

ENVIRONMENTAL REPORT

3 Elm Grove
Hayling Island
Hampshire
PO11 9EA

Predicted Noise Impact Assessment (Revised report)



October 2013

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Unit 3 Estevan Farm, Stoney Lane, Medstead, Alton, Hampshire GU34 5EL

Telephone: 01420 563377
e.mail: info@appleenvironmental.co.uk

www.appleenvironmental.co.uk

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1 Introduction and survey brief

This work has been requested by Havant Borough Council in order to determine noise levels expected from the operation of an MOT test centre on land at 3 Elm Grove, Hayling Island, and the effect that this may have on the general noise of the surrounding area.

This work has been carried out in accordance with the British Standard for rating industrial noise, BS4142, and through reference to BS7445-1 and DEFRA Planning Policy Statement PPG24 (now withdrawn).

The overall aim of this work therefore is to make an assessment of the level of noise that may propagate away from the building for submission to the local planning authority.

The objectives therefore being as follows:

- to measure current background sound pressure levels in the area, (expressed as the L_{eq} , L_{max} , L_{95} , L_{90} , L_{50} , L_{10} and L_5);
- to measure sound pressure levels at the noise source as it is without the MOT centre activities, (expressed as the L_{eq} , L_{max} , L_{95} , L_{90} , L_{50} , L_{10} and L_5);
- to determine the predicted sound pressure levels which may result from activities undertaken in the MOT centre, using secondary data; and
- to undertake a BS4142 assessment accordingly.

2 Site description and expected operation specifics

The premises of 3 Elm Grove is located in the southern section of Elm Grove car park, located behind the main row of shops. The site has a 2m fence to the western and northern boundaries. To the south there is a 1m high wall and to the east there is no boundary between the premises and the patio area of nearby flats.

To the south of the proposed building there are church buildings. There will be no windows on the side elevation facing these buildings. To the east is the rear of a post office and associated flats, and to the west is the entrance to the car park, which is accessed via Mengham Road. The car park itself covers an area of around 1,800m², and is surrounded by fencing or brick walls.

There are two nearby residential properties where the back of each house would be facing the entrance into the proposed MOT centre. These are both located in Elm Close. The corresponding back elevation of each of these properties would be approximately 41m and 46m west of the MOT centre respectively.

The row of shops running to the east of the proposed development have associated 1st floor living accommodation; the closest of which is located 18m to the east of the proposed premises front door. These flats are however located to the rear of the premises rear wall and are therefore less likely to be directly affected by noisy activities coming from within the premises.

The MOT centre is expected to have the following noise sources present:

- vehicle engines;
- general service work;
- break testing;
- closing of vehicle doors and bonnets;
- use of the vehicle lift ramp; and
- air compressor and associated tools.

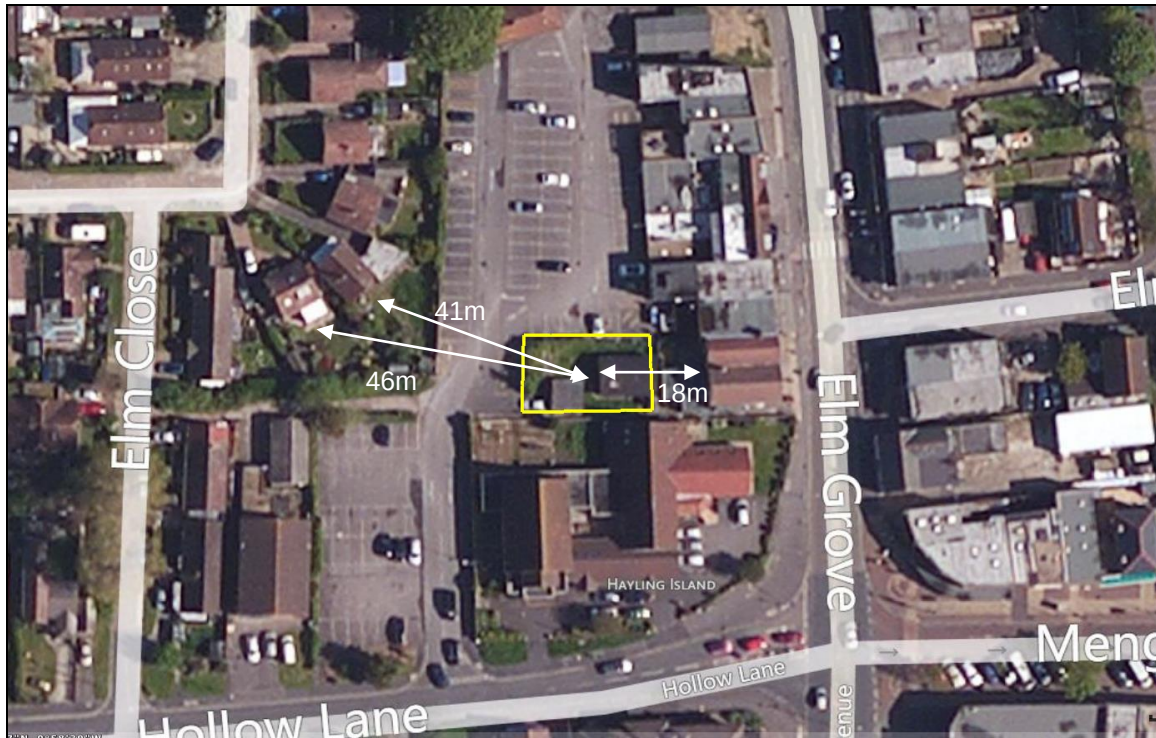
It is assumed for the purpose of this report that the doors to the MOT centre will be open during operation hours for health and safety reasons.

Upon visiting the site, the main background noises noted were as follows;

- wind (especially through vegetation);
- vehicles using the car park; and
- nearby traffic using Hollow Lane and Elm Grove.

A map showing the proposed location of the MOT centre along with the nearest potentially affected building façades is shown below in Figure 1.

Figure 1 Proposed location of the MOT centre and the surrounding area.



There are two ways in which sound can potentially be transmitted to receptors at this location:

- airborne sound from inside the MOT centre will transmit through the front elevation and the access doors. As previously stated in order to comply with health and safety regulations within the workshop, the doors will presumably remain open during operation hours. Consequently generated sound will theoretically be able propagate a distance of 40+m to reach the elevation of the nearest dwellings; and
- airborne sound will transmit through the front elevation and doors of the workshop, and potentially diffract over and around the building towards the residential buildings at the rear of the premises.

3 Methodology

3.1 Background noise/ residual noise recording

Background noise monitoring was undertaken on the site, during the afternoon of Thursday 14th February 2013. In each instance a Rion integrating sound level meter was used. Each meter was externally calibrated both prior to, and after use, at 94 and 103dB respectively.

