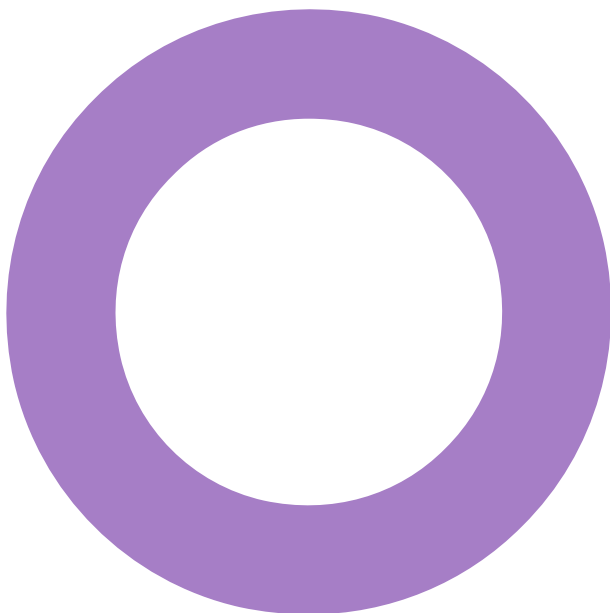


Grimshaw Lane. Manchester. Canmoor.

ACOUSTICS

REPORT ON EXISTING NOISE CLIMATE
PROPOSED INDUSTRIAL DEVELOPMENT
REVISION 2 - 04 FEBRUARY 2021



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed
0	04/11/2020	Draft report	AM	
1	12/11/2020	Issued report	AM	DM
2	04/02/2021	Updated site layout	AM	AM

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1. Introduction.

Hoare Lea Acoustics has been instructed to carry out a noise impact assessment for a proposed new warehouse/manufacturing facility on existing industrial land off Grimshaw Lane, Manchester. The new development will comprise seven new buildings which will be subdivided into 12no smaller units (units 1 to 6 and A to F).

This report reviews typical operational noise levels for warehouse/manufacturing facilities and assesses these with respect to the existing noise climate at the nearest residential properties. Recommendations for noise control measures are provided where appropriate.

2. Site Description.

The development site lies on an existing industrial site located off Grimshaw Lane to the north east of Manchester City centre. The site is currently occupied by a number of large industrial buildings and associated storage space.

Grimshaw Lane lies to the south of the site and carries traffic from the A62 in the north west through to Briscoe Lane in the south east. Traffic flows on this road tend to be intermittent.

To the north east of site is Ten Acres Lane which also connects the A62 to Briscoe Lane and the wider commercial and residential districts in the south east.

The north western and south eastern sides of the development site adjoin existing industrial and commercial units and areas of open land.

The nearest residential properties to the site lie to the north west off Bower Street and to the north east on Makkah Close and Staplehurst Road.

To the north west at a distance of approximately 350 metres, is the A62 Oldham Road. To the south west at a distance of 850 metres is the A6010.

An aerial view of the site and surroundings is shown below.



3. Development Proposals.

It is proposed that the existing buildings be demolished and the site cleared to enable redevelopment to provide seven industrial buildings which will be subdivided into 12no smaller units, each with associated loading bays and car parking.

All units will be accessed from Grimshaw Lane to the south west.

Each unit is, generally, located around the periphery of the site with units 1 to 3 aligned along the north western site boundary, units 4 and 5 aligned along the north eastern site boundary and unit 6 on the southern boundary. The smaller units A to F are located in the south western corner.

Unit 4 is the largest unit and is located closest to the nearest dwellings on Makkah Close. The site layout plans indicate that Unit 4 is set 25 metres from the nearest dwellings to the north east.

Unit 5 is the second largest unit and is located closest to the nearest dwellings on Staplehurst Road. The site layout plans indicate that Unit 5 is set 25 metres from the nearest dwellings to the north east.

Units 3 and 4 are set approximately 110 metres from the nearest dwellings to the north west.

The largest unit (unit 4) has provision for 16 loading bays and 119 car parking spaces.

The proposed site layout is shown in Appendix 1.

4. Basis of Assessment.

4.1 National Planning Policy Framework.

The National Planning Policy Framework (NPPF): June 2019 sets out the Government's planning policies for England and how these are expected to be applied. The document seeks to encourage sustainable development subject to all relevant factors.

Section 15: 'Conserving and enhancing the natural environment', paragraph 170, states the following:

'Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.'*

Furthermore, paragraph 180 states that:

'Planning policies and decisions should also 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:

- *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;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Paragraph 182 states that:

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

Paragraph 183, additionally, states *'The focus of planning policies and decisions should be on whether proposed development is acceptable use of land rather than control of processes or emissions (where these are subject to separate pollution control regimes).'*

NPPF also makes reference to the DEFRA Noise Policy Statement for England (NPSfE) 2010.

