

NOISE IMPACT ASSESSMENT

REPORT REFERENCE: **NCSL 1190**

ROCHDALE BOROUGH COUNCIL.
BALDERSTONE PLAYING FIELDS, OL11 2HD.
24TH MARCH 2023

Issue 1

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1 INTRODUCTION

Noise Control Solutions Limited (NCSL) have been commissioned by Rochdale Borough Council to undertake a noise impact assessment for the proposed 2no. rugby pitches and a 26-space car park at Balderstone Playing Fields, OL11 2HD. The assessment is required in order to accompany the relevant planning application which is to be considered by Rochdale Borough Council. The scope of this application is the introduction of 2no. rugby playing pitches and a 26-space car park.

Three noise sources associated with this development are to be considered within this assessment. The potential sources of noise are considered by NCSL to be;

1. Noise from the northern rugby pitch (source reference 'S1')
2. Noise from the southern rugby pitch (source reference 'S2')
3. Noise from the 26-space car park (source reference 'S3')

In order to assess the potential noise impact at the nearest noise sensitive receptors, an environmental noise impact assessment has been conducted, details of which are shown within this report.

Report prepared by  Andrew Todd BA_(HONS) MSc MIOA C_{ENG}

2 COMPETENCE

This report has been prepared by Mr Andrew Todd, a corporate member of the Institute of Acoustics, a holder of a MSc in Acoustics and a Chartered Engineer registered with the United Kingdom Engineering Council. Andrew has over 15 years of experience as an acoustic consultant/engineer working in various aspects of acoustics.

3 SUMMARY OF TERMS, DESCRIPTORS & QUANTITIES

Within this report, several acoustic descriptors and quantities are referred to. Due to their specialised nature, the following summary is provided.

DECIBELS (dB): Ten times the logarithm (base 10) of the ratio between a measured quantity and a reference quantity. For sound pressure levels defined within this report, the reference quantity is 20 Micropascals (μPa).

A-WEIGHTING: The filtering of acoustic signals in order to provide a closer approximation to the human hearing response. Measurements with this weighting applied are denoted with “(A)”, for example, “dB(A)”.

NTH PERCENTILE NOISE LEVEL ($L_{AN,T}$): The A-weighted sound pressure level, in decibels, exceeded for N% of the measurement duration (T). This metric is generally used to assess background noise levels (L_{A90}) as it allows for the removal of non-constant noise sources, for example, passing vehicles. The subscript ‘T’ defines the measurement duration.

EQUIVALENT CONTINUOUS NOISE LEVEL ($L_{Aeq,T}$): The logarithmically averaged sound pressure level, in decibels, over the measurement duration (T) with A-weighting applied. The subscript ‘T’ defines the measurement duration.

FAST TIME WEIGHTING: The integration time constant of the measurement. Fast time weighting, denoted by the subscript ‘F’, integrates sound pressure levels over 0.125 seconds.

MAX LEVEL ($L_{AF\text{ MAX}}$): The maximum reported RMS sound pressure level during a measurement period. The level is A-weighted and is calculated with a Fast time weighting.

DAY-TIME AND NIGHT-TIME PERIODS: Following guidance contained within BS4142, the day-time period is defined as 07:00 to 23:00 and the night-time period is defined as 23:00 to 07:00.

NOISE SENSITIVE RECEPTOR (NSR): A premises or area which is sensitive to noise disturbance. This is generally an existing, or future residential premises close to a proposed development.

SOUND POWER LEVEL (L_W): The sound energy radiated per unit time by a sound source, measured in Watts (W) on a decibel scale with a reference value of 10^{-12} W.

4 APPLICABLE LITERATURE

4.1 NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF), updated in 2021, outlines the Government's planning policies for England and how they are expected to be applied. In respect of noise, the document states that:

Planning policies and decisions should also ensure that new development is appropriate for its location, taking into account the 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.*

Additionally, the policy 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.*
- *Planning conditions should be kept to a minimum and only imposed where they are necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects. Agreeing conditions early is beneficial to all parties involved in the process and can speed up decision-making. Conditions that are required to be discharged before development commences should be avoided, unless there is a clear justification*

4.2 NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

Published in March 2010 by DEFRA, this document defines the Government's policy on noise. It incorporates the long-term vision of promoting good health and quality of life through the effective management of noise in the context of Government policy on sustainable development. The long-term vision of the NPSE is supported by the following aims:

- *Avoid significant adverse impacts on health and quality of life.*
- *Mitigate and minimise adverse impacts of health and quality of life.*
- *Where possible, contribute to the improvement of health and quality of life.*

This document also defines three categories relating to noise impact:

- **NOEL – NO OBSERVED EFFECT LEVEL.** This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – LOWEST OBSERVED EFFECT LEVEL.** This is the level above which adverse effects on health and quality of life can be detected.
- **SOAEL – SIGNIFICANT OBSERVED ADVERSE EFFECT LEVEL.** This is the level above which significant adverse effects on health and quality of life occur.

