

Car Workshop Unit 6C Longden Road Manchester

Acoustic Planning Report
1013/APR1
Revision 1

31 October 2022

For:

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1.0 Introduction

A car workshop is situated at Unit 6C Longden Road, Manchester. The site includes a single bay car workshop with off street parking for 2No. vehicles in front of the unit.

Lighthouse Acoustics has been appointed by Autostar Motors to undertake an environmental sound survey at the existing site and to undertake an assessment of typical operational activity sound associated with the car workshop to the nearest noise sensitive receptors.

The survey methodology, results and assessment are presented in this report.

2.0 Objectives

To establish the Local Authority's acoustic requirements for the car workshop.

To visit site to undertake a detailed environmental sound survey in order to establish existing environmental sound levels at the nearest noise sensitive receptor to the site.

To undertake an assessment of typical operational activity sound associated with the car workshop to the nearest noise sensitive receptor based on operational information received and comment on the acceptability in terms of achieving the requirements of the Local Authority at the nearest noise sensitive receptor.

If required, to propose mitigation measures for typical operational activity sound in order to minimise the impact at the nearest noise sensitive receptor.

3.0 Site Description

The car workshop is situated at Unit 6C Longden Road, Manchester. The site adjoins existing industrial premises to the north, east and west and is bound by Longden Road to the south. The unit features a single car bay with 2 post lift, roller shutter door, and off street parking for 2No. vehicles at the front of the unit.

Existing residential properties are situated to the south of the site opposite Longden Road.

An existing car repair centre is situated at Unit 5 Longden Road to the east of the site at the far eastern end of Longden Road.

The site plan overleaf indicates the site boundary and the surrounding environment.



Site plan indicating the site boundary and the surrounding environment

4.0 Local Authority Requirements

With regard to industrial developments, Section 3.6.1.5 of the Planning & Noise Technical Guidance document (dated December 2015) produced by Manchester City Council states the following:

"BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises (section 3.5). One of the indications of the impact of a BS 4142 assessment is the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The Council consider that new developments should contribute and enhance the area in which they are located and where possible, contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:

'The development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, restriction of the hours of operation) and the achievable noise level should be identified. This information will allow us to make a judgement concerning the application and its likely impact on the surrounding area.

In addition to the above, maximum noise levels should also be adequately controlled. Where uses generate high noise levels of a short duration (e.g. loud bangs) on a regular basis, these should aim to be controlled so as not to exceed 60 dB (L_{Amax}) at the façade of noise sensitive premises nearby in accordance with the recommendations of the World Health Organisation (section 3.5)."

Based on the above, an assessment of typical operational activity sound associated with the car workshop to the nearest noise sensitive receptor will be undertaken.

5.0 Environmental Sound Survey

5.1 Measurements

Due to the lack of secure locations to install unmanned monitoring equipment at the nearest residential properties, manned sound measurements were undertaken in order to obtain accurate measurements of environmental sound.

Manned environmental sound measurements were undertaken between 10:00 and 17:00 hours on Tuesday 25 October 2022. During this period the L_{Amax} , L_{Aeq} and L_{A90} sound levels were measured over 10 minute periods every other hour.

5.2 Weather Conditions

At the start of the survey period the wind conditions were calm (<1m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 12°C.

At the end of the survey period wind conditions were calm (<1m/s) and the sky was scattered clear. There was no rainfall and road surfaces were dry. The temperature was approximately 14°C.

The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

5.3 Measurement Position

Environmental sound levels were measured at a single position as described in the table below.

Position	Description
A	Microphone situated at the corner of Longden Road and Hemmons Road at 1.2m above ground level.

The measurement position is shown on the site plan below.



Site plan showing measurement position

Due to construction work noise in the adjacent unit to the west of Unit 6C, measurements of typical environmental sound levels were not possible outside the residential properties to the south of the site. Measurement Position A was therefore selected in order to assess typical environmental sound levels representative of those at the residential properties to the south of the site.

5.4 Equipment

The following equipment was used to undertake the environmental sound survey.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Brüel & Kjær	2250	2626230	26/10/2020
Preamplifier	Brüel & Kjær	ZC-0032	21309	26/10/2020
Microphone	Brüel & Kjær	4189	2621208	26/10/2020
Windscreen	Brüel & Kjær	UA-1650	-	-
Class 1 Sound Calibrator	Casella	120/1	3864878	02/11/2021

Field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits.

5.5 Results

The results of the daytime environmental sound survey periods are presented in the table below.