4.2 Noise Policy Statement for England.

The NPSfE is intended to apply to all forms of noise other than that which occurs in the workplace and includes environmental noise and neighbourhood noise in all forms.

NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have *'a single objective noise-based measure...that is applicable to all sources of noise in all situations'*. It further advises that the sound level at which an adverse effect occurs is *'likely to be different for different noise sources, for different receptors and at different times'*.

Paragraphs 2.20 and 2.22 of NPSE introduce the concepts summarised in the table below which can be applied when considering the significance of noise impacts, as defined by the World Health Organization.

Effect Level	Description
No Observed Effect Level (NOEL)	This is the noise level below which no effect can be detected. Below this level, there is no detectable effect on health and quality of life due to the noise.
Lowest Observed Adverse Effect Level (LOAEL)	This is the level above which adverse effects on health and quality of life can be detected.
Significant Observed Adverse Effect Level (SOAEL)	This is the level above which significant adverse effects on health and quality of life occur.

It is noted that NPSfE also advises that the general principle that increases in ambient noise should be 'minimised', needs to be considered in context for each site and, in this regard, states:

'Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical... the application of the NPSfE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular...development or other activity may not have been given adequate weight when assessing the noise implications.'

Noise Policy Statement for England (NPSE) (Department for Environment, Food & Rural Affairs, 2010) advises that noise impacts should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or numerical noise limits.

4.3 Planning Practice Guidance.

Online Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019) has been published to provide greater details in relation to the relevance of noise to the planning process following the introduction of NPPF and NPSE.

This guidance states, under the heading *'How can noise impacts be determined'*, that the following should be considered by local authorities:

- *'whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.'*

In line with NPSE, this includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation during the operation of the Proposed Development.

Further guidance on each of the various observed effect levels set out in NPSE is provided in the table contained within the section headed *'How can it be established whether noise is likely to be a concern?'* which is reproduced below.

Perception	Example of outcomes	Increasing effect level	Action
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			

Perception	Example of outcomes	Increasing effect level	Action
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude, or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect Level	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

It is important to note that no specific noise parameters or target noise levels are defined in the text.

In the absence of specific guidance for the assessment of environmental noise within NPPF, NPSfE and PPG, it is considered appropriate to base assessment on a combination of current British Standards, national guidance and local planning policy.

4.4 BS 8233: 2014.

BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' is the current British Standard providing guidance for acoustic requirements within buildings. The Standard advises appropriate criteria and limits for different building types including dwellings.

BS 8233 provides guidance regarding acceptable internal and external noise level criteria for dwellings but does not form any statutory requirement to achieve the guidance values provided therein.

The BS 8233 internal design criteria for dwellings are as follows:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB LAeq,16hour	-
Dining	Dining Room / Area	40 dB LAeq,16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16hour	30 dB LAeq,8hour

BS 8233 Section G1 advises that, where windows are open for ventilation, then sound reduction is limited to 15dB. The Standard does, however acknowledge that additional sound reduction will result from room effect.

Available site test data for a furnished room indicates that the typical sound reduction from outside to inside is approximately 20dB for mid frequencies when windows are open 100mm.

For gardens and terraces, BS8233 states that it is desirable that the steady noise level does not exceed $L_{Aeq,T}$ 50 dB whilst a level of $L_{Aeq,T}$ 55 dB would be acceptable in noisier environments.

4.5 BS 4142: 2014.

BS4142:2014 'Methods for rating and assessing industrial and commercial sound' is the current British Standard providing guidance for assessment of noise impact from industrial and commercial sites. In general, the likelihood of adverse impact for a particular noise is dependent upon factors including the margin by which it exceeds the background noise level, the character of the noise and its occurrence. The Standard recommends the determination of the Rating Level of the specific source and advises a correction factor of between +3dB and +9dB if the sound has a tonal quality, is intermittent or impulsive or has any other distinct characteristics which would make it more noticeable.

The degree of impact is assessed by comparing the measured background level with the Rating Level. Where the Rating Level exceeds the background, the level of impact increases as shown below:

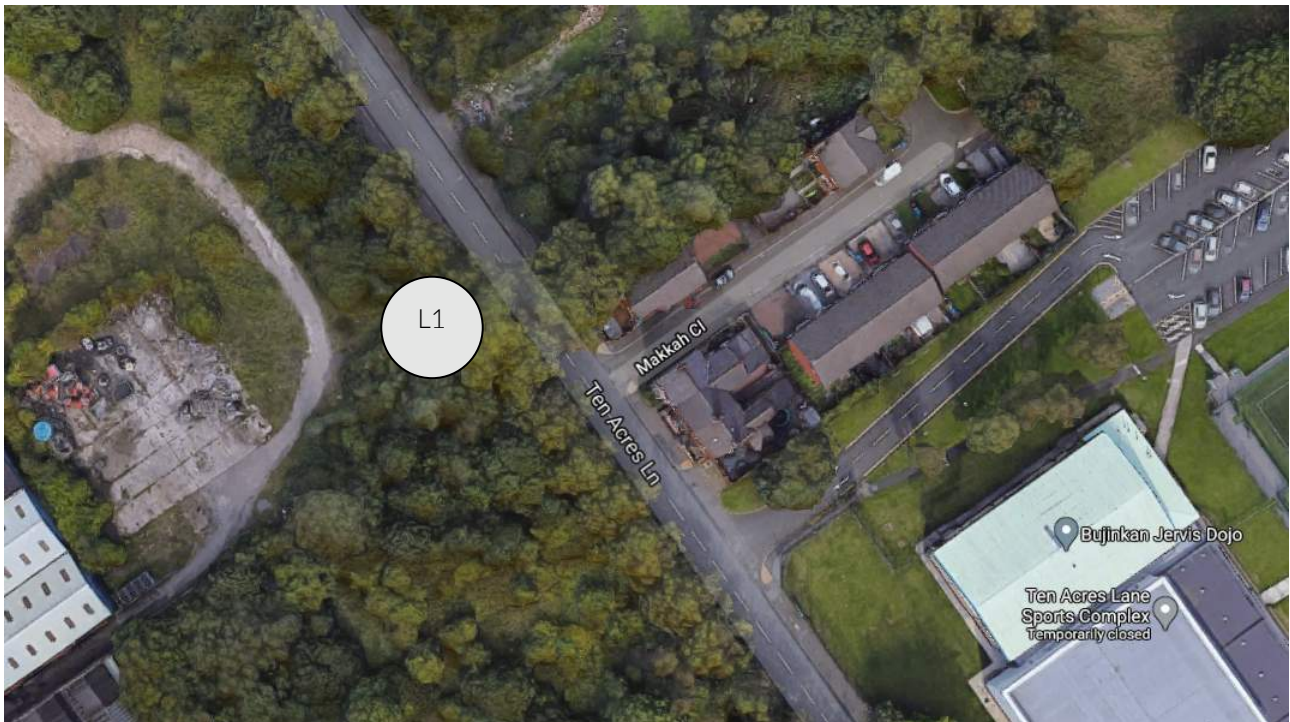
Comparison with background	Assessment
+0 dB or below measured background	Low impact
+ 5 dB	Adverse impact
+ 10 dB or more above measured background	Significant adverse impact

It should be noted that the assessment method applies to free-field external sound levels.

5. Measurements.

Monitoring was undertaken at the site over the period Friday 6th to Monday 9th November 2020 to determine the weekday and weekend noise climate. It is considered that the lowest background sound levels will occur at the weekend.

Levels were recorded continuously in 5-minute samples at position L1 to determine the equivalent continuous sound level, L_{Aeq} , the short duration level L_{Amax} and also the percentiles L_{A10} and L_{A90} . The automated noise logging meter was set back 5 metres from the nearest kerb of Ten Acre Lane and so it is considered that the measurement data obtained is representative of the overall noise climate that currently occurs at the nearest dwellings to the north east on Makkah Close and Staplehurst Road.



Weather conditions over the survey period were mostly dry. Wind speeds over the course of the survey were sufficiently low for environmental noise monitoring.

