



NOISE IMPACT ASSESSMENT

WING FAT, ASHTON OLD ROAD, MANCHESTER

REC REFERENCE: AC106983-1R0

REPORT PREPARED FOR: GOLDEN HORSE LIMITED

DATE: 26TH FEBRUARY 2019



National Consultancy, Locally Delivered

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EXECUTIVE SUMMARY

Noise Survey

A full weekday and weekend Background Sound Survey have been completed in a position considered representative of the existing receptors in the immediate vicinity of the Site.

Noise Impact Assessment

The Noise Assessment has identified that the key noise sources associated with the development will be HGV movements, unloading/loading operations within the service area and fixed plant items. Accordingly, REC has made reasonable assumptions in order to undertake a BS4142:2014 assessment for the proposed operations. As details of fixed plant items are unknown at this stage, REC have set plant noise emission limits for all proposed fixed plant items associated with the development.

Given the road traffic dominated noise environment, only an assessment of maximum noise levels due to car door shutting has been undertaken for the car parks as general car movements would be negligible given the existing noise climate.

This Noise Assessment has shown, through reasonable assumptions that no mitigation measures would be required based on approximately 2 HGVs per hour during the daytime.

The assessment has also shown that the existing offices, to the east of the Site will benefit from suitable internal noise levels without the need for mitigation measures.

With no mitigation in place, the No Observed Adverse Effect Level (NOAEL) is achieved for the current masterplan, perceived as 'noticeable and not intrusive', for all existing external and internal areas resulting in the following observation:

"Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life."





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1. INTRODUCTION

Resource and Environmental Consultants (REC) Limited have been commissioned by Golden Horse Limited to undertake a Noise Impact Assessment in order to support a planning application for a Wing Fat Cash and Carry Site on land off Ashton Old Road in Manchester, to be referred to hereafter as '*the Site*'.

This assessment has been undertaken to identify key noise sources associated with the development upon existing noise-sensitive receptors in the vicinity of the Site.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

1.1 Site Location and Proposed Development

The site is bound by Ashton Old Road to the north, Stainforth Street to the east, Gorton Road to the south and Gable Street to the west. The Site is located in a mixed-use area with industrial/commercial use to the south of Ashton Old Road and residential use to the north of Ashton Old Road.

The development proposals are for a new Wing Fat Cash and Carry Warehouse with associated High Racking, Shop Floor, Plant/Storage, Office, Bakery, Freezer and associated car parking for customers and staff.

This assessment has been undertaken with due regard to the supplied Site plan shown on the following planning drawing:

- ▶ Proposed Ground Floor (Drawing number. 810_200C) dated 7th September 2018 and produced by Cartwright & Gross Limited.

The Proposed Ground Floor is shown in Figure 1 of Appendix III.

1.2 Limitations

Where a noise survey is required to inform the assessment, REC will endeavour to ensure that all noise measurements taken are robust, representative and reliable in order to inform an accurate noise impact assessment.

Where mitigation measures are specified in our report, it should be noted that these measures are relative to a specific sound source, both in terms of the measured sound pressure level and the character of the source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, REC cannot be held responsible for any subsequent variations in the proposed mitigation performance.

Further limitations of this report are presented in Appendix I.

1.3 Confidentiality

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party





wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.





2. ASSESSMENT METHODOLOGY

2.1 National Planning Practice Guidance

Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Local planning authorities' plan-making and decision making should take account of the acoustic environment and in doing so consider:

- ▶ 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 the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

The Observed Effect Levels are as follows:

- ▶ Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- ▶ Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- ▶ No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 1 summarises the noise exposure hierarchy, based on the likely average response.

Table 1 Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			





Perception	Examples of Outcomes	Increasing Effect Level	Action
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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 the 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 Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.

These factors include:

- ▶ The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- ▶ For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- ▶ the spectral content of the noise and the general character of the noise. The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.

More specific factors to consider when relevant:

- ▶ where applicable, the cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration;
- ▶ consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations.



- ▶ If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.2 Manchester City Council (2015) 'Planning & Noise Technical Guidance'

Industrial / commercial developments

BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises. 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.

Deliveries and collections are usually controlled by restricting operational hours but depending on the extent of these activities, a Noise Management Plan (NMP) may be requested, which would include an assessment of noise. This would usually involve assessing the noise upon arrival, loading/unloading period and then departure.

The NMP may also need to include controls such as acoustically sealed delivery bays, and restrictions on vehicle mounted refrigeration units and audible alarm systems. Where applicable, the noise assessment will take account of multiple noise sources operating simultaneously and the state cumulative level of these.