The instrument details and serial numbers are as shown below in Table 1.

Table 1 Sound level equipment used

Equipment	Description	Serial No.	Monitoring location
Rion NL-04	Type 2 sound level meter with NX-04 octave filter	10691109	N.01
Rion NL-04	Type 2 sound level meter with NX-04 octave filter	10542923	N.02, N.03
Rion NX-04	Octave filter	10740471	-
Castle GA607	IEC 942 Class 1 acoustic calibrator	035070	-

During monitoring, each sound level meter was positioned in open space (at least 1.5m from any reflective surface), and at a distance of 1.6m above ground level.

Measurements were made over a single continuous 30 minute period at one location close to the premises and a second location a little distance from the premises. One further measurement was made over a single continuous 15 minute period at a location situated within the area, but much further away from the premises.

The assessment was undertaken at a time when the noise levels were presumed to be typical of a normal weekday.

Each measurement for this assessment has been taken to the west of the site, as this is the direction the sound is expected to be propagating as the open doors will be facing west.

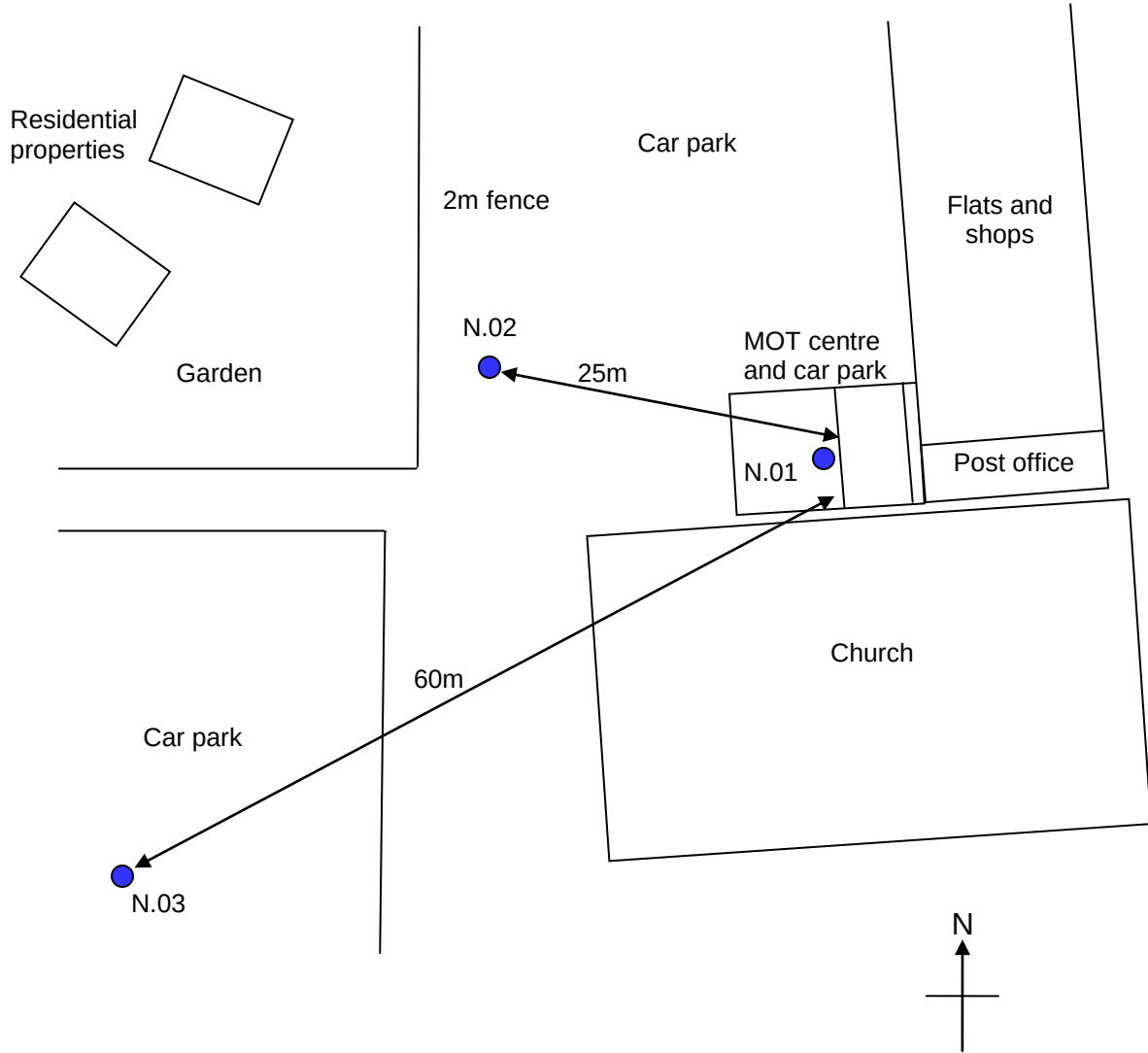
Local weather conditions were noted throughout the monitoring period and have been reproduced below in Section 4.

The following monitoring locations were therefore selected for this assessment:

- (N.01) At the proposed MOT centre premises;
- (N.02) 25m west from the premises; and
- (N.03) 60m southwest away from the premises.

The approximate position of each assessment point can be seen below in Figure 2.

Figure 2 Plan showing the noise monitoring locations



Photograph 1 Showing the proposed premises location from the west



Photograph 2 Showing the proposed premises location from the north



Photograph 3

Shows monitoring point N.03



3.2 Estimated noise from the proposed MOT centre

In view of the fact that the proposed MOT centre is currently not in operation, it is not possible to provide actual noise levels or use manufacturer sound power levels for machinery and tools. For the purposes of this assessment therefore secondary data has been referred to.

Data from a previous noise assessment carried out for an MOT test centre of similar design has been referred to. The premises are located at 22-28 Bawtry Road, Bramley, South Yorkshire. The noise assessment was carried out by G&D Garritt Limited in August 2011 (See Ref. 6), in which a mean daytime noise level of the plant was estimated (from measurements) as 68.2dB, expressed as the L_{eq} at 1m.

Similar to the Elm Grove location, there is the back elevation of a dwelling facing the open doors of this workshop of the MOT centre. This dwelling is 25m away from these doors. There is also a dwelling 6m away from the back of the MOT centre. Similarly the rear of the workshop does not have any doors or windows facing this dwelling. The site and surroundings were located in an industrial estate environment.

It was reported that the nearest dwelling located 25m away from the doors of the MOT workshop, would receive 43dB LAeq (1-hour) from the activities in the garage. The mean background noise at the dwelling was 55dB LAeq. This meant that the sound from the MOT centre was greater than 10dB below the background level here.

It was calculated that the dwelling at the rear of the MOT centre would receive noise levels of 35dB purely from activities therein. The background noise level recorded at this dwelling was 50dB. Therefore propagated noise from the MOT centre was around 15dB below the background level here.

