 49.9 dB. If the portacabin is installed the assessment would then indicate a low likelihood of adverse impact at the receptor.

Assessment Conclusion/Discussion

Sound Acoustics Ltd have assessed the noise impact of a proposed hand car wash and valeting centre at Boston Car Park, Wide Bargate, Boston PE21 6SH.

The BS4142:2014 assessment has found that the rating level of the unit is comfortably below the background noise for the New England Hotel and other receptors. The rating level at the closest dwelling at the rear of Wide Bargate is predicted to be 3.6 dB above background noise. However, this compares a busy period (4 cars per hour) with a quieter background for a robust assessment. If the number of cars halved, the rating level would drop by 3 dB and almost be at background levels (0.6 dB above). This is considered to be acceptable in either case, when the application is looked at in context with existing noise sources; traffic on John Adams Way is around 19 dB louder than the predicted car wash noise. The proposed portacabin at the rear of the closest dwelling on Wide Bargate would reduce levels by around 5 dB and the rating level would then be below background in all cases.

The assessment assumes that the compressor for the spray jet and the motor for the vacuum will be housed in their own acoustic enclosure at the locations shown on SM Design Consultancy Studio drawing PC/2020/006 and will reduce the sound of these elements by at least 5 dB. This should be relatively easy to achieve with either proprietary products or a metal or timber framed structure with fully sealed panels at least 10kg/m² in weight. The door to these enclosures should be closed and effectively sealed whenever equipment is in operation. Pipes and cables will need to be suitably sealed where they penetrate the panel and the inside of the enclosure would benefit from some form of soft lining to reduce reverberation e.g. acoustic foam readily available to DIY studio enthusiasts. It is considered highly likely that such an enclosure would be capable of providing significantly more than 5 dB attenuation. As such this aspect is not considered in the assessment as it will be considerably lower than the other noise sources.

Likewise we have not included the noise of hand washing or speaking. These will all be significantly lower than the assessed level and the existing noise source.

The assessment generally indicates a low likelihood of adverse comment. One location where there is a potential small impact would become low impact if the screening from the portacabin is considered or if the throughput is half of what we have assumed for the early evening

assessment when background levels are lower. Assessing against a higher background level during the day would show no impact.

On this basis, it is considered that planning permission can safely be given for this application.

Figure 1 – Site and Survey Location

● = approximate microphone position

■ = approximate assessment position