2.3 British Standard BS8233: 2014: Guidance on sound Insulation and Noise Reduction for Buildings

Noise Criteria Limits

The scope of this standard is the provision of recommendations for the control of noise in and around





buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including dwellings, as shown in Table 2:

Table 2 BS8233 Recommended Internal Noise Levels

Criterion	Typical Situation	Design $L_{Aeq, T}$ (dB)
Suitable resting/ sleeping conditions	Living Room	35
	Bedroom	30
For a Reasonable standard in bedrooms at night, individual noise events (measured with fast time weighting) should not exceed 45dB L_{max}		

2.4 BS4142: 2014 'Methods for rating and assessing industrial and commercial sound'

This standard describes methods for rating and assessing sound of an industrial 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 processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted noise level 'the specific noise level' from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.'

The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- ▶ Daytime (07:00 – 23:00) 1 hour; and
- ▶ Night-time (23:00 – 07:00) 15 minutes.

There are a number of 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows. These penalties vary in their weighting depending upon the severity of the acoustic feature, as follows:

Tonality

- ▶ +2dB: where the tonality is just perceptible;





- ▶ +4dB: where the tonality is clearly perceptible; and
- ▶ +6dB: where the tonality is highly perceptible.

Impulsivity

- ▶ +3dB: where the impulsivity is just perceptible;
- ▶ +6dB: where the impulsivity is clearly perceptible; and
- ▶ +9dB: where the impulsivity is highly perceptible.

Intermittency

- ▶ +3dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment.

BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

Assessment of the rating level relative to the background noise level can yield the following commentary:

- ▶ Typically the greater this difference (between the rating level and the background sound level), the greater the magnitude of impact;
- ▶ A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- ▶ A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- ▶ The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an 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.

With the above in mind, it is common that a LPA will specify their own criteria for the rating level relative to the background sound level and, where this is the case, this criteria usually takes precedence over a simple comparison of the rating level against the background sound level.





3. NOISE SURVEYS

3.1 Background Sound Survey

REC has conducted a full weekday and weekend Background Sound Survey in a position considered representative of the closest residential receptors to the north of the Site. The survey was carried out during the following time period:

- ▶ 12:00 Friday 22nd February to 10:00 Monday 25th February 2019.

The following location was chosen for the survey:

- ▶ Noise Measurement Position 1 (NMP1): Located on the northern Site Boundary approximately 10m from the nearside kerbstone of Ashton Old Road. The microphone of the sound level meter was located within 3m of existing shipping containers and so is regarded as façade conditions. The microphone was located at a height of 1.5m above local ground level. Sound sources at this location were dominated by road traffic sound along Ashton Old Road and surrounding local roads.

A summary of the median measured 1-hour daytime and 15 minute night-time background sound pressure levels are presented in Table 3 below. A full tabulated representation is shown in Table A3 of Appendix IV. A correction of 3dB has been applied to account for the measured levels being in façade conditions and converted to free-field.

Table 3 Median Measured Background Sound Pressure Levels

Date	Period	Median Measured Sound Pressure Level, Free-field (dB) L _{A90,T}
Friday 22 nd February 2019	Daytime (12:00 – 23:00)	51.4
	Night-time (23:00 – 07:00)	48.9
Saturday 23 rd February 2019	Daytime (07:00 – 23:00)	49.0
	Night-time (23:00 – 07:00)	48.1
Sunday 24 th February 2019	Daytime (07:00 – 23:00)	49.3
	Night-time (23:00 – 07:00)	49.3
Monday 25 th February 2019	Daytime (07:00 – 10:00)	53.3

During the survey, the weather conditions were calm and dry.

The following equipment was used for the Noise Survey.





Table 4 Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
NMP1	Sound Level Meter	01dB-Metravib Fusion	11832	27 th November 2020
	Pre-amplifier	GRAS 40CE	Internal	
	Microphone	01dB-Metravib	331198	
	Calibrator	01dB-Metravib CAL-31	84915	8 th February 2020

The sound level meter was field-calibrated on Site prior to and after noise measurements were taken. No significant drift was witnessed. Calibration certificates are available upon request.

3.2 Source Noise Survey

REC has previously conducted a source noise survey at an existing supermarket where HGV deliveries take place. Measurements were taken close to the sources to minimise any extraneous noise further.

A summary of the measured sound pressure levels are presented in Table 5.