4.3 PLANNING PRACTICE GUIDANCE

Further detail is provided within the Planning Practice Guidance (PPG) regarding how the effect levels, set out within NPSE, can be recognised and the associated concern arising from each.

At the lowest extreme, when noise is not perceived to be present, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed effect' level. However, the noise has no adverse effect so long as the exposure does not cause any change in behavior, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent

there is a change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

As the exposure increases further, it crosses the 'lowest observed adverse effect' level boundary above which the noise starts to cause small changes in behavior and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

Increasing noise exposure will at some point cause the 'significant observed adverse effect' level boundary to be crossed. Above this level the noise causes a material change in behavior such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.

At the highest extreme, noise exposure would cause extensive and sustained adverse changes in behavior and / or health without an ability to mitigate the effect of the noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be avoided.

Table 1 summarises the noise exposure hierarchy.

Response	Example of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Noticeable	No Effect	No Observed Effect	No Specific Measures Required
Response	Example of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level			

Present & 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			
Present & 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 & Reduce to a Minimum
Significant Observed Adverse Effect Level			
Present & 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 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 Level	Avoid
Present & 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

TABLE 1 – NOISE EXPOSURE HIERARCHY

4.4 BS4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS4142) sets out a methodology to determine the potential impact of proposed industrial and commercial sound sources upon nearby dwellings or premises used for residential purposes. Furthermore, BS4142 is appropriate to consider the impact of existing sources of industrial and commercial sound on proposed receptors.

The methodology prescribes the measurement of the existing acoustic environment at noise sensitive receptor locations, termed the 'background sound level'.

A measurement or calculation of the noise generated by the proposed noise source at the receptor location is also required and is termed the 'specific sound level'. This value is then adjusted to reflect any acoustic characteristics which may increase audibility or annoyance to define the 'rating level'.

Once these values have been attained, an analysis can be conducted in order to assess the estimated noise impact that will occur with the introduction of the proposed source into the existing environment.

- In instances where the rating level exceeds background noise level by +10dB, this is an indication of a significant adverse impact, depending upon the context.
- In instances where the rating level exceeds background noise level by +5dB, this is an indication of an adverse impact, depending upon the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will cause an adverse noise 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 assessment of a noise impact at a receptor should consider the context in which the sound occurs. BS4142 states that the following factors be included in the context assessment;

- The absolute level of sound
- The character and level of residual sound

- The sensitivity of the receptor.

However, BS 4142:2014 explicitly states that the assessment of noise from people and recreational activities is beyond the scope of its application.

4.5 BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS 8233) provides guidance on internal noise levels within dwellings allowing for sufficient resting and sleeping conditions, as shown in Table 2. However, it is also noted that these values may be relaxed by 5dB where a development is considered necessary or desirable with reasonable internal conditions still achieved.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB $L_{Aeq,16hour}$	N/A
Dining	Dining room	40dB $L_{Aeq,16hour}$	N/A
Sleeping	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$ 45dB L_{Amax}

TABLE 2 - BS 8233:2014: RECOMMENDATIONS FOR INDOOR NOISE LEVELS

BS 8233 also provides guidance as to acceptable external noise levels, as shown in Table 3.

Activity	Location	Desirable Noise Level	Upper Guideline Level
Relaxation	External Amenity Space	50dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$

TABLE 3 - BS 8233:2014: RECOMMENDATIONS FOR EXTERNAL NOISE LEVELS

BS8233, however, does recognise that these external guideline values are not achievable in all circumstances where development may be desirable. The standard also provides guidance on estimated noise reduction levels of commonly used building materials and constructions.

4.6 WORLD HEALTH ORGANISATION – GUIDELINES FOR COMMUNITY NOISE 1999.

The World Health Organisation (WHO) provides guidance on maximum recommended noise levels in outdoor living areas. The noise guideline levels are shown in Table 4.

Specific Environment	Critical Health Effect	dB L _{Aeq}	Time (hr)	dB L _{AMax}
Outdoor living area	Serious annoyance daytime and evening.	55	16	NA
	Moderate annoyance daytime and evening.	50	16	NA
Outside bedroom	Sleep disturbance, window open (outdoor values).	45	8	60

TABLE 4 - WHO RECOMMENDATIONS FOR OUTDOOR NOISE LEVELS

4.7 SPORT ENGLAND DESIGN GUIDANCE NOTE – ARTIFICIAL GRASS PITCH (AGP) ACOUSTICS (2015)

The Sport England design guidance note on Artificial Grass Pitches (AGPs), published in 2015, provides guidance relating to planning implications in regard to acoustics.

The guidance note recommends the use of the World Health Organisation's 'Guidelines for Community Noise' noise limits (see Section 4.6) external to residential properties and within external living areas.

This guidance document recommends a noise level of 50dB(A) from AGPs when assessed at residential receptors. The document also suggests that this level can be achieved with a separating distance of 40m in an open area. However, it is also noted within the document that:

"Exceedance of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher levels of noise exposure are reached. Therefore, it is not necessarily the case that where these levels are exceeded, the noise will adversely affect nearby residential properties".