Position	Hourly Period	Measured Sound Pressure Levels (dB)		
		L _{Amax}	L _{Aeq,10min}	L _{A90,10min}
A	10:00-11:00	51	45	42
	12:00-13:00	60	50	42
	14:00-15:00	57	47	42
	16:00-17:00	60	49	43

5.6 Discussion of Sound Climate

At Position A the dominant sound source was distant road traffic from the surrounding road network. Occasional road traffic along Hemmons Road and Longden Road also contributed towards the measured sound climate along with aircraft flyovers.

6.0 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound", describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems.

It should be noted that the determination of noise amounting to a nuisance is beyond the scope of BS 4142:2014+A1:2019.

The likely impact is indicated by subtracting the existing background sound level from the rating level of the industrial and/or commercial sound. The standard states that:

"a) Typically, the greater this difference, the greater the magnitude of the impact."

- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Note 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

The industrial and/or commercial sound is expressed as the specific sound level and given as a L_{Aeq,T_r} sound level. Should the specific sound level exhibit any acoustic features (i.e. tonality, irregularity or impulsiveness) a character correction is applied. The rating level is the specific sound level with character correction applied (if applicable) and is given as a L_{Ar,T_r} sound level. The existing background sound level is given as a $L_{A90,T}$ sound level.

The reference time interval, T_r , is 1 hour during the daytime period (07:00 to 23:00 hours) and 15 minutes during the night-time period (23:00 to 07:00 hours).

7.0 Assessment Data

7.1 Assessment Methodology

The assessment will be undertaken in accordance with the method described in BS 4142:2014+A1:2019 - See Section 6.0.

7.2 Operational Activity Sound Data

Sound data for the typical operational activities were measured on-site and are presented in the table below.

Operational Activity	Sound Level L_{Amax} (dB) at 1m	Sound Level L_{Aeq} (dB) at 1m	Duration of Event T (secs)
Battery Torque Gun (5 x nuts/bolts)	98	85	15
Angle Grinder (metal)	92	90	10
Hammer (metal)	101	95	5
2 Post Lift (Ascend)	92	82	60

The dominant sources of sound associated with the typical operational activities comprise a battery torque gun to remove/install wheel nuts/bolts which creates a loud 'clattering' sound, an angle grinder to grind metal which creates a loud 'screech' sound, the hammering of metal which creates a loud 'impulsive' sound and the 2 post lift which creates a loud 'clicking' sound as the safety pin repeatedly engages whilst ascending (not present when descending).

In accordance with BS 4142:2014+A1:2019, the following character corrections have been applied to the typical operational activities following a subjective assessment of the characteristics.

Operational Activity	Acoustic Feature	Subjective Assessment	Character Correction
Battery Torque Gun (5 x nuts/bolts)	Tonality	Clearly Perceptible	+4
Angle Grinder (metal)	Tonality	Clearly Perceptible	+4
Hammer (metal)	Impulsivity	Clearly Perceptible	+6
2 Post Lift (Ascend)	Impulsivity	Clearly Perceptible	+6

7.3 Operational Activities

Based on discussions with the operator of the car workshop, only a single vehicle may be worked on at any one time within the car workshop. Due to the variable nature of repairs required to vehicles it has been estimated that the typical operational activities may occur for the following number of events in a 1 hour period.

Operational Activity	Duration of Event T (secs)	No. of Events in 1 Hour Period
Battery Torque Gun (5 x nuts/bolts)	15	4
Angle Grinder (metal)	10	3
Hammer (metal)	5	4
2 Post Lift (Ascend)	60	1

The remainder of the time will comprise operational activities such as the removal/fitting of nuts/bolts/parts with hand tools, fluid changes and electrical fault finding which generate significantly less noise and have therefore been scoped out of the assessment.

7.4 Operating Hours

It is understood that the car workshop operating hours are 09:30 to 18:00 hours Monday to Friday and 09:30 to 13:00 hours on Saturday with no opening on Sundays or bank holidays. As such, the car workshop will only operate during daytime hours. In accordance with BS 4142:2014+A1:2019, the reference time interval is therefore 1 hour.

7.5 Background Sound Levels

The lowest representative $L_{A90,10min}$ background sound level measured at Position A during the operating hours are detailed in the table below.

Position	Lowest Representative $L_{A90,10min}$ Background Sound Level (dB)
	09:30–18:00
A	42

The above level will be used to assess the industrial/commercial activity sound against.

7.6 Nearest Noise Sensitive Receptor

The distance between the car workshop roller shutter door and the nearest noise sensitive receptor to the south is approximately 16m.