Table 5 Summary of Source Noise Levels

Activity	Measured Noise Level, $L_{Aeq,T}$ (dB)	Measurement Duration (seconds)	Measurement Distance (m)
HGV movement including reversing	62.6	94	8
Empty cage trolleys moving	64.1	883	10
Trolleys taken inside and unloaded	59.4	3600	8





4. NOISE IMPACT ASSESSMENT

4.1 HGV Movements and Unloading/Loading

This assessment has used the measured noise levels from the source survey of HGV operations to predict the noise level impact on the existing closest residential dwellings during the daytime and night-time periods.

With regard to assumptions for the assessment, the following has been considered:

- ▶ In order to inform a worst-case assessment, 2 HGVs in any given one-hour period during the day is assumed;
- ▶ The daytime period has been assessed between the hours of 07:00 to 23:00. For the assessment, BS4142:2014 has been used to determine the likelihood of adverse impact within the closest balconies over a reference time period of 1 hour;
- ▶ The night-time period has been assessed between the hours of 23:00 and 07:00 for a reference time period of 15 minutes for fixed plant items only;
- ▶ The measured on-time periods have been corrected to account for the hourly and 15 minute assessment periods given in BS4142:2014; and
- ▶ Distance correction has been applied by way of a 6dB reduction per doubling of distance for a point source.

For the BS4142:2014 assessments, penalties are applied to the specific sound level in order to provide the rating level. These penalties relate to the acoustic features of the sound source. Accordingly, the following subjective features have been accounted for in the assessment, in accordance with the subjective method detailed in BS4142:2014, for the units as a whole operation.

Table 6 Acoustic Penalties

Source	Penalty	Applicable?	Attributable Penalty	Comment
Cash and Carry with HGV Activity	Tonality	No	-	It is assumed that white noise reverse alarms would be used with tones not being perceptible over the dominant road traffic
	Impulsivity	Yes	3dB	Just perceptible impulsivity is expected due to use of trolleys and/or dropping of pallets, etc
	Intermittency	No	-	Intermittent HGV movements are not likely to be discernible over road traffic sound
	Other Sound Characteristics	No	-	Other Penalties applied

4.1.1 BS4142 Assessment - Daytime

Table 7 details the resultant specific noise level at the closest receptors to the immediate north.





Table 7 Calculation of Specific Noise Level at Receptor

Source	Measured Sound Pressure Level, $L_{Aeq,T}$ (dB)	Measured On-time (seconds)	Measurement Distance (m)	Distance to Receptor (m)	Line of Sight Removal (dB)	Calculated Specific Sound Level, $L_{Aeq,1hr}$ (dB)
HGV x 2	62.6	94	8	63	-10	21.8
Empty Cage Trolleys	64.1	883	10	63	-10	35.0
Trolleys Inside	59.4	3600	8	46	-10	34.2

Table 8 below calculates the combined rating level and compares this to the lowest measured daytime median background sound level over the entire measurement period.

Table 8 Calculation of Rating Level and Comparison with Background Sound Level

Combined Specific Sound Level, $L_{Aeq,1hr}$ (dB)	Acoustic Penalties (dB)	Calculated Rating Level, $L_{A,r}$ (dB)	Background Sound Level, $L_{A90,1hr}$ (dB)	MCC Criterion, $L_{A,r} = L_{A90} - 5dB$	Difference +/- (dB)
38	+3	41	49	44	-3

Table 8 indicates that the predicted rating level falls below MCCs criterion.

BS4142 states that:

“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. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.”

Accordingly, no mitigation measures would be required based on the above worst-case assumptions.

4.2 Car Park Usage

4.2.1 Maximum Noise Level Assessment

There is the potential for impact due to the maximum instantaneous noise level due to car doors shutting between 23:00 and 07:00, depending on shift patterns and opening times.

Accordingly, a level of 92dB $L_{Amax,fast}$ at 1m has been used to inform the assessment. It is assumed that the car door shutting will take place on the closest car park spaces to Ashton Old Road to the receptor. This assessment has calculated the resulting maximum sound pressure levels for the existing receptors closest to the car park.

Table 9 below details the calculation of the maximum noise level at the receptor.





Table 9 Calculation of Maximum Noise Level at First Floor Window

Receptor	$L_{Amax,fast}$ at 1m (dB)	Distance to Closest First Floor Window (m)	$L_{Amax,fast}$ at First Floor Window (dB)	Criteria (dB)	Difference +/- (dB)
Ashton Old Road	92	38	60	60	0

Table 9 indicates that the internal maximum noise level in the closest bedrooms would not exceed the criteria. Accordingly, no mitigation measures are required.