The conclusion put forward within that assessment report was that the noise emanating from the MOT test centre was of an acceptable level. The BS 4142 calculation showed that complaints would be unlikely.

The noise levels included within that report can therefore be used in order to determine expected sound power levels at the source of the proposed MOT centre in Elm Grove.

For additional reference, sound power levels for individual equipment typically used within an MOT garage servicing environment has also been obtained. This data was obtained for Springer Commercial Services Limited (MOT Garage) by Martec Environmental Consultants Limited in May 2010. These values have been reproduced in Table 2 below, appended to this report (See Ref.7).

Table 2 Data collected from a previous noise assessment of an MOT test centre

Condition	Use (mins/hour)	Octave Band Centre Frequency / Hz						
		125	250	500	1000	2000	4000	All
Compressor	10	69.7	66.0	68.5	67.9	62.7	60.8	71.4
Air gun	5	59.3	58.2	62.2	67.8	72.8	73.2	78
Angle grinder	5	51.6	56.6	68.4	71.4	77.4	81.5	85.1
Gas welder	5	59.7	54.6	56.7	53.4	55.3	50.0	62
Hand hammer	5	59.0	61.4	66.6	74.5	82.2	80.2	85.8
Exhaust gas analyser	1	79.3	72.1	70.9	72.6	72.0	67.2	77.4
Horn test	1	62.5	63.7	87.1	93.8	92.9	84.4	97.3
Brake test	1	67.7	63.7	65.0	60.2	59.0	54.8	66.7
Combined based on hourly use		65.2	60.9	68.4	74.0	75.6	73.9	79.2

Through reference to the above table, this tends to suggest that a typical source noise level throughout the day (expressed as an hourly mean) may be around 79.2dB(A).

Subsequent correspondence from Havant Borough Council has suggested that there may be an error in these calculations and that the mean value should be 81.7dB. It is not known whether there is a reason why the lower value has been quoted rather than this suggested value.

This value is seen to be greater the value obtained from the other MOT testing premises in Bramley, South Yorkshire, where the SPL of 68.2dB corresponds to a SWL of 76.2dB (for a point source with one plane of reflection)

In summary therefore, this tends to suggest that the level of noise expected to be produced at the proposed MOT station in Elm Grove (expressed as the SWL) will fall within this noise band of 76-82dB.

In the absence of any primary sound power levels (due to the current non-existence of the MOT centre here) both of these secondary data values will be used for the BS4142 assessment, in conjunction with measured data reproduced below.

4 On-site monitoring results

For the purpose of this assessment, $L_{(A)eq(T)}$ values (equivalent continuous A-weighted sound pressure level) have been used as an indication of mean noise levels, where $T = 30$ minutes (as suggested by BS4142 where noise characteristics are unlikely to change throughout the operation).

In addition to these values, the maximum value has been shown (as L_{max}), the A-weighted sound exposure level (as $L_{(A)E}$), and a range of percentile measurements have been included for reference (L_5 , L_{10} , L_{50} , L_5 , L_{90} , and L_{95}).

Readings have been reproduced in Table 3, below. A meteorological summary is shown in Table 3.

Table 3 Noise readings obtained compared to predicted levels

	N.01	N.02	N.03
	Noise at proposed premises / dB(A)	Noise 25m from proposed premises / dB(A)	Noise 60m from proposed premises / dB(A)
$L_{(A)eq}$	62.1	57.8	62.7
$L_{(A)MAX}$	89.2	84.5	85.1
$L_{(A)5}$	66.0	62.5	67.6
$L_{(A)10}$	62.3	58.7	65.1
$L_{(A)50}$	52.0	49.6	56.5
$L_{(A)90}$	47.0	45.6	48.5
$L_{(A)95}$	46.3	45.7	47.0
Weather conditions	Dry, clear sky, 8°C, little breeze north-northwest at 3.06ms ⁻¹ .		
Any other notes	Nearby traffic was the dominant noise source. General noise could also be heard from birds and vegetation in the breeze.		

Table 4 Local weather conditions during the monitoring period

Parameter	Mean reading
Average temperature / °C	8
Average barometric pressure / hPa	1012
Average relative humidity / %	92
Total rainfall / mm	0
Average wind speed / ms ⁻¹	3.06
Mean wind direction	NNW

5 Evaluation

For the purposes of undertaking this evaluation, the following principles have been applied:

- noise levels will diminish with distance from a point source in accordance with the inverse square law ($1/d^2$) which essentially will result in a decrease of 6dB for every doubling of distance;
- an increase in the background noise level by +3dB will be unnoticed by the human ear;
- an increase in the background noise level by +5dB is likely to be of marginal significance;
- an increase in the background noise level by +10dB is most likely to cause complaint.

The sound power level (SWL) is the uninfluenced sound energy of the source (Watts / $4 \pi r^2$).

The sound pressure level (SPL) is the value where the SWL has been influenced by both reflections and distance from the source:

i.e. $SPL = SWL - 20\log_{10} - \text{the reflective influence.}$

Using the formula $L_{(A)eq,T} = 10\log_{10}\{(1/T) \sum T_i 10^{0.1L_{(A)eq,T_i}}\}$ the SWL can be determined (as detailed within BS4142, Para. 6.3.7).

Considering the two estimated SWLs of the proposed MOT station discussed in Section 3.2, the expected noise levels at the façade of each of the dwelling directly facing the open doors can be calculated, along with the dwelling that is located to the rear of the MOT station, facing the rear wall. (Table 5).

The distance attenuation can therefore be calculated using the formula:

$$SPL = L_1 - 20\log(r_2/r_1).$$

Where:

- r_2 is the receiver distance; and
- r_1 is the measurement distance.

Table 5 Calculated values with distance from source with MOT activities in operation using both library values

Details	Distance from source	Sound level / dB(A)	Sound level / dB(A)
Source (SWL)	0	82.0	76.0
Calculated SPL (at front facing dwelling façade 41m from proposed open doors)	41	49.74	43.74
Calculated SPL (at front facing dwelling façade 46m from proposed open doors)	46	48.74	42.74
Calculated SPL (at rear facing dwelling façade 18m from proposed back wall)	18	56.89	50.89

The values in Table 5 above have been calculated as follows:

- The SPL at 41m from the source would be:
 $82 - 20\log(41/1) = 49.74\text{dB(A)}$ or $76 - 20\log(41/1) = 43.74\text{dB(A)}$
- The SPL at 46m from the source would be:
 $82 - 20\log(46/1) = 48.74\text{dB(A)}$ or $76 - 20\log(46/1) = 42.74\text{dB(A)}$
- The SPL at 18m from the source would be:
 $82 - 20\log(18/1) = 56.89\text{dB(A)}$ or $76 - 20\log(18/1) = 50.89\text{dB(A)}$

BS4142 assessments for this location are shown below in Tables 6a and 6b, 7a and 7b, 8a and 8b, and 9a and 9b. The assessments have been undertaken using both secondary data and primary data, as discussed above. Tables 6a/b show the excess of rating over the background level at the proposed noise source, whereas Tables 7a/b, 8a/b and 9a/b show this at the dwelling façades 41m, 46m and 18m from the proposed MOT centre respectively.