7.7 Building Construction

The car workshop building comprises a masonry external wall construction with timber roof. The weak point acoustically will be the roller shutter door.

7.8 Building Attenuation

An allowance of -5dB has been made for attenuation provided by the building structure itself between the car workshop and the nearest noise sensitive receptor to the south. This is with the roller shutter door open. With a typical roller shutter door ($R_w \geq 15dB$) closed, the allowance is expected to increase to -20dB.

8.0 BS 4142:2014+A1:2019 Assessment

8.1 Roller Shutter Door Open

Descriptor	Operational Activity			
	Battery Torque Gun (5x nuts /bolts)	Angle Grinder (metal)	Hammer (metal)	2 Post Lift (Ascend)
Sound Pressure Level $L_{Aeq,T}$ at 1m (dB)	85	90	95	82
Duration of Activity, T (secs)	15	10	5	60
Duration of Activity as Percentage of 1 hour (%)	0	0	0	2
On time correction (dB)	-24	-26	-29	-18
Sound Pressure Level $L_{Aeq,1hour}$ at 1m (dB)	61	64	66	64
Number of Events (#)	4	3	4	1
Correction (dB)	+6	+5	+6	0
Distance to Receptor (m)	16	16	16	16
Distance Attenuation (dB)	-24	-24	-24	-24
Building Attenuation (dB)	-5	-5	-5	-5
Specific Sound Level $L_{Aeq,1hour}$ at Receptor (dB)	38	40	43	35
Character Correction (dB)	+4	+4	+6	+6
Rating Level $L_{r,1hour}$ at Receptor (dB)	42	44	49	41
Combined Rating Level $L_{r,1hour}$ at Receptor (dB)	52			
Representative Background Sound Level $L_{A90,15min}$ at Receptor (dB)	42			
Difference (dB)	+10			

As can be seen, the assessment indicates that the rating level due to typical operational activities at the car workshop is likely to achieve a difference of +10dB with the roller shutter door open when compared to the lowest representative daytime $L_{A90,10min}$ background sound level at the nearest noise sensitive receptor.

This is therefore an indication of typical operational activities at the car workshop having a significant adverse impact at the nearest noise sensitive receptor during the daytime period with the roller shutter door open.

8.2 Roller Shutter Door Closed

Descriptor	Operational Activity			
	Battery Torque Gun (5x nuts /bolts)	Angle Grinder (metal)	Hammer (metal)	2 Post Lift (Ascend)
Sound Pressure Level $L_{Aeq,T}$ at 1m (dB)	85	90	95	82
Duration of Activity, T (secs)	15	10	5	60
Duration of Activity as Percentage of 1 hour (%)	0	0	0	2
On time correction (dB)	-24	-26	-29	-18
Sound Pressure Level $L_{Aeq,1hour}$ at 1m (dB)	61	64	66	64
Number of Events (#)	4	3	4	1
Correction (dB)	6	5	6	0
Distance to Receptor (m)	16	16	16	16
Distance Attenuation (dB)	-24	-24	-24	-24
Building Attenuation (dB)	-20	-20	-20	-20
Specific Sound Level $L_{Aeq,1hour}$ at Receptor (dB)	23	25	28	20
Character Correction (dB)	4	4	6	6
Rating Level $L_{r,1hour}$ at Receptor (dB)	27	29	34	26
Combined Rating Level $L_{r,1hour}$ at Receptor (dB)	37			
Representative Background Sound Level $L_{A90,15min}$ at Receptor (dB)	42			
Difference (dB)	-5			

As can be seen, the assessment indicates that the rating level due to typical operational activities at the car workshop is likely to achieve a difference of -5dB with the roller shutter door closed when compared to the lowest representative daytime $L_{A90,10min}$ background sound level at the nearest noise sensitive receptor.

This is therefore an indication of typical operational activities at the car workshop having a low impact at the nearest noise sensitive receptor during the daytime period with the roller shutter door closed.

As such, the roller shutter door should remain closed when the typical operational activities detailed in the table above are undertaken within the car workshop.

8.3 Context

BS 4142:2014+A1:2019 states the following with regard to the context of the industrial/commercial sound:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

In addition, BS 4142:2014+A1:2019 states the following:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following."

3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) facade insulation treatment;*
- ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
- iii) acoustic screening."*

"This standard is not intended to be used to assess the extent of the impact at indoor locations."

In order to place the industrial/commercial sound in context the following points have therefore been considered:

- Industrial/commercial sound occurs daytime hours only (09:30 to 18:00 hours Monday to Friday and 09:30 to 13:00 hours Saturday);
- BS 4142:2014+A1:2019 only uses outdoor sound levels to assess the likely effects of sound.