4.3 Plant Noise Emission Limits

At this stage, exact plant items for the proposed development are unknown, furthermore it is unknown whether the plant will be externally mounted. Therefore, REC have set plant noise emission limits for any proposed fixed plant items. The following criteria has been used in accordance with the requirements of MCC:

▶ $L_{Ar} = L_{A90} - 5dB$

This corresponds with the following advice:

“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. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.”

This indicates that the Rating Level, from any single or combined plant items, shall not exceed the existing background sound level, when measured or calculated at the façade of the closest existing and proposed residential receptors. With regards applying the feature penalties given in BS4142:2014, in our opinion the fixed plant items, such as, air conditioning units and extractor fans will have a tonal aspect to them. Therefore, a penalty of 4dB should be accounted for as the tones would be clearly perceptible but due to dominance of road traffic across the site, the tones should not be highly perceptible. However, the actual penalty will depend on the plant items used.

The proposed operating periods for the plant had not been finalised at the time of producing this assessment, however it is assumed the plant items will run 24/7 in order to serve the Freezers, as such Table 10 details the calculated plant noise emission limit based on the typical measured 1-hour background sound level for the daytime and 15 minute background sound level for the night-time period, in accordance with BS4142:2014. The typical levels have been taken as the lowest median levels over the entire survey period. The limits are considered cumulative and should be measured/predicted at the receptor based on all fixed plant across the development.





Table 10 Plant Noise Emission Limits

Receptor	Assessment Period	Lowest Measured Median Background Sound Level, $L_{A90,T}$ (dB)	BS4142:2014 Criteria (dB)	Specific Noise Level at the Receptor, $L_{Aeq,T}$ (dB)	Derived Rating Level, $L_{A,r}$ (dB)
NMP1 – Ashton Old Road	Daytime (07:00 – 23:00)	49	$L_{A,r} = L_{A90} - 5\text{dB}$	40	44
	Night-time (23:00 – 07:00)	48		39	43

4.4 Existing Office Space

For the basis of this assessment, the upper criteria level of 40dB given in BS8233:2014 has been used given the locality of the Site. The assessment used in 4.1 has been used for the basis but corrected to the offices located to the immediate east of the Site.

Table 11 Comparison of Predicted Daytime Noise Levels with Criteria for Offices

Receptors	Distance to HGV Deliveries	Predicted Sound Pressure Level, $L_{Aeq,1hr}$ (dB)	Internal Noise Level with Partially Open Window (dB)	Difference with Criteria, +/- (dB)
Office Space – Kay Street	34	52	37	-3

Table 11 has determined that the existing office space on Kay Street will experience acceptable internal noise levels even with windows open.



5. CONCLUSION

REC Limited have been commissioned by Golden Horse Limited to undertake a Noise Impact Assessment for a proposed Wing Fat Cash and Carry at Ashton Old Road in Manchester.

A full weekday and weekend Background Sound Survey have been completed in a position considered representative of the existing receptors in the immediate vicinity of the Site.

The Noise Assessment has identified that the key noise sources associated with the development will be HGV movements, unloading/loading operations within the service area and fixed plant items. Accordingly, REC has made reasonable assumptions in order to undertake a BS4142:2014 assessment for the proposed operations. As details of fixed plant items are unknown at this stage, REC have set plant noise emission limits for all proposed fixed plant items associated with the development.

Given the road traffic dominated noise environment, only an assessment of maximum noise levels due to car door shutting has been undertaken for the car parks as general car movements would be negligible given the existing noise climate.

This Noise Assessment has shown, through reasonable assumptions that no mitigation measures would be required based on approximately 2 HGVs per hour during the daytime.

The assessment has also shown that the existing offices, to the east of the Site will benefit from suitable internal noise levels without the need for mitigation measures.

With no mitigation in place, the No Observed Adverse Effect Level (NOAEL) is achieved for the current masterplan, perceived as 'noticeable and not intrusive', for all existing external and internal areas resulting in the following observation:

"Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life."





Noise Impact Assessment
Wing Fat, Manchester
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AC106983-1r0

APPENDIX I LIMITATIONS





1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Limited and the Client as indicated in Section 1.2.
2. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
3. REC cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.