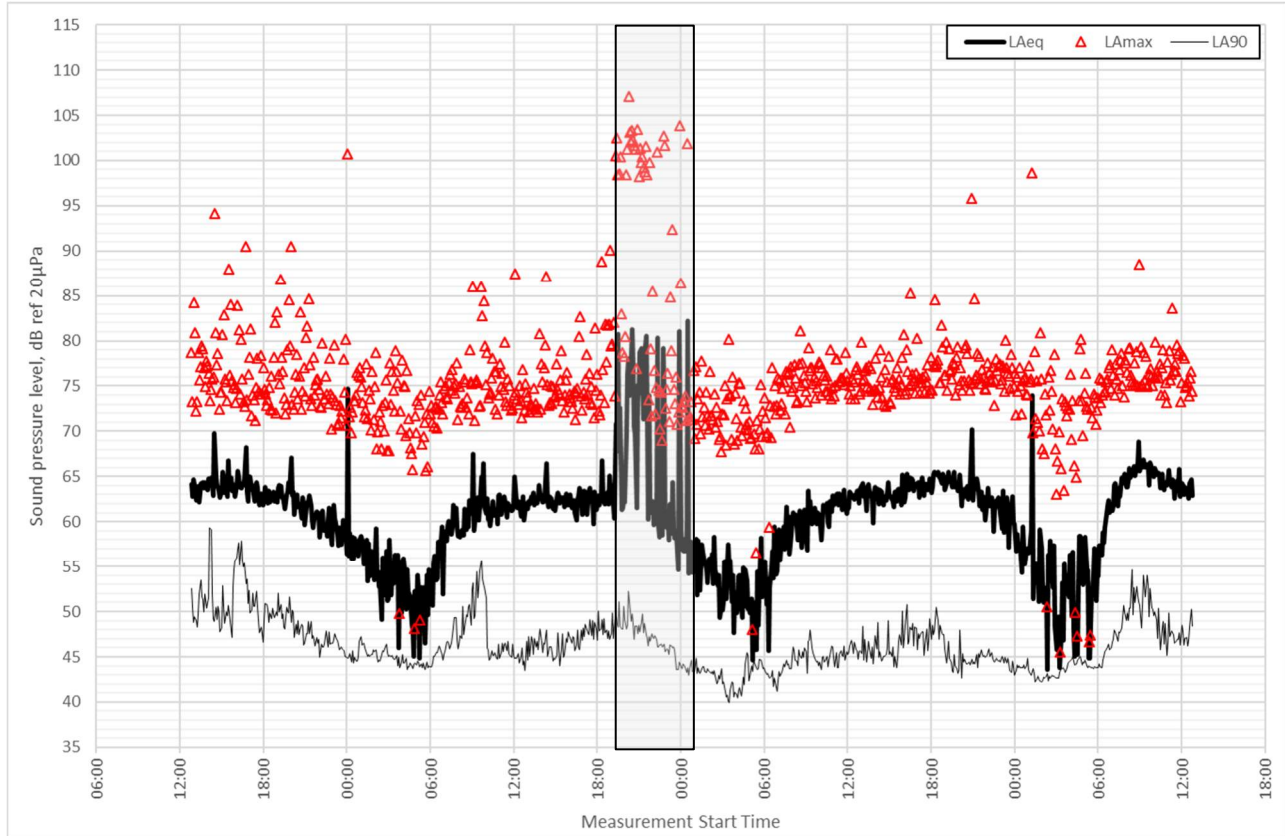
It is noted that bonfire night occurred during the monitoring survey. This is expected to impact upon the Friday and Saturday evening average and maximum noise levels but is not expected to affect the night time, early morning or daytime background sound levels.

All measurements were made with calibrated, precision grade sound level meters in accordance with BS EN 60651 and BS 7445:1993. Details of the equipment used are provided in Appendix 5 – List of Measurement Equipment. All equipment was calibration-checked before and after the survey with no significant drift observed.

6. Results.

The results of all diurnal site measurements are tabulated in Appendix 2. Levels are shown as hourly values derived from the measured 15-minute sample results.

The measured levels are shown graphically below.



As noted in Section 5, bonfire night occurred during the monitoring period and noise levels from fireworks in the vicinity influenced the measured noise levels during the evening as indicated in the area shaded grey.

The following table summarises the average sound levels at the measurement position.

Period	LAeq, dB	LAmx, dB	LA90, dB
Friday (12:50 – 23:00)	63.0	79 – 94	46.5
Friday night	58.4	74 – 101	44.1
Saturday *	69.1	78 – 107	45.0
Saturday night *	65.3	75 – 104	41.2
Sunday	62.9	77 – 96	43.7
Sunday night	58.9	74 – 99	42.8
Monday (07:00 – 12:50)	64.7	78 – 89	47.3

[*] Artificially high levels as a result of fireworks

The mean daytime ambient noise level was LAeq,16hr 66.1dB.

The mean night time ambient noise level was $L_{Aeq,8hr}$ 62.1dB.

With the periods above affected by firework noise removed from the dataset, the mean daytime ambient noise level reduced to $L_{Aeq,16hr}$ 63.0dB whilst the mean night time ambient noise level reduced to a level of $L_{Aeq,8hr}$ 57.8dB.

The lowest typical background noise level was $L_{A90,1hour}$ 45dB during the day and $L_{A90,15-min}$ 44dB during the night.

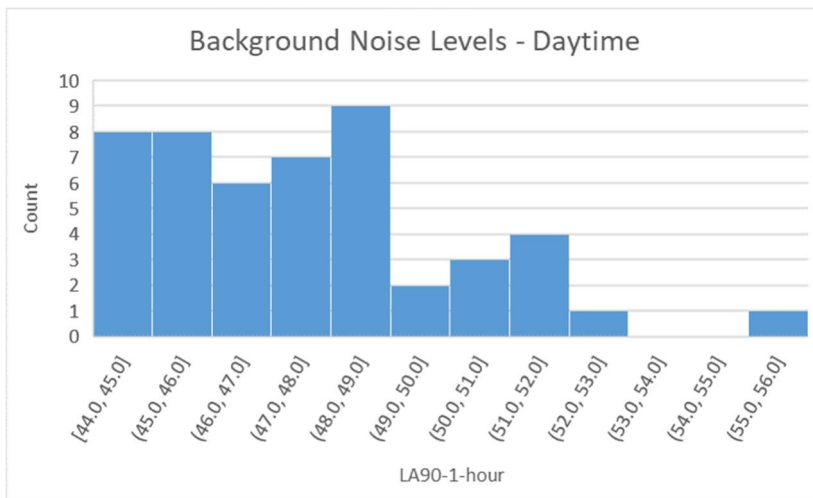
7. Calculations.