Although this document is not directly related to rugby pitches, it is believed that the character and content of the sound generated by AGPs is likely to be similar to the proposed rugby pitches, i.e. ball impact noise, players shouting etc. It is therefore believed that this document is relevant and should be considered within this noise assessment. Further, no other guidance which relates to sports pitches is recognised as good practice.

5 LOCATION

5.1 SITE LOCATION

The development in question (reference 'D1') is located at Balderstone Playing Fields, OL11 2HD. This is a public park and playing field. The area surrounding the site is comprised of residential premises. Additionally, there is a commercial / industrial area located to the North of the development.

5.2 NOISE SENSITIVE RECEPTOR LOCATION

Three noise sensitive receptors have been identified in reference to this noise impact assessment, these are detailed in Table 5 and Figure 1 below.

NSR Reference	NSR Address	Distance to Development
NSR1	Properties on Queen Victoria Street.	~18m
NSR2	Arnold Bagnall Court.	~22m
NSR3	Properties on Beaconsfield Road.	~45m

TABLE 5 - NOISE SENSITIVE RECEPTOR DETAILS

NSR1 and NSR2 premises have rear garden amenity areas facing the proposed development site, whereas NSR3 premises have front facades facing the development site.

NSR1 is separated from D1 by a 1.8m high brick wall bounding the rear garden amenity areas which is in good condition and is expected to provide some noise attenuation.

NSR2 is separated from D1 by an anti-climb metal fence and a slotted timber fence – both of which are expected to provide no appreciable acoustic attenuation.

NSR3 is separated from D1 by an anti-climb metal fence which is expected to provide no appreciable acoustic attenuation.

5.3 LOCAL AREA MAP

Figure 1 shows an aerial view of the existing development site.



FIGURE 1 - LOCAL AREA MAP

Figure 2 shows the layout of the proposed development site.



During a site visit on Saturday 11th February 2023 a subjective assessment of the existing acoustic environment was conducted by NCSL. It is noted that this is a relatively quiet location, and that during the site visit, the playing field was in use exclusively by dog walkers.

6 PROPOSED NOISE SOURCES

The proposed development (reference 'D1') comprises introduction of 2no. rugby playing pitches and a 26-space car park.

Further information relating to the proposed noise sources relevant to this planning application is detailed in the following sections.

6.1 NORTHERN RUGBY PITCH (SOURCE S1)

The Northern pitch has proposed dimensions of approximately 80m x 50m. This noise source is in close proximity to NSR1 and NSR2 (approximately 18m and 22m respectively).

It is understood that the pitch is to be enclosed by a 2m high anti-climb fence. This is expected to be of the mesh type and is not expected to provide any acoustic attenuation.

It is noted that there is no floodlighting provisioned for the rugby pitch, so it is expected that use will be primarily during day-light hours.

6.2 SOUTHERN RUGBY PITCH (SOURCE S2)

The Southern rugby pitch has proposed dimensions of approximately 110m x 55m.

It is understood that the pitch is to be enclosed by a 2m high anti-climb fence. This is expected to be of the mesh type and is not expected to provide any acoustic attenuation.

It is noted that there is no floodlighting provisioned for the rugby pitch, so it is expected that use will only be during day-light hours.

6.3 26-SPACE CAR PARK (SOURCE S3)

The development also includes provision for a 26-space car park. This is proposed to have a permeable tarmac surface.

7 ACOUSTIC CALCULATIONS & DEFINED SOUND LEVELS

7.1 SPECIFIC SOUND LEVEL CALCULATION

The specific sound level is the calculated noise level generated at a NSRs due exclusively to the noise source under investigation. In this case, the specific sound level has been calculated with the use of a computer noise model generated within the noise propagation simulation software SoundPLAN Essentials 5.1.

This computer noise model incorporates the sport activity noise levels contained within The Sport England design guidance note on Artificial Grass Pitches (AGPs). This is expected to be comparable to the noise levels generated by the proposed rugby pitches as it is focused mainly upon noise from players and ball impacts.

The receiver locations within the computer noise models at NSR1 and NSR2 are set at a height of 1m to replicate a seated position of a person using the rear garden amenity areas for rest and relaxation purposes. At NSR3, the receiver height is set at 1.5m to replicate a standing person.

An ambient noise survey was not commissioned by the client.