Table 6a BS4142 assessment at the noise source using the SWL of 82dB

Expected noise level L_{eq} (presumed SWL whilst operating)	BS4142 Clause 6.3	82.0
Residual noise level L_{eq} (measured SPL whilst not operating)	BS4142 Clause 6.3	62.1
Background level (L_{90} measured at source)	BS4142 Clause 7.3	47.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SWL - correction)	BS4142 Clause 8.1	82.0
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SWL + acoustic feature correction)	BS4142 Clause 8.2	87.0
Excess of rating over background level (87.0 – 47.0)		40.0

Table 6b BS4142 assessment at the noise source using the SWL of 76dB

Expected noise level L_{eq} (presumed SWL whilst operating)	BS4142 Clause 6.3	76.0
Residual noise level L_{eq} (measured SPL at source location)	BS4142 Clause 6.3	62.1
Background level (L_{90} measured at source)	BS4142 Clause 7.3	47.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SWL - correction)	BS4142 Clause 8.1	76.0
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SWL + acoustic feature correction)	BS4142 Clause 8.2	81.0
Excess of rating over background level (81.0– 47.0)		34.0

As shown above in Tables 6a and 6b, the excess of rating over the background noise level at the source has been calculated to fall between 34dB and 40dB, depending upon which value of SWL is used.

Consequently in accordance with BS4142 (Para.9), under normal circumstances as the rating level is greater than 10dB the difference here is expected to be noticeable.

Table 7a BS4142 assessment at the façade of the dwelling 41m from the proposed source using the SWL of 82dB

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	49.7
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	49.7
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	54.7
Excess of rating over background level (54.7 – 46.0)		8.7

Table 7b BS4142 assessment at the façade of the dwelling 41m from the proposed source using the SWL of 76dB

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	43.7
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	43.7
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	48.7
Excess of rating over background level (48.7 – 46.0)		2.7

As shown above in Tables 7a and 7b, the excess of rating over the background noise level at the façade of the dwelling 41m from the proposed source has been calculated to lie between 2.7dB and 8.7dB; again depending upon which SWL is referred to.

In undertaking the assessment in this way however it is possible that the application of the BS4142 acoustic feature correction factor here may be distorting the actual result.

Firstly, noise from this type of premises is essentially broadband in nature (as shown in Table 2 above) rather than having a dominant tonal nature, and secondly considering a distance between the source and receptor of 41m any impact from ‘distinguishable, discrete continuous notes’ or ‘distinct impulses’ would presumably be lessened. As an environmental model BS4142 is not particularly flexible, and does not give an opportunity for either of these to be taken into account.

It is therefore suggested that the acoustic feature correction may well be less than 5dB, and the corresponding excess of rating over background is expected to be less than the calculated 8.7dB or 2.7dB values.

Consequently any increase in noise here is likely to be of marginal significance at worst.

Table 8a BS4142 assessment at the façade of the dwelling 46m from the proposed source using the 82dB SWL

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	48.7
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	48.7
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	53.7
Excess of rating over background level (53.7– 46.0)		7.7

Table 8b BS4142 assessment at the façade of the dwelling 46m from the proposed source using the 76dB SWL

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	42.7
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	42.7
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	47.7
Excess of rating over background level (47.7 – 46.0)		1.7

* Measured value at 25m from proposed site location - see Table 3.

As shown above in Tables 8a and 8b, the excess of rating over the background noise level at the façade of the dwelling 46m from the proposed source has been calculated to fall between 1.7dB and 7.7dB.

Again this has used the same 5dB acoustic feature correction factor as discussed above, whereas it is likely that the impact from these exceptional noise factors could be even less than for the previous dwelling.

It is concluded therefore that the excess of rating over background is expected to be less than the calculated 7.7dB or 1.7dB values.

Consequently any increase in noise here is likely to be of marginal significance at worst.

Table 9a BS4142 assessment at the façade of the dwelling 18m from the proposed source using the 82dB SWL

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	56.9
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	56.9
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	61.9
Excess of rating over background level (61.9 – 46.0)		15.9

Table 9b BS4142 assessment at the façade of the dwelling 18m from the proposed source using the 82dB SWL

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	50.9
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	50.9
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	55.9
Excess of rating over background level (55.9 – 46.0)		9.9

As shown above in Tables 9a and 9b, the excess of rating over the background noise level at the façade of the dwelling 18m from the proposed source has been calculated to fall between 9.9dB and 15.9dB.

In this instance the model does not take account of the fact that the receptor here will be at the rear of the premises, facing a rear brick wall with no openings.

As such, although some noise may well reflect back towards this dwelling from the front, any direct noise through the rear of the premises will be reduced significantly as it passes through the building wall.

A brick wall can easily reduce broadband noise by 40dB, which therefore suggests that the actual rating level will be much less than the quoted 61.9dB.

Again it is concluded therefore that the excess of rating over background is expected to be significantly less than the calculated 15.9dB or 9.9dB values.

Consequently any increase in noise here is likely to be of marginal significance at worst.

6 Estimated noise impact on the church hall

6.1 Observations

It has been requested by Havant BC that the adjacent church hall to the south of the proposed MOT site is specifically considered as a potential noise receptor, in addition to the domestic receptors discussed above.

To establish whether activities within the church are likely to be affected, the nature of these activities along with the interior layout, relative distances and building materials used have been specifically considered in this section of the report.

The church has three weekly timetabled events which would coincide with works undertaken in the MOT centre. These are as follows;

- Tuesday 9.30 - 11.30 (Little Fishes in the main hall);
- Wednesday 10.00 - 12.00 (Friends of the Bible); and
- Friday 10.00 - 11.00 (coffee morning in the small hall).

There is also a sewing club every other Tuesday afternoon in the small hall, and other possible events on an as-and-when basis. Through discussion with the sewing group the general opinion was that they did not expect noise from the proposed MOT centre to affect their activities.

Figure 3 below shows the layout of the hall, and the distances of the closest façades to the proposed MOT centre. The façade closest to the proposed MOT centre is 11m southeast of where the open doorway to the garage would be. This façade is the most likely receiver of noise, and has four windows; three on ground level (overgrown with vegetation and not normally opened), and one on the first floor landing (not normally opened).