7.1 Background Noise Levels.

An appropriate background sound level for the nearest dwellings has been determined based upon the guidance provided in Section 8 of BS4142 which states that *'the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during a particular time period'*.

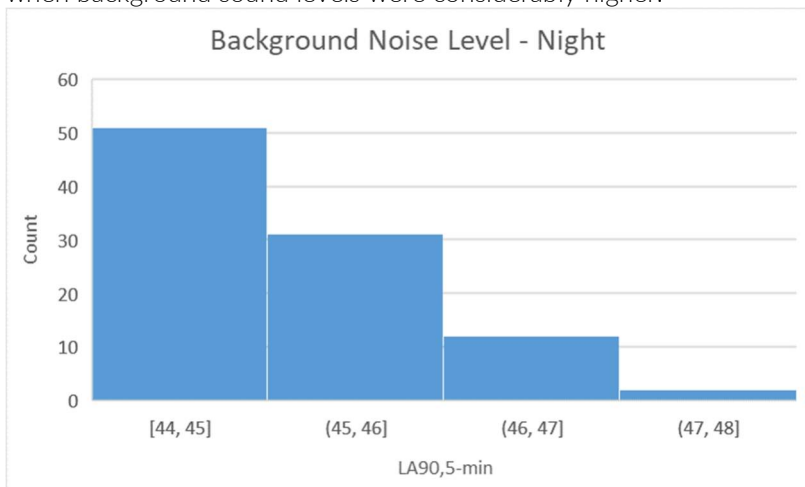
Daytime

The histogram below shows the result of statistical analysis of the results of the daytime (07:00 – 23:00) at position L1 in order to determine an appropriate background sound level at the nearest dwellings. For this distribution of the data, LA90(1-hour) of 44dB was considered to be representative, although there were periods when background sound levels were considerably higher.



Night time

The histogram below shows the result of statistical analysis of the results of the night time (23:00 – 07:00) at position L1 in order to determine an appropriate background sound level at the nearest dwellings. For this distribution of the data, LA90(15-min) of 44dB was considered to be representative, although there were periods when background sound levels were considerably higher.



7.2 Noise Break-out from the Warehouse Buildings.

Sound transfer to outside from activity within the buildings will be determined by the sound reduction provided by the building fabric and by the distance between the building and the receptor. The nearest dwellings on Makkah Drive are approximately 25m from the north eastern elevation of Unit 4. Similarly, the nearest dwellings on Staplehurst Road are 25 metres from the northeastern elevation of Unit 5.

All other units are set further back from the boundary and so will benefit from significantly greater distance attenuation along with screening provided by units 4 and 5. Dwellings to the north west off Bower Street will be much further away at approximately 110m from Unit 4.

It is understood that the main building fabric will be constructed from steel frame with an outer cladding. As a worst case, it is assumed that the outer cladding will be composite thermal panels with a minimum manufacturer's rated sound reduction of R_w 27/mean 25dB(A).

Measurement exercises carried out in several large manufacturing workshops indicate reasonably consistent levels in the range L_{Aeq} 75-77dB with an overall mean level of $L_{Aeq,1hr}$ 76dB and highest maximum levels in the range L_{Amax} 90-95dB. These levels are quite loud and would require shouted conversation for communication between two individuals 1m apart. For warehouse operations, a recent measurement exercise within an existing warehouse facility indicated that, over a one hour period in an active section of the warehouse, typical sound levels were in the range $L_{Aeq,5-min}$ 50-64dB with an overall mean level of $L_{Aeq, 1-hour}$ 59dB. Short duration maximum levels were in the range L_{Amax} 80-82dB.

The assessment below has been based on the higher manufacturing sound levels. On this basis, the break-out sound level just outside the building, from standard theory, would be approximately L_{Aeq} 45dB.

For positions at a significant distance from the proposed building, there will be additional distance attenuation and an accepted method of determining noise breakout is as follows:

$$spl_{ext} = spl_{int} - TL - 20\log r + 10\log s - 14dB \quad \text{where } r \text{ is the distance and } s \text{ is wall area}$$

The predicted break-out sound levels are as follows:

	Makkah Close & Staplehurst Road
spl_{int}	76dB(A)
-TL	-25
-20logr	-28.0 (25m)
+10logs	27.5 (560m ²)
-14	-14
spl_{ext}	36.5 dB(A)

Assessment of the calculated immission levels in accordance with BS 4142 is shown below

	Makkah Close & Staplehurst Road	
	Day	Night
spl_{ext}	37	37
Character correction (intermittent)	+3	+3
Rating level at nearest dwelling	40	40
Typical lowest night time background $L_{A90, T}$	44	44
Difference	-4	-4
BS4142 Assessment- impact	'low impact'	'low impact'

At the nearest sensitive dwellings on Makkah Close and Staplehurst Road, the assessment indicates a BS 4142 condition of 'low impact' during both the day and night.