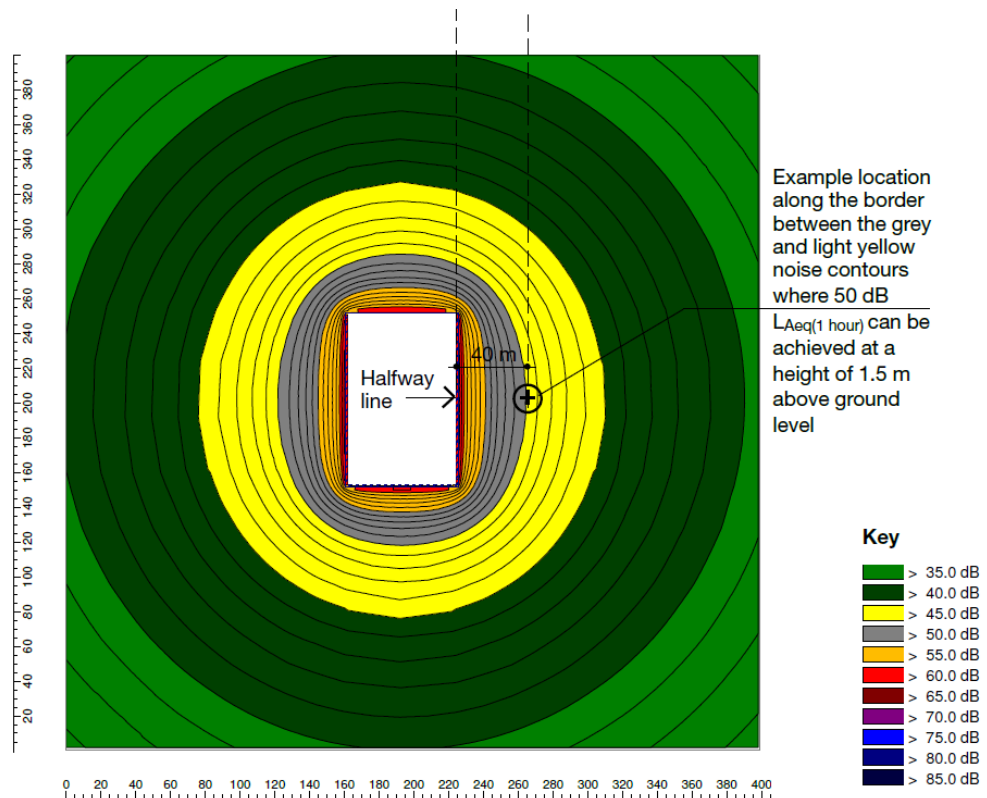
7.2 DEFINED SOUND LEVEL SUMMARY

The defined sound levels, as calculated by the computer noise model, are summarised in Table 6.

Source Reference	NSR	Specific Sound Level (dB, L _{Aeq})
S1 (Northern Rugby Pitch)	NSR1	53.3
	NSR2	55.4
	NSR3	47.4
S2 (Southern Rugby Pitch)	NSR1	43.9
	NSR2	46.1
	NSR3	50.9
S3 (Car Park)	NSR1	25.7
	NSR2	30.4
	NSR3	31.2
Cumulative (Sum of all sources)	NSR1	53.8
	NSR2	55.9
	NSR3	52.5

TABLE 6 - DEFINED SOUND LEVEL SUMMARY

These results give reasonable correlation with the data presented within the Sport England design guidance note on Artificial Grass Pitches – an extract of which is shown below in Figure 3.



Plan of typical noise contours for an AGP in an open area measured at a height of 1.5 m above ground level

FIGURE 3 – SPORT ENGLAND DESIGN GUIDANCE NOTE ON ARTIFICIAL GRASS PITCHES EXTRACT

8 NOISE IMPACT ASSESSMENT

It is suggested that the most suitable literature upon which to base this noise impact assessment is the Sport England design guidance note on Artificial Grass Pitches. This document recommends that a noise level, due to AGPs, of 50dB(A) when observed at residential premises is a satisfactory level. Further guidance is available within BS8233 which suggests an upper-guideline noise level of 55dB(A) in external amenity areas. However, the guidance in BS8233 is generally concerned with steady state sound sources and transportation noise. Noise from the playing of rugby may not be considered 'steady state'.

The proposed development, with all sources operating, is expected to exceed the recommended noise levels provided within AGP at all three NSR locations. Furthermore, there is expected to be an exceedance of the upper guideline value for external amenity areas, as provided within BS8233, at NSR2. It is therefore expected that the proposed development has the potential to result in a moderate noise impact to the local area.

However, it should also be considered that AGP states that;

"Exceedance of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher levels of noise exposure are reached. Therefore, it is not necessarily the case that where these levels are exceeded, the noise will adversely affect nearby residential properties".

In addition, BS8233 does recognise that these external guideline values are not achievable in all circumstances where development may be desirable.

Furthermore, the assessment of noise impact at a receptor should also consider the context in which the sound occurs. This is discussed in the following section.

8.1 CONTEXT ASSESSMENT

As shown in the previous section, it is expected that the proposed development, based upon the objective results, has the potential to cause a moderate noise impact at residential receptor locations. However, the context of the proposed development should also be considered.

It is noted that the development is likely to provide additional amenity to the local area, which in itself may reduce the perceived noise impact.

In addition, the frequency of use of the proposed rugby pitches must be considered - as infrequent use is likely to also reduce the noise impact experienced by local residents.

It is also significant that no flood-lighting is provisioned within the development, with use of the pitches therefore restricted to daylight hours only. This is also expected to reduce the perceived noise impact of the development as during the most sensitive time periods (i.e. during the night time period) there is likely to be no noise emission from the proposed development.