As shown in Figure 4 below, the area in the church adjoining the wall comprises two store rooms and a WC. There is also a staircase running alongside the wall giving access to the 1st floor on the east-hand side. There are no rooms in general use adjoining this façade. Beyond the store rooms and WC is a corridor. There are thick fire doors between each room. Beyond the corridor on the opposing side is the stage of the main hall.

19m southwest of the site is a façade of another section of the church. This wall has no windows as shown in Figure 3.

Figure 3 Aerial view of the church, with description of the internal layout

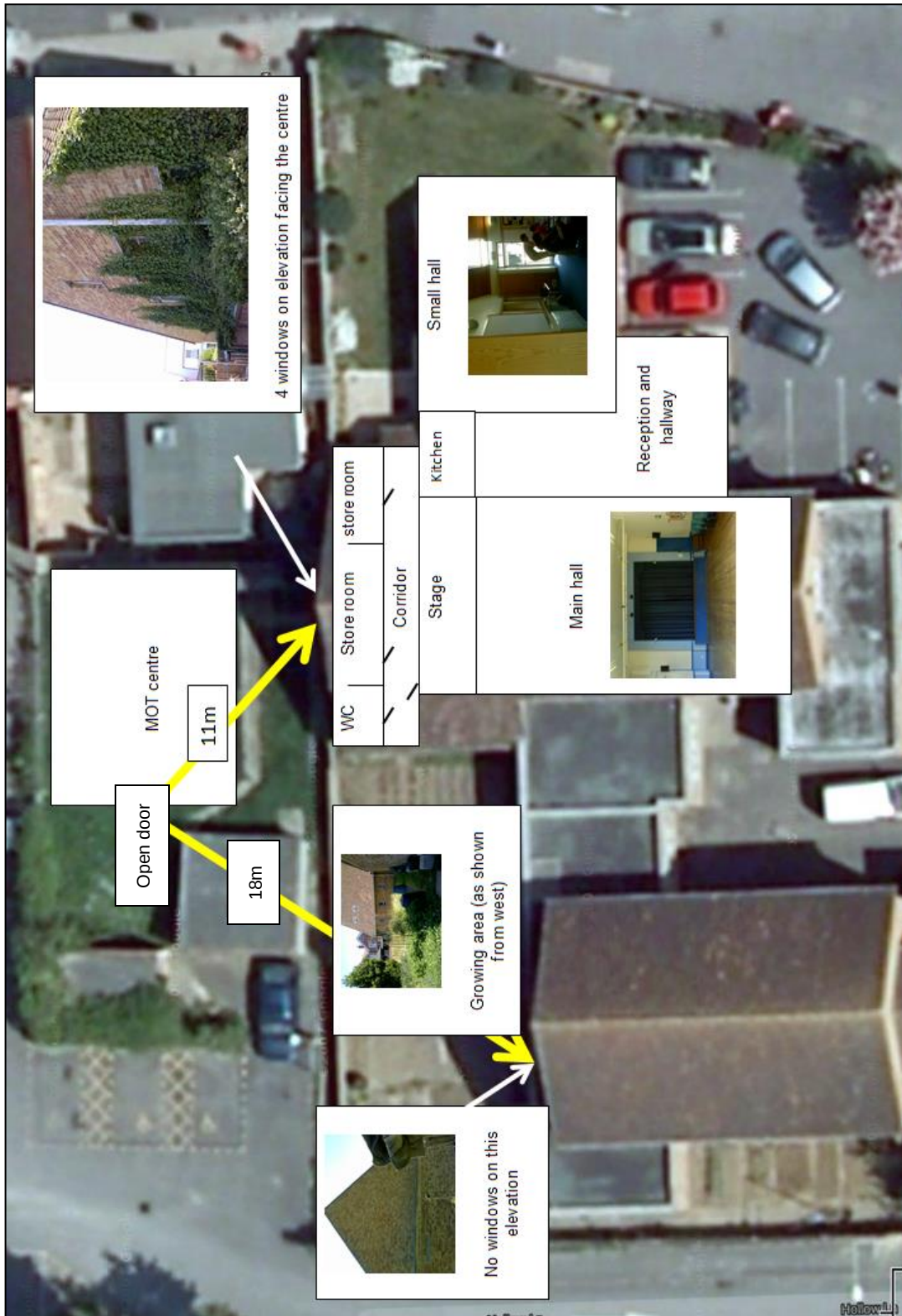
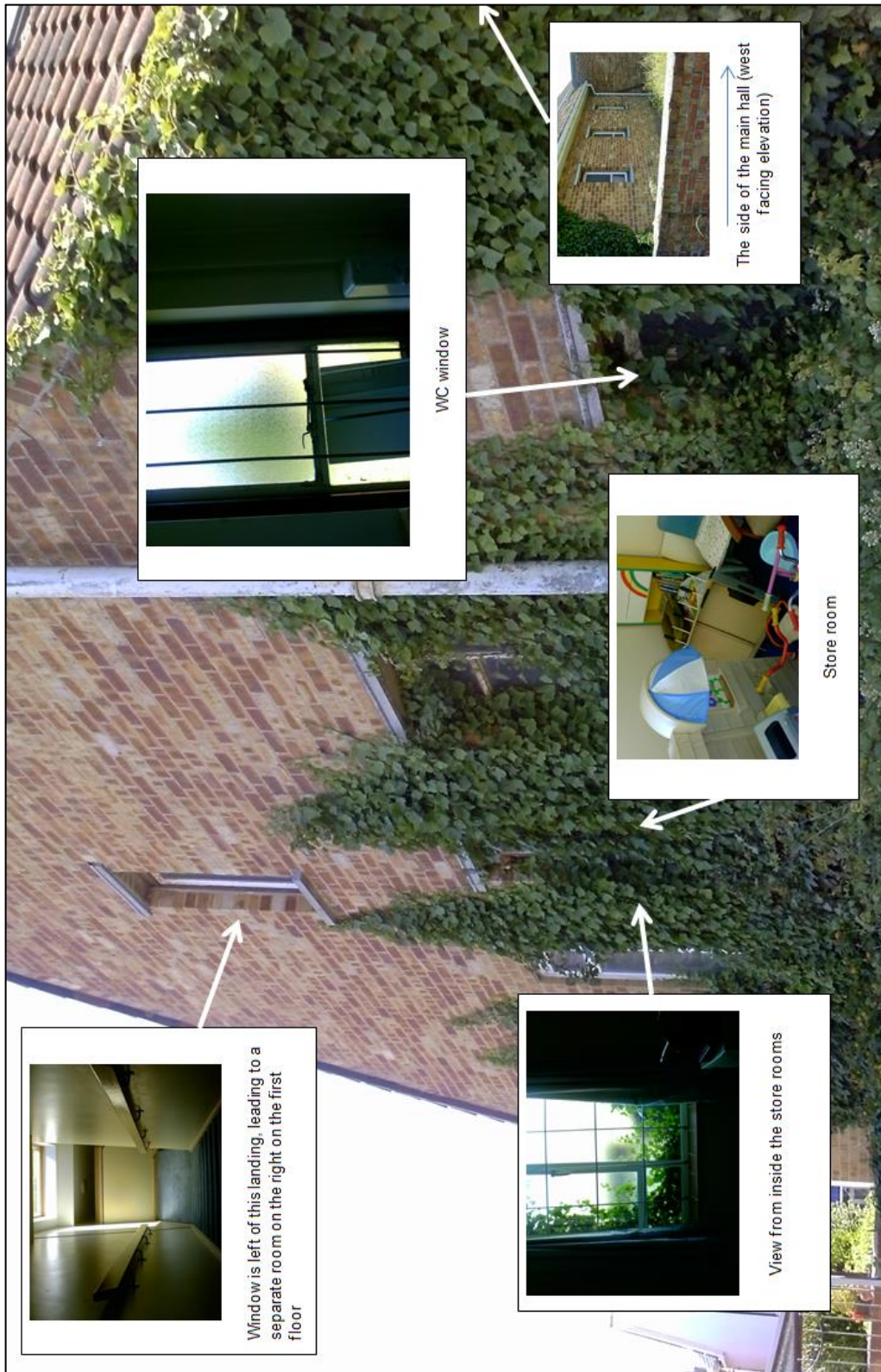


