NOISE IMPACT ASSESSMENT
CRINGLE ROAD, MANCHESTER

REC REFERENCE: AC102951-1R0

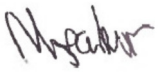
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EXECUTIVE SUMMARY

Noise Survey

A series of Noise Surveys have been completed in order to quantify the impact of road traffic and aircraft sound upon the proposed residential development.

Noise Impact Assessment

The Noise Impact Assessment has identified that the key noise sources impacting upon the development is from aircraft associated with Manchester Airport. Accordingly appropriate mitigation has been specified in order to reduce these impacts for both external and internal habitable areas.

Recommended Noise Mitigation Measures

This Noise Impact Assessment has determined the external noise levels due to aircraft sound fall below the 55dB criteria for external amenity areas.

The noise levels incident upon the facades can be controlled internally by standard glazing unit with a configuration 6mm glass/12mm air space/6mm glass. A partially open window, which provides approximately 15dB attenuation, would also be sufficient in controlling internal noise levels. The noise levels would fall below the daytime and night levels stated in BS8233:2014.

The No Observed Adverse Effect Level (NOAEL), perceived as 'noticeable and not intrusive', would be achieved for all 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."

TABLE OF CONTENTS

1. INTRODUCTION **1**

1.1 Site Location and Proposed Development 1
1.2 Limitations 1
1.3 Confidentiality 1

2. ASSESSMENT METHODOLOGY **2**

2.1 National Planning Practice Guidance 2
2.2 Local Authority Guidance and Criteria – Manchester City Council's Environmental Health Department 4
2.3 British Standard BS8233: 2014: Guidance on sound Insulation and Noise Reduction for Buildings 4

3. NOISE SURVEYS **6**

3.1 Road & Aircraft Traffic Noise Survey 6

4. NOISE IMPACT ASSESSMENT **7**

4.1 Aircraft Noise Impact Assessment 7
4.1.1 External Amenity Areas 7
4.1.2 Internal Habitable Rooms 7

5. MITIGATION **9**

6. CONCLUSION **10**

Appendix I Limitations
Appendix II Glossary of Acoustic Terminology
Appendix III Figures

1. INTRODUCTION

Resource and Environmental Consultants (REC) Limited have been commissioned by Paul Butler Associates Limited to undertake a Noise Impact Assessment for a residential development off Cringle Road, Manchester, to be referred to hereafter as '*the Site*'.

This assessment has been undertaken to identify key noise sources that may have the potential to impact upon the noise-sensitive residential receptors at 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 currently exists as Shores Fold Farm and agricultural fields. The Site is bound by Cringle Road to the south beyond which lie existing residential dwellings. Open grassland borders the north eastern and western boundaries of the Site.

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

- Cringle Road context analysis sheet, produced by GA Studio Architects Ltd.

The Layout is shown in Figure 1 of Appendix III.

1.2 Limitations

The 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 taking 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 Local Authority Guidance and Criteria – Manchester City Council's Environmental Health Department

REC have contacted Rick Knightly at Manchester City Council on Tuesday 21st February 2017 in order to agree the methodology for the noise survey and the appropriate noise criteria for this assessment which are as follows:

'We have been appointed by a developer to complete a Noise Impact Assessment for a proposed residential development at Cringle Road, Manchester. The site currently exists as Shores Fold Fam and grassland. The site is bound by Cringle Road to the south, beyond which lies existing residential dwellings. Open grassland borders the north, east and west of the site. REC will Complete a Noise Survey which includes for the following:

1. A road traffic survey for Cringle Road on the southern boundary, will be completed over a 3-hour period in line with the criteria presented in the Calculation of Road Traffic Noise; and
2. A aircraft traffic survey. A sample number of aircraft over-flights for aircraft landing at Manchester Airport will be taken.

REC will complete a Noise Impact Assessment which include for the following:

1. Road Traffic/ Aircraft Traffic Assessment: REC will assess the impact of noise from road traffic and aircraft traffic against the criteria presented in BS8233:2014. The assessment will ensure that external noise levels are as low as practicably possible and internal noise levels within habitable rooms adhere to the guidance presented in this document and, where necessary, upgraded glazing and mechanical ventilation will be specified.'

At the time of submitting this report, a reply has not been received. However, the above methodology and criteria is considered robust. Therefore REC will seek to achieve the following:

- REC will look to achieve a maximum permissible average noise level in garden areas of 55dB $L_{Aeq,16hr}$ where applicable, in accordance with BS8233;2014;
- The maximum permissible average noise level in living rooms shall not exceed 35dB $L_{Aeq,16hr}$;
- The maximum permissible average noise level in bedrooms shall not exceed 30dB $L_{Aeq,8h}$;and,
- The maximum permissible instantaneous noise level in bedroom shall not exceed 45dB $L_{Amax,fast}$ criteria.

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 evens (measured with fast time weighting) should not exceed 45dB L_{max}		

BS8233 goes on to recommend noise levels for gardens. According to BS8233;

"It is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted".

BS8233 goes on to say:

"In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited".

Ventilation Requirements

Where a partially open window cannot be relied upon to provide an adequate level of facade sound insulation performance, it is necessary to consider alternative ventilation for habitable rooms. Section 8.4.5.4 within BS8233 states:

"The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Alternatively, acoustic ventilation units (see 7.7.2 below) are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans."

Section 7.7.2 states:

"NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level."

3. NOISE SURVEYS

3.1 Road & Aircraft Traffic Noise Survey

REC has conducted an attended Road and Aircraft Traffic Noise Survey in order to measure the level of noise generated by vehicles using Cringle Road and aircraft fly overs. The survey was carried out over the following time period:

- Wednesday 16th February 2017 between 15:00 and 15:30.