It is noted that the assessment indicates that a significantly higher internal operational sound level would still achieve a condition of 'low impact' at the nearest dwellings.

7.3 HGV Impact.

Based upon the current proposed site layout shown in Appendix 1, vehicles will enter the site from the south west from Grimshaw Lane. The layout indicates that none of the service yards will be visible from the nearest dwellings on Makkah Close or Staplehurst Road due to the screening effect of Units 4 and 5. However, dwellings on Bower Street to the north west at a similar distance will have a line of sight to the service yard of Units 3 and 4.

An assessment of the noise from HGV movements at the development on the Bower Street dwellings has been based upon the following assumptions:

- 1 movement per loading bay per hour during the daytime (Units 6 and 7 only, total 18 bays)
- 1 movements per unit in any 15 period during the night (2 movements)
- The approximate maximum vehicle traverse distance for unit 7 is 70m which would take approximately 16 seconds at 10mph.
- HGV reversing time of 11 seconds based upon a reversing distance of 25m at a speed of 5mph
- Source noise data from HLA archived measurements
- Point source attenuation

7.3.1 HGV Movements

Parameter	Units 3 and 4	
	Day	Night
Archive HGV noise level ($L_{Aeq,T}$ at 2m)	75.1	75.1
On time correction (<i>16 + 11 seconds</i>)	-21.2	-15.2
Specific Noise Level – $L_{Aeq,T}$ dB	53.9	59.9
movements in assessment period (dB)	+12.5 (18)	+3.0 (2)
Distance Attenuation	-40.4 (210m)	-40.4 (210m)
Level at Dwelling - L_{Aeq}	26	22.5

7.3.2 HGV Reversing Alarms

Manufacturer's data indicates that, for tonal alarms, the most common rating level is SWL 96-98dB. For the purposes of the assessment, the common tonal noise alarm has been assumed with each alarm having a 1-second on/off cycle.

HGV Reversing Alarms Parameter	Units 3 and 4	
	Day	Night
SWL	98dB	98dB
Alarm noise level (L_{Aeq} at 1m)	87	87
On time correction (<i>11 seconds</i>)	-25.1	-19.1
Specific Noise Level – $L_{Aeq,T}$ dB	61.9	67.9
movements per assessment period (dB)	+12.5 (18)	+3.0 (2)
Distance Attenuation	-46.4 (210m)	-46.4 (210m)
Level at Dwelling - L_{Aeq}	28	24.5

7.3.3 BS4142 Assessment.

From the above, the BS 4142 assessment for vehicle movements at the nearest dwellings to the north can be calculated as follows:

	Units 3 and 4			
	Day		Night	
	HGV	Alarm	HGV	Alarm
spl L_{Aeq}	26	28	22.5	24.5
correction (intermittent +3, tonal +2)	+3	+5	+3	+5
Rating Level at dwelling - L_{Aeq}	29	33	25.5	29.5
Total Rating level	34.5		31	
Typical lowest background	44		44	
Difference	-9.5		-13.0	
BS4142 Assessment	'low impact'		'low impact'	

7.4 Mechanical Services plant.

Mechanical services installations associated with the development are not yet known and, consequently, BS 4142 assessment cannot be carried out. However, noise limit criteria for the development can be determined from the measured background sound levels and the guidance in BS 4142.

The maximum allowable total cumulative plant noise level associated with the development can be determined in accordance with BS4142 and based upon a Rating Level no greater than the background sound level. This is equivalent to a BS 4142 assessment of 'low impact'.

The typical lowest L_{A90} values measured during the survey have been used as the basis of the assessment.

The total cumulative plant noise limits are derived as follows:

Parameter	Day	Night
Lowest typical L_{A90} level (1-hour day, 15-min night)	44	44
Noise character correction (BS4142 Annex 1)	-3	-3
Plant noise limit level at any dwelling - L_{Aeq}	41	41

The above limit criteria are the cumulative levels for all plant operating at rated output.

Noise control measures may be required to achieve these levels and it will be necessary to review plant selections and locations during the construction phase.

8. Discussion.

8.1 Existing Noise Climate.

The general ambient noise climate across the site is attributable to traffic flows on Grimshaw Lane, Ten Acres Lane and other roads in the vicinity of the site. Background levels at the site are determined by surrounding commercial premises and the A6010 to the west and A62 to the north. It is expected that these larger roads would be more noticeable during evening, night time and at weekends.

The majority of noise from the roads is attributable to tyre 'roar' which has a characteristic mid-frequency tonal peak whilst noise from the railway during train pass-by has similar characteristics.