Figure 4 Showing the façade facing the proposed MOT centre



6.2 Estimated noise levels at the nearest façades

As discussed in Section 3.2 above, in the absence of any primary SWL data (due to the current non-existence of the MOT centre here) the estimated SWLs of 82dB(A) and 76dB(A) have again been used. These have both been considered within this report as being potentially typical mean noise values throughout a working day.

Considering these values, the expected noise levels at the façade of the church hall facing the open doors can be calculated using the formula:

$$\text{SPL} = \text{SWL} - 20\log(r_2/r_1).$$

Where:

- r_2 is the receiver distance; and
- r_1 is the measurement distance.

The SPL at the closest church façades are shown in below in Table 10.

Table 10 Calculated values with distance from source with MOT activities in operation using both possible SWL values

Details	Distance from source	Sound level / dB(A)	Sound level / dB(A)
Source (SWL)	0	82.0	76.0
Calculated SPL (at facing church façade 11m from proposed open doors)	11	61.2	55.2
Calculated SPL (at facing church façade 18m from proposed back wall)	18	56.9	50.9

The values in Table 10 above have been calculated as follows:

- The SPL at 11m from the source would be:
 $82 - 20\log(11/1) = 61.2\text{dB(A)}$ or $82 - 20\log(11/1) = 56.9\text{dB(A)}$
- The SPL at 18m from the source would be:
 $76 - 20\log(18/1) = 55.2\text{dB(A)}$ or $76 - 20\log(18/1) = 50.9\text{dB(A)}$

The above values indicate expected noise levels at the two façades of the church building. In actuality the noise experienced inside the building will be further reduced by the nature of the building fabric.

It is generally accepted that a 230mm brick wall with plaster on one side will attenuate noise by 48dB, whereas a closed 6mm single glazed window will reduce noise by around 29dB.

The façade at 11m from the proposed MOT centre has windows present but these are non-opening. This is therefore calculated to reduce the noise level at the internal façade to a theoretical noise level of between 28dB and 32dB.

The façade at 18m from the proposed MOT centre has no windows present, and is calculated to reduce the noise level at the internal façade to a theoretical level of between 3dB and 7dB.

These are all theoretical calculated values that are unlikely to exist in actuality due to general noise generated from within the church building; however they do appear to show that the MOT centre noise is unlikely to affect on-going activities within this building.

7 Further consideration of noise from the use of the proposed MOT centre – HBC Comments

A concern has been also been raised by the Environmental Health Officer at Havant BC regarding the relevance of using mean noise levels generated through library data, as discussed above in Section 3.

All conclusions have been based upon mean noise concentrations of 82dB and 76dB, due to the fact that it is not possible to determine exactly what processes will be occurring at any one time in the proposed MOT centre, and to what extent.

In reality, the noise generated during an MOT check would not normally be regarded as particularly significant. Assuming an MOT check takes around 45 minutes to complete, excessive noise is only likely to be generated during momentary activities such as a horn test and engine revving. There would normally be no need for the use of air tools during a test or the use of hammers or grinders. Consequently, considering the fact that there will only be a maximum of two MOT tests occurring at any one time, the amount of time that these noisier activities are occurring should still only account for a few minutes in any hour.

It has been suggested that there will also be associated servicing occurring here in addition to MOT testing. If this does occur then it is expected that this will be a secondary function of the premises. It is further presumed that this will be related to MOT testing in as much as it will be in place to rectify test failure.

It is not possible to predict the nature of any such repairs, although these will undoubtedly involve use of air tools and compressor, along with hand tools. The latter could well involve hammering and grinding, although there is little to suggest that the use of either will account for a significant amount of time, as both are generally used sparingly during motor repairs; especially when considering the type of repairs that will presumably be required will be those required to bring the vehicle up to the MOT standard.

The emailed response received from Havant BC (27.06.2013) has identified a number of concerns that this revised report has endeavoured to consider.

In the first instance, it has been suggested that use of the car horn at 65.3dB will be clearly audible at the façade of the property 40 metres away.

The testing of the horn typically lasts 0.5 seconds. Furthermore, at worst, with 2 MOT bays operating continually throughout the day, this would involve a maximum of 21 MOT tests. This should result in a total maximum horn time of 10.5 seconds in any working day.

It is suggested therefore that this would not be a significant issue, especially as the surrounding area is a car park in which vehicle horns could theoretically be used and heard routinely throughout the day.

Secondly the response refers to the use of angle grinders and hammers which similarly would be heard above the background noise. These tools both are shown above to have SWLs around 85dB, which at 41m would be expected to reduce to 44.7dB. The background noise level measured at 25m from the proposed MOT centre was 46dB, which suggests that although they would be clearly heard at the source location, they would not be an issue at either of the front-facing receptors.

Furthermore, as discussed above, the nature of vehicle servicing work undertaken here is not likely to involve much use of angle grinders and hammers, as the principal purpose will be to address MOT failures. Typical work therefore may involve work with air tools to remove wheels, but with just one service bay operating for this purpose the volume of work undertaken is unlikely to be great.

Considering air tools however, this report has stated that the typical noise level overall should be less than 82dB at the source, which would correspond to a level of around 42dB at the 41m façade. Once again this would presumably go unnoticed against the 46dB background level.

