MILLER GOODALL
ACOUSTICS AND AIR QUALITY

NOISE ASSESSMENT

on behalf of

COPELAND BOROUGH COUNCIL

for the site at

LECONFIELD INDUSTRIAL ESTATE, CLEATOR MOOR, COPELAND, CA25 5QB

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Summary

Miller Goodall Ltd has on behalf of Copeland Borough Council, undertaken a noise assessment in connection with an outline planning application for the refurbishment and extension of Leconfield Industrial Estate, Cleator Moor, Copeland, CA25 5QB. The site falls within the administrative boundary of Copeland Borough Council (CBC) who have requested a noise assessment be submitted in connection with the application to demonstrate that a reasonable degree of amenity is capable of being secured for both existing and future noise-sensitive areas of the development from existing and proposed noise-generating areas of the site and wider area.

Noise surveys have been undertaken at locations representative of existing dwellings and proposed noise-sensitive development that would be closest and most exposed to any noise associated with the proposals. Potential road traffic noise emissions from new access roads in Areas 2 and 3 have been predicted using computer noise modelling, the results of which have then been assessed against a range of policies, guidance, and standards. The assessment found that based on an indicative layout, some physical noise mitigation measures would likely be necessary. Occupants of the proposed new industrial units, the location and layout of which are subject to change during the detailed design stage, have not yet been established. Consequently, further outline noise levels limits and other mitigation and reduction measures have been provided to help safeguard existing residential amenity.

Based on the measured noise levels and provided noise from any new proposal non-residential uses is adequately controlled, a reasonable degree of amenity can be achieved in any noise-sensitive development in Area 2 without any specific noise mitigation measures. There may be some matchday noise from the Cleator Moor Celtic Football Club, and whilst we understand that there have been no formal complaints regarding noise from CMCFC, the need to consider and mitigate any potential noise impact from the football ground can be secured by a suitably worded planning condition.

Provided any sound insulation, noise mitigation and control measures are incorporated in the design and use of the site, an acceptable degree of residential amenity should be secured at both existing and proposed noise-sensitive receptors, and it can be concluded that the proposed development would be acceptable in noise terms.

Record of changes

Prepared By:	David Sproston MIOA MCIEH	Reviewed By:	Jo Miller MIOA MCIEH
Signed:		Signed:	
Date:	1 March 2022	Date:	1 March 2022

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1	1 March 2022	First issue	DS

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1 Introduction

1.1 Miller Goodall Ltd has on behalf of Copeland Borough Council (CBC), undertaken a noise assessment in connection with an outline planning application for the refurbishment and extension of Leconfield Industrial Estate, Cleator Moor, Copeland, CA25 5QB.

1.2 The site falls within the administrative boundary of CBC who have requested a noise assessment be submitted in connection with the application to demonstrate that a reasonable degree of amenity is capable of being secured for both existing and future noise-sensitive areas of the development from existing and proposed noise-generating areas of the site and wider area.

2 Site Description

2.1 The site is located in Cleator Moor, a small town in the western part of the Lake District. The site is located approximately 5 km to the southeast of Whitehaven. The site location and identification of the three Areas are shown in **Appendix A**.

2.2 The Site is divided into three areas of development:

- Area 1 'Leconfield Industrial Estate' - located in the central and western area of the site and occupied by existing buildings and industrial/commercial uses of Leconfield Industrial Estate, which is accessed via Leconfield Street on the south-western boundary. Some of the existing premises generate significant noise, including fixed plant and equipment on the south-facing elevation of Capital Aluminium Extrusions Ltd (shown in **Appendix A**)
- Area 2 'Land to the east towards Heather Bank and Cleator Moor Medical Centre' or 'Northern Growth Area' - part open land with the remainder occupied by Cleator Moor Celtic FC Club House car park and stands (note that the pitch does not fall within the application site boundary).
- Area 3 'Land to the north, located between Bowthorn Road and Birks Road') - currently open, undulating land.

2.3 Outside the Site, the nearest noise-sensitive receptors include;

- Dwellings to the south-western boundary on Leconfield Street and Furnace Court;
- Dwellings to the north and north-west on Bowthorn Road, Sanderson Park and Threapland; and,
- Dwellings to the east and south-east on Birks Road, Heather Bank, James Street and Heatcote Park

2.4 The nearest existing noise-generating land uses around the Site include;

- Cleator Moor Celtic Football Club (CMCFC) that would typically have one football match each week of the football season (**Appendix A**); and;
- Local roads

3 Proposed Development

3.1 An indicative site layout is shown in **Appendix A**. The proposal description is as follows:

> *"Provision of up to 44,350 sqm (GEA) floorspace for light industrial, general industrial and storage & distribution (Class E(g(ii&iii)), B2, B8 uses) and Student Accommodation (Sui Generis) with ancillary food/beverage (Class E(b)), education and community facility uses (Class F1(a & e)) with internal accesses, parking, service yards, attenuation basins, electricity substations and associated infrastructure, earthworks and landscaping."*

3.2 Existing buildings and uses in Area 1 will be retained and may be refurbished. Some new industrial buildings/uses (Use Class E, B2 and B8) and car parking areas are proposed in Area 1, and the existing access retained.