Traffic levels on the surrounding roads were moderate throughout the survey period and were mainly composed of car movements with but with intermittent HGV movements associated with other commercial and industrial units in the local vicinity.

8.2 BS8233 Assessment.

British Standard BS 8233:2014 provides guidance on acceptable sound levels in and around dwellings and it would be expected that the new development should not give rise to noise levels that exceed the target criteria in the standard.

BS 8233 advises internal noise level of L_{Aeq} 35dB daytime and L_{Aeq} 30dB night time. It must be assumed that windows may be open for ventilation and BS 8233 advises that an open window provides a sound reduction of 15dB. From this information, it may be extrapolated that external levels should not exceed L_{Aeq} 50dB daytime and L_{Aeq} 45dB night time.

The highest calculated immission level for break-out from the warehouse units is L_{Aeq} 37dB at the nearest dwellings to the north east. The calculated levels would enable the BS 8233 internal criteria to be readily achieved with open windows.

The calculated levels for HGV activity within the service yard incident at dwellings to the west are below L_{Aeq} 30dB for both the daytime and night time. These levels would readily achieve the BS8233 internal criteria when windows are open.

In the case of gardens at dwellings to the west, immission levels during daytime are significantly below the BS 8233 preferred limit level of L_{Aeq} 50dB.

8.3 BS4142 Assessment.

In the case of noise breakout from the warehouse buildings, the calculations indicate that immission levels would achieve a BS 4142 condition of 'low impact' at all times.

It is noted that the assessment is based upon internal operational noise levels typical of engineering/manufacturing use and for warehouse type use, break-out sound levels will be significantly lower than indicated by the assessment. Noise break-out at the operational levels assumed is unlikely to be of significance due to the masking effect of general ambient noise.

The calculations shown in Section 7 indicate that all vehicle related activity on the service yards at the proposed new development would achieve a BS 4142 condition of 'low impact' at the nearest dwellings at all times of the day and night.

In the case of noise from vehicle movement, it is noted that vehicle movement is not a continuous operation and that there will be no noise from this source for the majority of the day.

For vehicle reversing alarms, the assessment indicates that night time use falls within the category of 'low impact' at all times. Given the infrequent and short duration of this noise, it is considered that impact upon the dwellings would be negligible.

Section 7 derives plant noise limit levels for the development which would enable a BS 4142 condition of 'low impact' to be achieved at all nearby dwellings at all times.

It is noted that the proposed development does not represent the introduction of new noise sources to this site and noise from plant, HGV movements and loading and unloading activities previously occurred at the development site.

9. Recommendations.

It is recommended that all fixed mechanical services plant associated with the new development be selected and specified to achieve the noise limit criteria derived at Section 7.5 of this report. It will be necessary to review plant selections and locations during the construction phase to ensure compliance with the criteria.

10. Conclusions.

Assessment carried out for this report indicates that the noise climate in the vicinity of the proposed development site is mostly attributable to road traffic noise in the local area. It is considered that this noise will determine background sound levels at existing dwellings nearest to the development site.

Assessment of activity noise levels for the proposed development indicates that the BS 8233 daytime and night time internal and external criteria for new dwellings would readily be achieved at the nearest residential properties. BS 8233 internal criteria would be achieved with open windows at the nearest dwellings.

Assessment of activity noise levels in accordance with BS 4142 indicates that noise from the proposed development would achieve a condition of 'low impact' at the nearest existing residential properties at all times and would be unlikely to give rise to noise disturbance.

It is noted that the predicted noise levels at the dwellings from the proposed development are significantly below the existing ambient and background noise climate and, consequently, are unlikely to be noticeable.

It will be necessary to implement noise limit criteria for any plant installations associated with the proposed new development in order to prevent disturbance at the nearest residential properties. Limit criteria in this respect have been determined in accordance with BS 4142:2014.

It is noted that the proposed development does not represent the introduction of new noise sources to this site and noise from plant, HGV movements and loading and unloading activities have all previously occurred at the development site.

Appendix 2 – Measured Sound Pressure Levels.