The following noise measurement position was chosen for the survey:

- Noise Measurement Position 1 (NMP1): Located on the southern Site boundary, approximately 9m from the centre of the Cringle Road. The microphone was located 1.5m above the ground level and in free-field conditions. Noise sources at the location consisted distant road traffic form the surrounding road network.

Whilst on Site it was observed that the volume of traffic on Cringle Road fell below the required 50 vehicles per hour required in order to conduct the calculation of road traffic noise measurement, therefore the road has not been considered in the assessment.

During the Site visit source measurements of aircraft overflights have been undertaken, however the measurements were not readily discernible from the existing ambient noise. Therefore, noise contours produced by Manchester Airport are to be used in the Assessment.

The following equipment was used for the Noise Surveys. Calibration due dates relate to those at the time of the surveys.

Table 3 Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
NMP 1	Sound Level Meter	01dB-Metravib Fusion	10819	24th November 2018
	Pre-amplifier	GRAS 40CE	10714	
	Microphone	01dB-Metravib	217637	
	Calibrator	01dB-Metravib CAL-21	34554787	27th June 2017
Calibration Level at Start of Survey	93.8dB	01dB-Metravib Fusion	10819	24th November 2018

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.

4. NOISE IMPACT ASSESSMENT

4.1 Aircraft Noise Impact Assessment

4.1.1 External Amenity Areas

In order to assess noise levels in external amenity areas across the Site, the grid noise map produced in the Noise Action Plan 2013-2018 was used. According to BS8233:2014, "*It is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted*". Therefore, the aim was to achieve 55dB $L_{Aeq,16hr}$ in external amenity areas.

The L_{den} noise map determines that the predicted noise levels across the Site, due to aircraft sound, would fall below the 55dB meaning that the upper external noise criteria of 55dB$L_{Aeq,T}$ is not exceeded.

Without mitigation in place, the No Observed Adverse Effect Level (NOAEL) is achieved which would be noticeable and disruptive resulting in the following:

"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."

4.1.2 Internal Habitable Rooms

In order to determine the noise levels within habitable rooms, it has been necessary to calculate the external noise level immediately outside the façade. Accordingly the L_{night} noise produce in the Noise Action Plan 2013-2018 has been used in order to calculate façade noise levels due to the impact of aircraft noise.

The L_{night} noise map determines that the predicted night-time noise levels across the Site, due to aircraft sound would fall below 48dB.

With regards to internal noise levels, BS8233:2014 suggest that a glazing unit with configuration 6mm glass/12mm air space/6mm glass affords insulation performance in the order of 33dB however and so this value has been used to calculate internal noise levels. It also goes on to recommend that a partially open window provides approximately 15dB attenuation.

With standard specification glazing the internal noise levels will fall below the 30dB for bedrooms and 35dB for livingrooms criteria stated in BS8233:2414. With regards alternative ventilation, it has been assumed that the opening of windows would be required for fresh air flow and background ventilation. If windows are opened, it has been shown that the internal criteria would be exceeded by 3dB during the night-time. However, as the 48dB noise contour is located approximately 2km to the south, and the next equidistant contour closer to the Site would have been 45dB, meaning the internal noise levels meet the internal criteria with an open window.

Without mitigation in place, the No Observed Adverse Effect Level (NOAEL) is achieved which would be noticeable and disruptive resulting in the following:

"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."

5. MITIGATION

The previous section has determined that the daytime noise levels would fall below the 55dB and the night time noise level fall below 48dB due to aircraft sound. These figure where determined using noise map contours provided in the Noise Action Plan 2013-2018 by Manchester Airport.

The noise levels incident upon the facades can be controlled internally by standard glazing unit with a configuration 6mm glass/12mm air space/6mm glass. A partially open window, which provides approximately 15dB attenuation, would also be sufficient in controlling internal noise levels. The noise levels would fall below the daytime and night levels stated in BS8233:2014.

Therefore without mitigation in place, the No Observed Adverse Effect Level (NOAEL), perceived as 'noticeable and not intrusive', would be achieved for all 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."

6. CONCLUSION

REC Ltd was commissioned by Paul Butler Associates to provide a Noise Impact Assessment for the proposed Residential development off Cringle Road in Manchester.

This assessment has been undertaken to identify key noise sources in the vicinity of the Site which may have the potential to impact upon the proposed noise sensitive residential development.

A series of Noise Surveys have been completed in order to quantify the impact of aircraft and road traffic upon the proposed residential development.

The Noise Impact Assessment has identified that the key noise sources impacting upon the development is from aircraft traffic associated with Manchester Airport. Accordingly appropriate mitigation has been specified in order to reduce these impacts for both external and internal habitable areas.

This Noise Impact Assessment has determined the external noise levels due to aircraft sound fall below the 55dB criteria for external amenity areas.

The noise levels incident upon the facades can be controlled internally by standard glazing unit with a configuration 6mm glass/12mm air space/6mm glass. A partially open window, which provides approximately 15dB attenuation, would also be sufficient in controlling internal noise levels. The noise levels would fall below the daytime and night levels stated in BS8233:2014.

Without mitigation in place, the No Observed Adverse Effect Level (NOAEL), perceived as 'noticeable and not intrusive', would be achieved for all 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."

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.

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 (2x10-5Pa).
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.

APPENDIX III FIGURES



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Figure 1

Cringle Road Context Analysis Sheet & Noise Measurement Positions