Thirdly the response mentions other noises not specifically considered above. These include revving of engines, music and shouting. Again in view of the fact that this is to be located within a public car park these noises are more likely to come from the general use of the car park as opposed to the MOT centre. There would appear to be no justification to suggest that these are confined to the MOT centre, or even that the MOT centre will generate more of these noises than elsewhere.

Fourthly, the response mentions use of a rolling road. Typically the use of such a facility would last around 1 minute during a normal MOT test. Using the same work rate as discussed above, this suggests a maximum of 21 minutes during a working day, otherwise expressed as 2-3 minutes per hour. Again this could be argued as to whether or not this represents a significant noise source.

Reference to dynamometer technical specifications (Ref. Piper Test and Measurement Limited) suggests that rolling road sound power levels are around 50-60dB only. Consequently there is little to suggest that this would affect general background noise levels beyond the MOT centre.

Finally the response suggests that there will be 'periods when there will be lots of noise' and also that these will be 'frequent events on a continuous and regular basis throughout the day', yet it is suggested herein that these comments are without justification. This report has endeavoured to provide information to show not only that periods of excessive noise will be infrequent, but also that these events will not generate noise levels significantly greater than the expected background levels.

The response has also stated that physical structural measures need to be detailed within this report in order to mitigate against excessive noise. However in view of the fact that there does not appear to be any specific activity that is expected to have a significant effect on background noise levels at the façade of any nearby building there would seem to be little need for specifically introducing sound insulation within the proposed building.

The proposed building itself will be constructed through consideration of robust standards with regards to noise impact and will comply fully with building regulations. There will be no windows on the side elevation facing the church hall. The front door will exist as a roller shutter, and there is no proposal to introduce air conditioning to the building. There will however be a need for LEV to remove vehicle exhaust fumes during testing, however extraction fans of this nature generally vent direct to atmosphere and have sound power levels in the region of just 55-66dB (measured at 3m) depending upon size (Ref. Vortice Limited). Again this should have little effect on background noise levels, and no effect at all on noise exposure levels at the aforementioned dwellings.

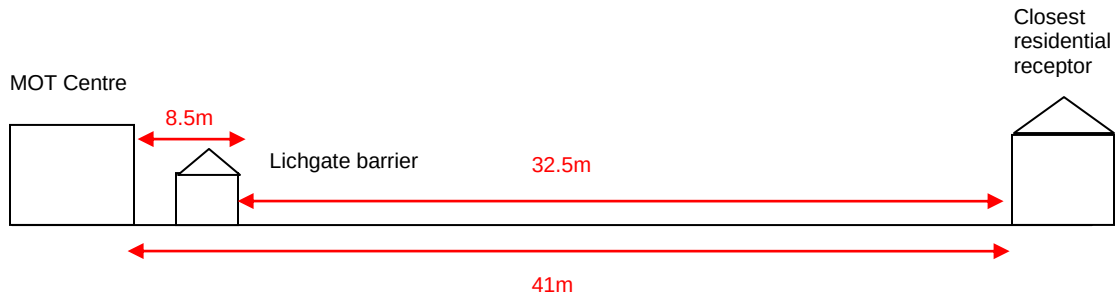
8 Further consideration of noise from the use of the proposed MOT centre – design alterations

Since revising the original report and resubmitting to the planning authority it is understood that proposals have now been put forward for amending the exterior layout of the MOT centre. More specifically, it is now proposed to construct a lichgate building in front of the main garage doors as a means of attenuating the emitted noise.

Revised plans now show a lichgate building of 4m height and 5m depth to be located approximately 3.5m from the main doors.

The details of the proposal are diagrammatically shown below in Figure 5.

Figure 5 The location of a proposed barrier structure outside of the MOT Centre.

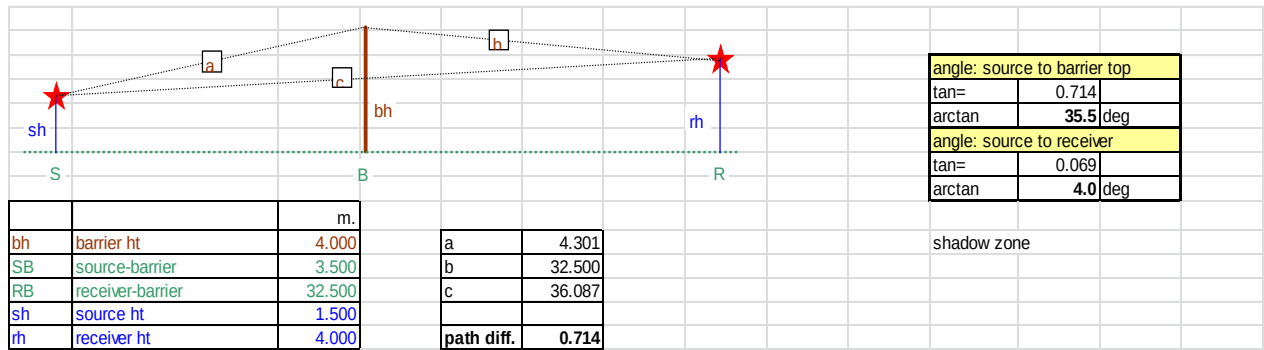


Assuming this structure is located such that the noise source lays within the shadow of the barrier, and, assuming there is no direct line of sight to the receptor then it is generally accepted that this should attenuate noise by at least 5dB within the noise shadow zone; dependent upon the nature of the barrier material and the specific noise wavelength (Ref. CRTN 1988).

As a rule of thumb the lower frequencies tend to be attenuated less than the higher frequencies, such that attenuation of the latter can be much greater than 5dB.

Through reference to CRTN, and using a noise source height of 1.5m and a receptor height of 4.0m (as a bedroom window), and a barrier height of 4.0m, it has been calculated that the introduction of the barrier will give a path difference (δ) of 0.714m. The spreadsheet calculation is shown in Figure 6 below.

Figure 5 The path difference calculation taken from the spreadsheet



If this value of 0.714m is used to determine the potential barrier correction as a function of the path difference (CRTN Chart 9) then the potential barrier correction value is actually shown to be in the region of -14dB.

However, in view of the fact that this calculation relates to a line source and not a point source situation, and, in the absence of any data modelling, it is suggested that the minimum 5dB value can be considered a conservative estimate of the situation.

Assuming therefore a reduction in noise can be achieved by the lichgate barrier of 5dB, the BS4142 calculations in Section 5 above can be reviewed. This has been performed for the closest dwelling only, at 41m from the source.

- The SPL at 41m from the source would be:

$$82 - 20\log(41/1) - 5 = \mathbf{44.74dB(A)} \quad \text{or} \quad 76 - 20\log(41/1) - 5 = \mathbf{38.74dB(A)}$$

The corresponding BS4142 calculations for these amended figures are shown below in Tables 11a and 11b.