8.2 NOISE IMPACT ASSESSMENT SUMMARY

A noise impact assessment has been undertaken by NCSL to assess the potential noise impact from the proposed development at receptors.

The assessment indicates that the noise associated with the development has the potential to produce a moderate noise impact at noise sensitive receptors. It is however expected that an assessment of context will likely reduce the potential impact of noise from the development, resulting in an expected minor adverse impact at residential receptors.

If required, in order to reduce the impact of noise further at noise sensitive receptors, mitigation measures have been suggested within the following section.

9 PROPOSED MITIGATION MEASURES

Two possible mitigation measures are proposed if it is believed that the expected noise level from the development, when assessed in context, is excessive.

9.1 RELOCATION OF PITCHES

As per the guidance provided within the Sport England design guidance note on Artificial Grass Pitches, the location of the pitches may be reviewed to ensure they are sited at least 40m from residential premises in open-space. This may be reduced slightly when considering NSR1 due to the brick wall which encloses the rear garden areas, as this is expected to provide some additional noise attenuation.

9.2 PROVISION OF ACOUSTIC BARRIER

The introduction of a 2m high solid fence around the proposed pitches is a potential method for reducing the noise impact at local receptors – however it is unlikely to result in noise levels below those recommended within the Sport England design guidance note on Artificial Grass Pitches.

A noise model has been produced to demonstrate the effect of introducing such a barrier around the proposed pitches. The results are shown below in Table 7 and further information is shown in Appendix B. Please note, this barrier effect could also be provided by an earth bund assuming the height is comparable.

Source Reference	NSR	Specific Sound Level (dB, L _{Aeq})
S1	NSR1	52.3
	NSR2	52.8
	NSR3	46.7
S2	NSR1	43.1
	NSR2	44.9
	NSR3	49.7
S3	NSR1	25.3
	NSR2	26.2
	NSR3	27.4
Cumulative	NSR1	52.8
	NSR2	53.5
	NSR3	51.5

TABLE 7 - SPECIFIC SOUND LEVEL WITH ACOUSTIC BARRIER (2M)

10 CONCLUSIONS & RECOMMENDATIONS

A noise impact assessment has been commissioned in order to accompany the relevant planning application relating to the proposed 2no. rugby playing pitches and a 26-space car park at Balderstone Playing Fields, OL11 2HD.

The noise impact assessment is based upon a computer noise model created within the sound propagation simulation software SoundPLAN Essentials 5.1. The input data for this noise model has been sourced from the Sport England design guidance note on Artificial Grass Pitches, which is believed to be the most relevant guidance document for a development such as this.

The results of this noise model suggest that the proposed development will exceed the recommended noise level at receptors (as per Sport England design guidance note on Artificial Grass Pitches) of 50dB(A) by up to 6dB.

Although the objective results outlined above are central to this assessment, it is also necessary to consider the context of the development. In this case, it is expected that the development will add amenity to the local area – which is likely to reduce the observed overall impact. Furthermore, the frequency of use of the proposed rugby pitches must be considered, as infrequent use is likely to further reduce the noise impact of the development. Finally, as the proposal has no provision for flood-lighting, it is expected that the proposed pitches will only be used during day-light hours, further reducing the expected noise impact.

It is likely that this development therefore has the potential to produce a **minor adverse impact** at receptors.

In order to minimise adverse noise impact, mitigation options are shown in Section 9 of this report.