Noise Impact Assessment
Wing Fat, Manchester
February 2019
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APPENDIX II GLOSSARY OF ACOUSTIC TERMINOLOGY





Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A1 Typical Sound Pressure Levels

Sound Pressure Level	Location/Example
0	Threshold of hearing
20 - 30	Quiet bedroom at night
30 - 40	Living room during the day
40 - 50	Typical office
50 - 60	Inside a car
60 - 70	Typical high street
70 - 90	Inside factory
100 - 110	Burglar alarm at 1m away
110 - 130	Jet aircraft on take off
140	Threshold of pain





Acoustic Terminology

Table A2 Terminology

Descriptor	Explanation
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 ⁻⁵ Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L _{Aeq, T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L _{Amax}	L _{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L ₁₀ & L ₉₀	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L ₉₀ is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L ₁₀ index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.





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APPENDIX III FIGURES





Figure 1 – Proposed Site Layout and Noise Measurement Position





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APPENDIX IV MEASURED BACKGROUND SOUND LEVELS





Table A3 Measured Background Sound Levels at NMP1

Period Start	Measured Sound Pressure Level, $L_{Aeq,1hr}$ (dB)	Measured Background Sound Level, $L_{A90,1hr}$ (dB)
22/02/2019 12:00	64	53.6
22/02/2019 13:00	63.7	53.1
22/02/2019 14:00	64.6	54.5
22/02/2019 15:00	65.4	55.5
22/02/2019 16:00	66.3	57.7
22/02/2019 17:00	66.3	57.3
22/02/2019 18:00	64.9	55.7
22/02/2019 19:00	64.4	54.3
22/02/2019 20:00	63.6	54.4
22/02/2019 21:00	63.3	52.9
22/02/2019 22:00	63.2	53.9
22/02/2019 23:00	62.8	54.4
23/02/2019 00:00	63.9	53.9
23/02/2019 01:00	63	52.4
23/02/2019 02:00	60.6	49.9
23/02/2019 03:00	63	49.4
23/02/2019 04:00	62.5	51.4
23/02/2019 05:00	63.2	51.4
23/02/2019 06:00	64.8	53.6
23/02/2019 07:00	64.3	54.4
23/02/2019 08:00	64.5	54.4
23/02/2019 09:00	63.5	52
23/02/2019 10:00	62.9	52
23/02/2019 11:00	63.2	52.7
23/02/2019 12:00	63.9	53.1
23/02/2019 13:00	63.8	52.6





Period Start	Measured Sound Pressure Level, L _{Aeq,1hr} (dB)	Measured Background Sound Level, L _{A90,1hr} (dB)
23/02/2019 14:00	63.6	52.2
23/02/2019 15:00	63.7	50.8
23/02/2019 16:00	63.2	51.5
23/02/2019 17:00	63.7	51.9
23/02/2019 18:00	62.9	51.7
23/02/2019 19:00	62.6	51.3
23/02/2019 20:00	63.7	51.6
23/02/2019 21:00	61.8	51.1
23/02/2019 22:00	63.4	52.4
23/02/2019 23:00	62.4	52.7
24/02/2019 00:00	63.8	53.5
24/02/2019 01:00	61.8	49.3
24/02/2019 02:00	63.7	50
24/02/2019 03:00	61.1	50.9
24/02/2019 04:00	60.9	49.7
24/02/2019 05:00	61	49.3
24/02/2019 06:00	62.2	50.3
24/02/2019 07:00	63.6	52
24/02/2019 08:00	63.7	51.9
24/02/2019 09:00	64.3	51.9
24/02/2019 10:00	63.6	50.8
24/02/2019 11:00	63.7	53.3
24/02/2019 12:00	63.8	53
24/02/2019 13:00	63.5	52.5
24/02/2019 14:00	63	49.9
24/02/2019 15:00	62.5	49.4





Period Start	Measured Sound Pressure Level, L _{Aeq,1hr} (dB)	Measured Background Sound Level, L _{A90,1hr} (dB)
24/02/2019 16:00	63.1	51.7
24/02/2019 17:00	63.4	52.9
24/02/2019 18:00	64	54.2
24/02/2019 19:00	64.2	54.3
24/02/2019 20:00	63.8	53.8
24/02/2019 21:00	62.2	53
24/02/2019 22:00	62.5	51.8
24/02/2019 23:00	61.5	53.1
25/02/2019 00:00	61.7	52.4
25/02/2019 01:00	61.4	50.8
25/02/2019 02:00	60.4	48.8
25/02/2019 03:00	60	48.3
25/02/2019 04:00	61.3	52.1
25/02/2019 05:00	64	52.1
25/02/2019 06:00	66.3	57.6
25/02/2019 07:00	65.9	58.1
25/02/2019 08:00	65	56.9
25/02/2019 09:00	64.4	55.6
25/02/2019 10:00	68.4	54