Based on the above, it is considered that the industrial/commercial sound is likely to have a low impact at the nearest residential property to the south of the site during the daytime period with the roller shutter door closed. This conclusion is reached by professional judgement, taking context into consideration.

8.4 Uncertainty

Weather conditions during the survey period are considered to be suitable for undertaking measurements of sound levels. Measurement positions were selected that were representative of the nearest noise sensitive receptors. Measurements were undertaken when daytime environmental sound levels may be expected to be typical. Whilst environmental sound levels have the potential to be lower than those measured on some occasions, they are likely to be similar to those measured for the vast majority of the time. As such, uncertainty in the survey methodology is considered to be of marginal significance.

The survey was undertaken using Class 1 equipment which had been calibrated within the required intervals. In addition, field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits. As such, uncertainty in the survey equipment is considered to be of negligible significance.

Assessment data including sound data and operating hours has been based on site measurements and observations. A character correction has been applied as deemed appropriate. As such, uncertainty in the assessment data is considered to be of marginal significance.

Calculations have been undertaken in accordance with recognised procedures and have been performed in a spreadsheet. As such, uncertainty in the assessment is considered to be of negligible significance.

Based on the above, overall uncertainty in the assessment is considered to be of marginal significance.

9.0 L_{Amax} Assessment

9.1 Roller Shutter Door Open

Descriptor	Operational Activity			
	Battery Torque Gun (5x nuts /bolts)	Angle Grinder (metal)	Hammer (metal)	2 Post Lift (Ascend)
Sound Pressure Level L _{Amax} at 1m (dB)	98	92	101	92
Distance to Receptor (m)	16	16	16	16
Distance Attenuation (dB)	-24	-24	-24	-24
Building Attenuation (dB)	-5	-5	-5	-5
Specific Sound Level L _{Amax} at Receptor (dB)	69	63	72	63
Required Sound Level L _{Amax} at Receptor (dB)	60	60	60	60
Difference (dB)	+9	+3	+12	+3

As can be seen, the assessment indicates that sound levels due to typical operational activities at the car workshop are likely to exceed the required maximum sound level of L_{Amax} 60dB at the nearest noise sensitive receptor with the roller shutter door open.

9.2 Roller Shutter Door Closed

Descriptor	Operational Activity			
	Battery Torque Gun (5x nuts /bolts)	Angle Grinder (metal)	Hammer (metal)	2 Post Lift (Ascend)
Sound Pressure Level L _{Amax} at 1m (dB)	98	92	101	92
Distance to Receptor (m)	16	16	16	16
Distance Attenuation (dB)	-24	-24	-24	-24
Building Attenuation (dB)	-20	-20	-20	-20
Specific Sound Level L _{Amax} at Receptor (dB)	54	48	57	48
Required Sound Level L _{Amax} at Receptor (dB)	60	60	60	60
Difference (dB)	-6	-12	-3	-12

As can be seen, the assessment indicates that sound levels due to typical operational activities at the car workshop are likely to achieve the required maximum sound level of L_{Amax} 60dB at the nearest noise sensitive receptor with the roller shutter door closed.

As such, the roller shutter door should remain closed when the typical operational activities detailed in the table above are undertaken within the car workshop.

10.0 Conclusions

The Local Authority's acoustic requirements for the car workshop have been established.

A detailed environmental sound survey has been undertaken in order to establish existing environmental sound levels at the nearest noise sensitive receptor to the site.

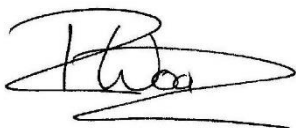
An assessment of typical operational activity sound associated with the car workshop to the nearest noise sensitive receptor has been undertaken.

The assessment indicates that the rating level of typical operational activities is likely to achieve a difference of +10dB with the roller shutter door open and -5dB with the roller shutter door closed when compared to the lowest representative daytime background sound level at the nearest noise sensitive receptor.

This is therefore an indication of typical operational activities at the car workshop having a significant adverse impact with the roller shutter door open and a low impact with the roller shutter door closed at the nearest noise sensitive receptor during the daytime period.

In addition, the L_{Amax} assessment indicates that sound levels due to typical operational activities at the car workshop are likely to exceed the required maximum sound level of L_{Amax} 60dB at the nearest noise sensitive receptor with the roller shutter door open and achieve the requirement with the roller shutter door closed.

As such, the roller shutter door should remain closed when the typical operational activities detailed are undertaken within the car workshop.



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