11 UNCERTAINTY

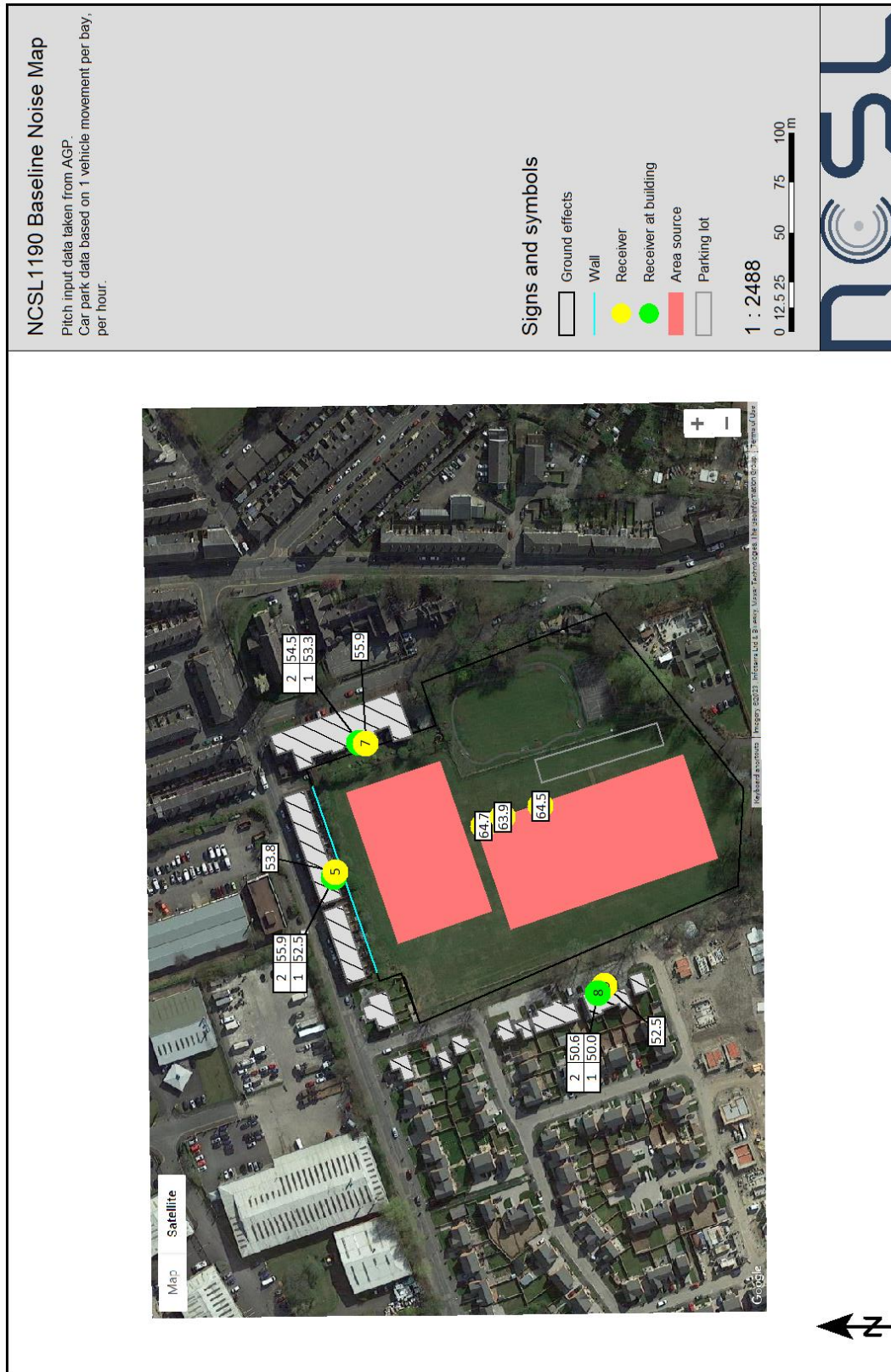
All calculations within this report have been made under repeatable conditions and therefore any uncertainty in the result will be low.

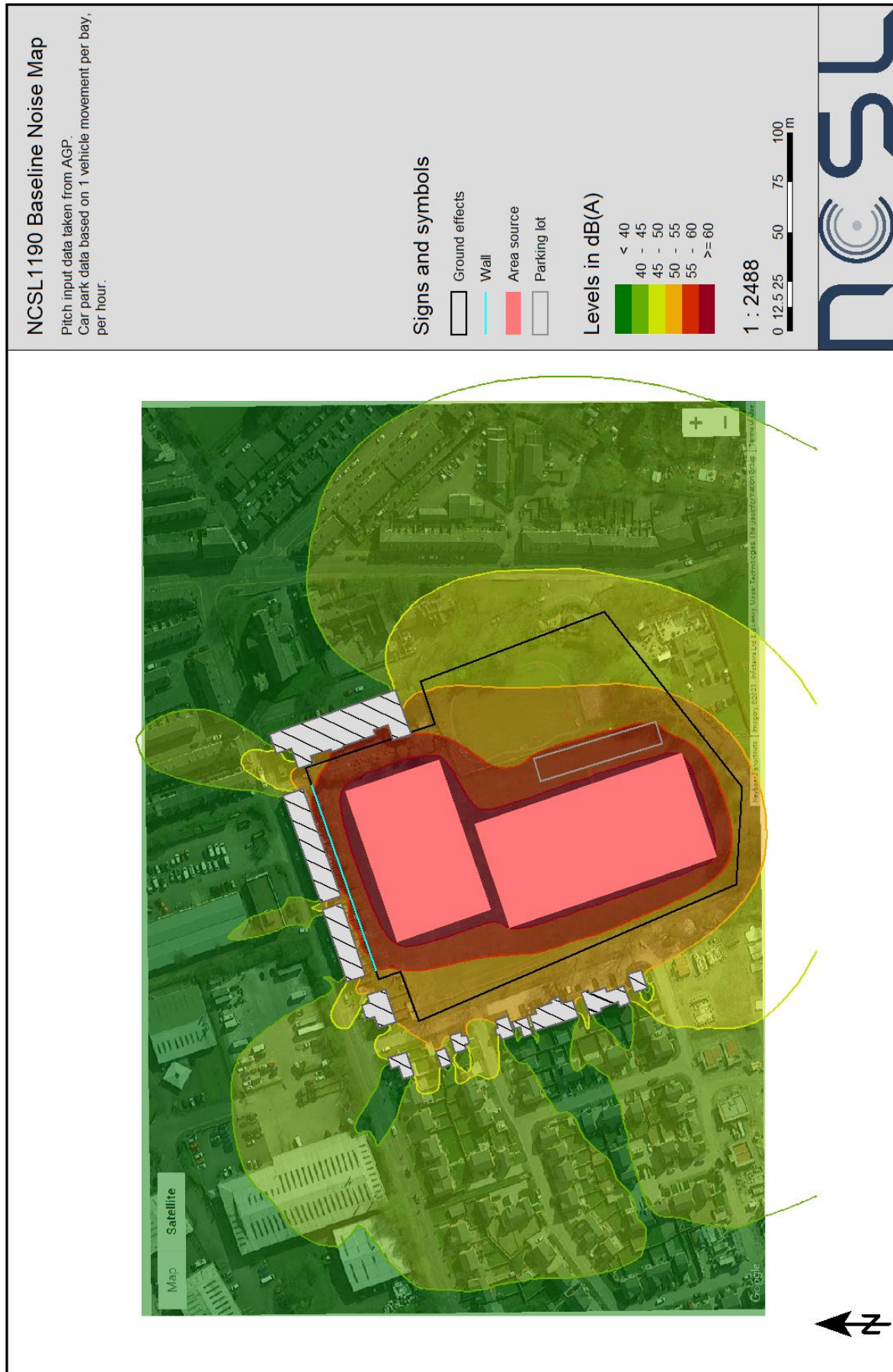
To reduce measurement uncertainty, the following steps have been taken.