Position L1

Date	Day	From:	To:	Leq,1hr	Lmax,1hr	L10,1hr	L90,1hr
06/11/2020	Friday	12:00	12:59	55.7	78.7	67.8	51.6
		13:00	13:59	63.8	84.2	68.1	50.5
		14:00	14:59	64.9	94.1	68.1	51.6
		15:00	15:59	64.3	88.0	68.0	50.3
		16:00	16:59	64.6	90.5	67.6	55.3
		17:00	17:59	63.5	81.3	67.6	50.1
		18:00	18:59	62.8	82.0	67.3	49.6
		19:00	19:59	63.2	86.8	67.5	50.0
		20:00	20:59	62.9	90.5	66.8	48.3
		21:00	21:59	61.2	84.7	65.8	47.3
		22:00	22:59	59.8	79.7	64.2	46.5
		23:00	23:59	59.5	80.2	63.7	46.3
07/11/2020	Saturday	00:00	00:59	64.7	100.7	59.8	45.0
		01:00	01:59	56.4	77.5	56.2	45.8
		02:00	02:59	54.6	78.7	52.7	45.4
		03:00	03:59	54.3	78.9	49.5	44.7
		04:00	04:59	52.8	77.9	48.1	44.2
		05:00	05:59	51.7	74.4	47.9	44.1
		06:00	06:59	55.7	75.5	53.6	45.1
		07:00	07:59	59.8	77.6	63.7	47.0
		08:00	08:59	60.0	79.0	63.8	48.5
		09:00	09:59	63.4	86.0	66.7	52.7
		10:00	10:59	61.2	78.7	66.2	45.8
		11:00	11:59	61.8	79.8	66.9	45.8
		12:00	12:59	62.1	87.5	66.6	45.0
		13:00	13:59	62.6	80.8	67.4	46.4
		14:00	14:59	62.8	87.2	67.3	45.9
		15:00	15:59	62.5	78.9	67.3	46.1

Date	Day	From:	To:	Leq,1hr	Lmax,1hr	L10,1hr	L90,1hr
		16:00	16:59	62.2	82.7	66.8	46.8
		17:00	17:59	62.4	81.4	67.0	48.0
		18:00	18:59	63.3	90.1	67.0	48.0
		19:00	19:59	71.7	102.5	68.2	48.8
		20:00	20:59	75.7	107.1	69.2	49.0
		21:00	21:59	75.8	101.6	67.5	47.8
		22:00	22:59	72.7	102.7	66.5	46.5
		23:00	23:59	70.6	103.9	63.1	45.2
08/11/2020	Sunday	00:00	00:59	71.5	101.9	61.0	43.8
		01:00	01:59	55.8	77.8	56.0	43.6
		02:00	02:59	54.7	76.6	53.7	43.0
		03:00	03:59	53.9	80.2	49.4	41.2
		04:00	04:59	52.4	75.4	47.4	42.4
		05:00	05:59	52.2	75.2	49.6	44.0
		06:00	06:59	54.9	77.0	53.1	42.7
		07:00	07:59	58.7	77.1	60.8	43.7
		08:00	08:59	60.1	81.1	63.2	45.2
		09:00	09:59	60.7	79.2	64.3	45.4
		10:00	10:59	61.1	79.0	65.2	44.8
		11:00	11:59	62.3	78.7	67.2	45.0
		12:00	12:59	62.8	77.1	67.9	45.8
		13:00	13:59	63.1	79.8	68.1	45.7
		14:00	14:59	63.0	79.0	67.9	46.0
		15:00	15:59	63.0	78.2	67.8	45.9
		16:00	16:59	64.1	85.3	68.9	47.8
		17:00	17:59	64.0	80.3	69.0	47.1
		18:00	18:59	64.9	84.5	69.9	48.2
		19:00	19:59	64.4	79.8	69.5	44.5
		20:00	20:59	64.6	95.8	68.6	44.5
		21:00	21:59	62.9	84.7	67.7	44.9

Date	Day	From:	To:	Leq,1hr	Lmax,1hr	L10,1hr	L90,1hr
		22:00	22:59	62.1	78.0	66.8	45.0
		23:00	23:59	61.0	80.1	64.2	44.3
09/11/2020	Monday	00:00	00:59	57.5	77.0	56.4	43.9
		01:00	01:59	63.9	98.6	52.6	42.9
		02:00	02:59	54.2	78.5	48.8	42.8
		03:00	03:59	51.2	73.6	46.7	43.5
		04:00	04:59	54.5	80.2	49.7	44.6
		05:00	05:59	54.1	76.4	49.5	44.0
		06:00	06:59	59.7	77.3	61.1	45.1
		07:00	07:59	63.7	79.0	68.4	48.1
		08:00	08:59	65.7	88.5	69.6	51.0
		09:00	09:59	66.0	79.3	70.2	51.5
		10:00	10:59	64.8	79.9	69.2	48.1
		11:00	11:59	64.4	83.6	69.1	47.3
		12:00	12:59	62.9	78.4	68.5	47.7

Appendix 3 – Glossary of Terms.

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm's are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB(A).

$L_{Aeq,T}$

The A-Weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

$L_{A90,T}$

The A-Weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

L_{Amax}

The highest A-Weighted noise level recorded during a noise event.

Appendix 4 – List of measurement equipment.

Measurements

Rion type NL-28 Sound Level Meter	S/N 01260202
Rion type NH-23 pre-amplifier	S/N 60105
Rion type UC-59 Microphone	S/N 282

Additional Equipment

Rion Type NC-74 Calibrator	S/N 34172706
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The above equipment fulfils IEC 61672 Class 1 and is traceable to calibration under BS7580:Part 1:1997.

The equipment was calibration-checked before and after measurement – no adverse deviation was observed.



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