Table 11a BS4142 assessment at the façade of the dwelling 41m from the proposed source using the SWL of 82dB and a barrier correction of 5dB

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	44.7
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	44.7
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	49.7
Excess of rating over background level (49.7– 46.0)		3.7

Table 11b BS4142 assessment at the façade of the dwelling 41m from the proposed source using the SWL of 76dB and a barrier correction of 5dB

Presumed noise level L_{eq} (presumed SPL whilst operating)	BS4142 Clause 6.3	38.7
Residual noise level L_{eq} (measured SPL at 25m)	BS4142 Clause 6.3	57.8
Background level (L_{90} measured at 25m)	BS4142 Clause 7.3	46.0
Correction made (from BS4142 Table 1)	BS4142 Table 1	0
Specific noise level (presumed SPL - correction)	BS4142 Clause 8.1	38.7
Acoustic feature correction (from BS4142 s.8.2)	BS4142 Clause 8.2	5
Rating level (presumed SPL + acoustic feature correction)	BS4142 Clause 8.2	43.7
Excess of rating over background level (43.7 – 46.0)		-2.3

As now shown above in Tables 11a and 11b, the excess of rating over the background noise level at the façade of the dwelling 41m from the proposed source has been calculated to lie between 3.7dB and -2.3dB; again depending upon which SWL is referred to.

9 Summary

In the absence of the MOT centre actually being present, secondary data has been referred to in order to make a prediction regarding the likely noise emanating from the premises during normal use. This data has subsequently been used to determine potential noise levels at the façade of each of the closest dwellings, as well as at the adjacent church hall.

In doing so it has been calculated that considering the distance from source to receptor, the noise would be expected to reduce to a level of between 49.7dB(A) and 43.7dB(A) at the closest dwelling to the open front doors of the MOT centre, where the background L_{90} was measured at 46dB.

Subsequently it has been shown that with the construction of an effective noise barrier the noise would now be expected to reduce to a level of between 44.7dB(A) and 38.7dB(A) at the closest dwelling.

These lower values are based upon the assumptions made within this report regarding the characteristics of the barrier. The conclusion from this is that a barrier should be able to reduce the noise level by at least 5dB where there is no line of sight between the source and receptor.

To the rear of the dwelling the noise has been calculated to reduce to somewhere between 28dB and 22dB due to the reduction offered by non-opening double-glazed windows.

In reality however, these reductions will presumably not occur as the general background noise levels in this area will dominate. Consequently these basic calculations imply that changes to the current noise levels at the façade of each building are expected to be unnoticed.

The assessment has also looked at the noise level at the nearest façade of the church hall, which is expected to be in the region of 58dB, which although above the background level here is very unlikely to affect activities occurring within the hall due to the noise attenuation offered by walls and windows.

In order to support the assumption that the closest dwellings will not be significantly affected by noise from the proposed MOT centre, BS4142 calculations were performed at the proposed noise source, as well as at the façade of the two closest dwellings to the front and at the one to the rear.

In doing so, in the presence of the barrier it has similarly been shown that the increase in noise at the source should be unnoticeable, regardless of which SWL is used. The calculated excess of rating value over background level at the façade of the closest dwelling has been calculated to lie somewhere between 3.7dB and -2.3dB.

This supports the belief that at worst any increase in noise at the corresponding building façade should not have a significant impact.

This report has also responded to comments made by the Environmental Health Department at Havant BC. In reviewing our original report concerns were raised regarding specific potential vehicle testing and servicing activities that were not previously considered.

10 References

- 1 BS7445-1:2003 Description and measurement of environmental noise
- 2 BS4142:1997 Rating industrial noise affecting mixed residential and industrial areas
- 3 The Little Red Book of Acoustics 2nd Ed. R.Watson and O.Downey
- 4 Planning Policy Guidance 24 (Planning and Noise):1994 - DEFRA
- 5 http://roam.rotherham.gov.uk/PlanNet/documentstore%5C5662507-5-00015_110920_50_01_A.PDF
- 6 <http://www.dealec.co.uk/acatalog/pdf/vortice/vorcrange.pdf>
- 7 <http://publicaccess.preston.gov.uk/portal/servlets/AttachmentShowServlet?ImageName=110390>
- 8 <http://www.piperdynamometers.com/downloads/cd2000%20manual%20np.pdf>
- 9 Calculation of Road Traffic Noise - HMSO 1988

APPENDIX I

Calibration certification

CERTIFICATE OF CALIBRATION

Issued By Pullman Instruments UK Ltd.

Date of Issue 17 August 2012

Certificate Number

1201134

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Pullman Instruments
Chatsworth House,
Chatsworth Terrace,
Harrogate, HG1 5HT
Tel 01423 720360 Email info@pullman.co.uk

Approved Signatory

☐ A.J.Cox

☒ M. Conboy

Customer : APPLE ENVIRONMENTAL LTD
UNIT 3, ESTEVAN FARM, STONEY LANE
MEDSTEAD, ALTON HANTS. GU34 5EL

Date Received : 16 August 2012

Instrument -	System ID :	035070	Job Number : 251925-1
	Description :	Sound Level Calibrator	Ref. Number : 035070
	Manufacturer :	CASTLE	
	Model Number :	GA607	
	Serial Number :	035070	Last Certificate Number : 1111376
	Procedure Version :	S/4624/S	Last Calibration Date : 23/07/2011

Environmental Conditions

Temperature :	20°C +/- 2°C	Mains Voltage :	230V +/- 20V
Relative Humidity :	50% +/- 15%	Mains Frequency :	50Hz +/- 0.1Hz

Comments

No calibration adjustments or repairs were made to unit.
All measurements traceable to national standards.
Unit tested to manufacturers specification

Traceability Information

Instrument description	Serial number	Certificate number	Cal. Date	Cal. Period
C087 - Cirrus CRL2.22 & BK 4230 S/L Kit	009492	1180823	08/09/2011	52

Calibrated By : N.Bowman

Date of Calibration : 17 August 2012

This certificate provides traceability of measurement to recognised National Standards, and to the units of measurement realised at the National Physical Laboratory or other recognised National Standards laboratories.
Copyright of this certificate is owned by the issuing laboratory and may not be reproduced except with the prior written approval of the issuing laboratory.
This certificate complies with the requirements of BS EN ISO 10012:2003.

CERTIFICATE OF CALIBRATION

Certificate Number
1201134

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Test Title	Tolerance	Applied Value	Reading	Pass/Fail
Tet Results				
Measured Output dB				
94.0dB	0.30dB	94.0dB	94.0dB	Pass
104.0dB	0.30dB	104.0dB	104.1dB	Pass
Output Frequency				
1 kHz	10Hz	1.000 0kHz	1.000 0kHz	Pass
End of Results				

Uncertainties

Sound Meas/Gen	+/-0.3db
Time/Frequency Meas	±3.0 E-11