- The distances between the source and nearest receptors have been measured from scaled plans showing the locations of each building.

All noise impact assessments and similar acoustic assessments inherently rely upon estimations and assumptions. This report should therefore be considered within this context.

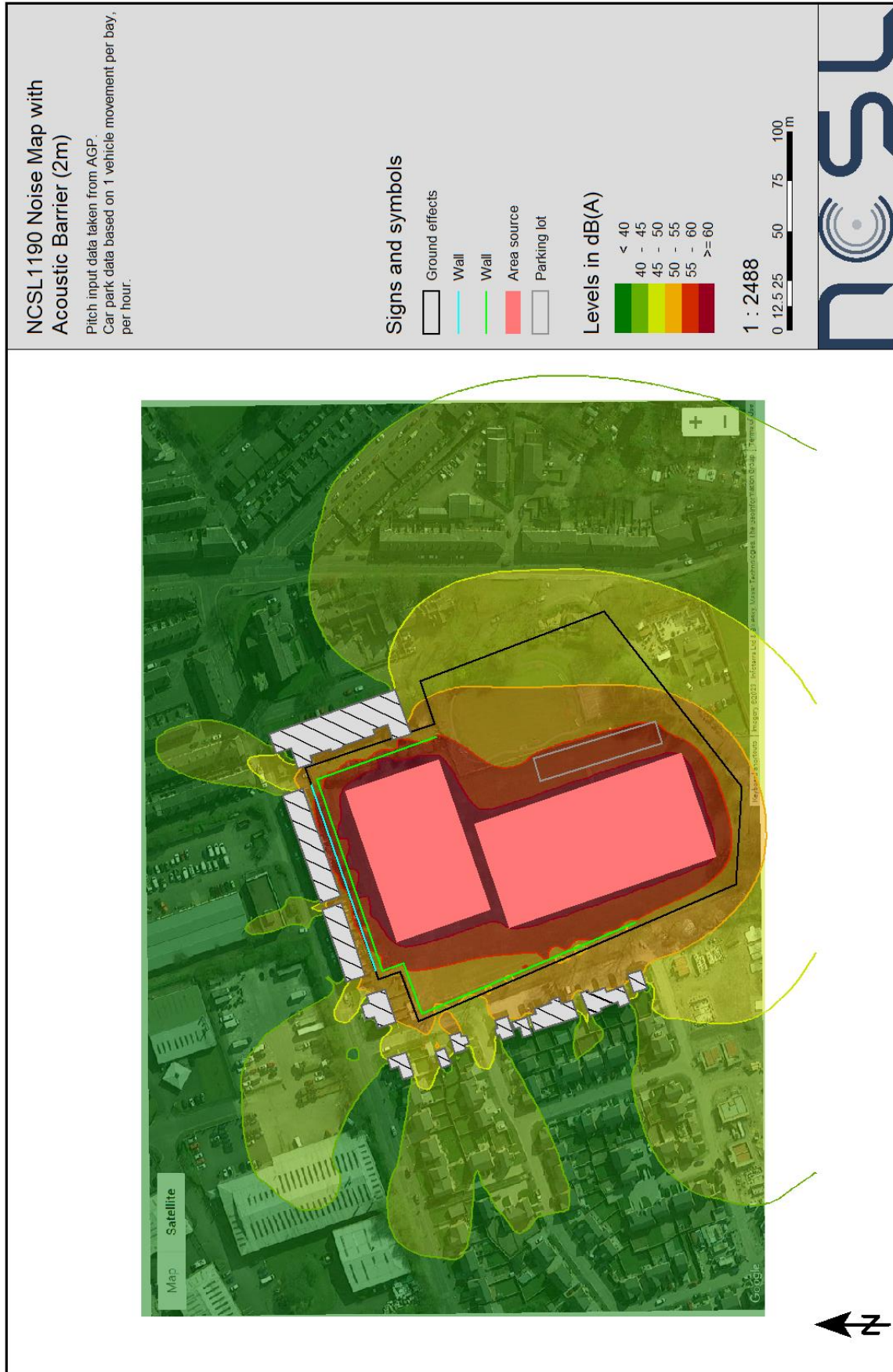
APPENDIX A – BASELINE NOISE MODEL





APPENDIX B – MITIGATION NOISE MODEL (2M BARRIER)





TERMS AND CONDITIONS OF BUSINESS

1. GENERAL

Work done or services undertaken are subject to the terms and conditions detailed below and all other conditions, warranties and representations, expressed or implied are hereby excluded.

2. PRICES

Prices are based on current costs, exchange rates, duty and freight and are subject to change without notice. The quoted price does not cover the cost of attending meetings, telephone calls or email exchanges. This is charged separately at a pro rata hourly rate of £75 per hour.

3. TIMING ESTIMATES

Timing estimates are made in good faith and date from receipt of a written order and full information to enable us to proceed. While NCSL makes every effort to fulfil them, such estimates are subject to unforeseen events and if not maintained, cannot give rise to any claim.

4. CANCELLATION AND RETURNS

Cancellation of orders for services, training or consultancy is only acceptable by prior agreement of NCSL and a charge will normally be made. NCSL reserve the right to cancel any work at any time.

5. CLAIMS

Claims for errors etc should be notified within 10 days of date of receipt.

6. PAYMENT TERMS

Full payment is required before any work is undertaken by NCSL. Failure to comply with the terms of payment may result in delayed delivery of services and a review of the Customer's credit account (if applicable). Should the customer become subject to an administration order, or becomes bankrupt or goes into liquidation, NCSL has a right to cancel any contract and discontinue any work.

7. RETENTION OF TITLE

All reports & data remain the property of NCSL. Under no circumstances will a customer's purchase order override our Retention of Title clause. In the case of software and data, the ownership remains with NCSL. Payment of invoices in full will entitle the customer to use reports or other services under licence until (a) a set expiry date is passed (b) they cease trading. In both instances, the licence shall then revert to NCSL. All measurement data and reports are the sole property of NCSL and shall not be reproduced or distributed without written consent from NCSL.

8. TEST REPORTS

NCSL shall not be liable for any subsequent loss or damage incurred by the client as a result of information supplied in a test report. Any specifications or targets supplied by NCSL are to be considered as guidance only. No guarantee is offered by NCSL that the meeting of any supplied targets or specifications will solve the relevant issue or prevent future issues.

9. RESPONSIBILITY

Every effort is made to ensure accuracy in description, drawings and other information in correspondence etc but no warranty is given in this respect and NCSL shall not be liable for any error therein. NCSL carries out all tests and/or advises only on the basis that the same are carried out, made or given without any responsibility whether for negligence or otherwise. NCSL and its servants or agents will not be liable for any damage or loss direct or indirect of whatsoever kind, whether or not the same results directly or indirectly from negligence on the part of NCSL or its servants or agents.

10. CONFIDENTIALITY

Unless specifically excluded in the terms of an individual contract between NCSL and its Customer, the following shall apply to all reports, advice, drawings, photographs, specifications or data:

- i. The above shall not be disclosed to third parties or used in litigation without the consent of NCSL.
- ii. Where NCSL has given consent to disclosure, the Customer shall draw the attention of the third party to these terms of business and the basis on which NCSL undertakes test, reporting and advising. The Customer shall indemnify NCSL for any failure to do so.
- iii. The above items are submitted to the Customer as confidential documents. Confidentiality shall continue to apply after completion of the business but shall cease to apply to information or knowledge which may come into the public domain.

11. CONSTRUCTION AND ARBITRATION

The laws of England shall govern all contracts and the parties submit to exclusive jurisdiction of the courts of England, unless otherwise agreed.

12. JOB SPECIFIC TERMS

NCSL will not be held responsible for any adverse impact arising from the introduction of proposed palliative measures. Furthermore, no guarantee is given regarding the effectiveness of any proposed palliative and/or mitigation measures. The client is responsible for any palliative measures, including, but not limited to, the sourcing of suppliers, the quality of installation, the cost of all materials / installation, maintenance and safety. All advice given should be taken as guidance only. It is the responsibility of the client to ensure the safe operation of any mitigation measures, including but not limited to, adequate fire safety and ventilation requirements. NCSL provide no guarantee that adherence to provided specifications will result in no further noise and/or vibration complaints and/or the elimination of noise and/or vibration issues. NCSL do not supply, procure, install or maintain any materials. We reserve the right to publicise the work conducted by NCSL, including, where appropriate, client logos etc. On occasion, work may be conducted by sub-contract partners.