3.3 In Area 3, the proposed site plan (**Appendix A**) shows seven separate plots, within which B2 and/or B8 uses are proposed. Vehicular access to Area 3 will be via a new access road served from the B5294 located on the north-western boundary, and each plot will have a staff car park. Access to Area 3 from Birks Road to the south will be reserved for emergency vehicles only by way of a locked gate or other suitable means.

3.4 For Areas 1 and 3;

- No changes to the currently permitted operating houses are proposed;
- The operating hours for all new uses in Areas 1 and 3 will be restricted to the daytime period (i.e. 07:00-23:00hrs).
- All new buildings will be 9-15m in height.

3.5 In Area 2, the proposals could include, one or more of the following;

- Retention of CMCFC's Clubhouse;
- Retention and extension of CMCFC's car park;
- Existing vehicular used as site access; and
  - Student accommodation, and;
  - Offices Use (Class Egii - research and development of products or processes (formerly use class B1(b)), limited to daytime use only).

4 Policy Context

4.1 Noise Policy Statement for England

4.1.1 The Noise Policy Statement for England (NPSE[1]), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

[1] Noise Policy Statement for England, Defra, March 2010

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse effects on health and quality of life;
- mitigate and minimise adverse effects on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."

4.1.2 The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and the quality of life occur.

4.1.3 The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the Statement). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case:

"…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development".

4.1.4 Importantly, the NPSE goes on to state:

"This does not mean that such adverse effects cannot occur".

4.1.5 The Statement does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that:

"Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available"

4.1.6 It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

4.2 National Planning Policy Framework

4.2.1 The National Planning Policy Framework (NPPF[2]) initially published in March 2012, was updated in July 2021. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise"[3].

4.2.2 The revised NPPF advises that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of these is an environmental objective which is described in par. 8 (c):

[2] National Planning Policy Framework, Ministry of Housing, Communities and Local Government, June 2019

[3] Planning Policy Guidance 24: Planning and Noise, DCLG, September 1994

"to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

4.2.3 At par. 174 we are advised that:

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

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

4.2.4 Par. 185 goes on to state:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) 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;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

4.2.5 Par. 187 seeks to ensure that any new development (i.e. new noise-sensitive development) does not prejudice the legally permitted operations and activities of other, existing non-residential uses (such as the existing industrial uses and CMCFC), stating:

"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."

4.3 Planning Practice Guidance – Noise

4.3.1 As of March 2014, a Planning Practice Guidance[4] for noise was issued which provides additional guidance and elaboration on the NPPF, the guidance was updated in July 2019. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- 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

[4] Planning Practice Guidance – Noise, https://www.gov.uk/guidance/noise--2 22nd July 2019.

- Whether or not a good standard of amenity can be achieved.

4.3.2 In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

"…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".

4.3.3 Examples of these factors include:

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;
- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;
- The impact of noise from certain commercial developments such as nightclubs and pubs where activities are often at their peak during the evening and night.

4.3.4 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

"Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed".

4.3.5 The PPG was amended in December 2014 to clarify guidance on the potential effect of noise from existing businesses on proposed new residential accommodation. Even if existing noise levels are intermittent (for example, from a live music venue), noise will need to be carefully considered and appropriate mitigation measures employed to control noise at the proposed accommodation.

5 Local Authority Consultation

5.1 Kevan Buck, Environmental Health Officer at CBC was consulted in respect of the assessment methodology used in this assessment, via email, and finally, a meeting at the site[5]. It was agreed that.

- Offices, R&D, Industrial processes that fall within Use Class E are by definition, uses which can be carried out in a residential area without detriment to the amenity of residents and therefore potential noise impact from these uses in Area 2 and the wider site are not needed to be considered in the assessment.
- For Areas 2 and 3, the assessment should consider both the resulting overall impact of road traffic on the access roads, and the peak hour HGV movements to/from Area 3.
- The proposed noise monitoring locations and methodology were acceptable.

[5] Site visit and meeting on 23/11/2021

- Potential impact of existing noise sources on any proposed noise-sensitive development is considered.
- Potential noise impact on existing dwellings and any proposed noise-sensitive development from the future use of Area 2 is considered.
- Operational noise from the proposed B2/B8 uses is assessed with respect to BS 4142:2014, as far as practicable at this stage.
- For any unknown elements of the proposals, the cumulative operational noise levels, as rated in accordance with BS 4142 should not exceed the background sound level.

6 Acoustic Standards and Guidance

6.1 World Health Organisation (WHO) Guidelines for Community Noise 1999

6.1.1 The WHO Guidelines 1999 recommends that to avoid sleep disturbance, indoor night-time guideline noise values of 30 dB L_{Aeq} for continuous noise and 45 dB L_{AFmax} for individual noise events should be applicable. It is to be noted that the WHO Night Noise Guidelines for Europe 2009[6] makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB L_{AFmax}. The number of individual noise events should also be taken into account and the WHO guidelines suggest that indoor noise levels from such events should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night.

6.1.2 The WHO document recommends that steady, continuous noise levels should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. It goes on to state that to protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB L_{Aeq}.

6.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

6.2.1 This standard carries the full weight of an adopted British Standard, provides recommended guideline acoustic design criteria for new dwellings and is supported by guidance contained within WHO GCN[7]. The guideline noise design criteria of BS 8233 apply to external noise "*without a specific character"* (previously and sometimes termed or referred to as "*anonymous noise"*) such as that associated with road and rail traffic.

Internal Amenity

6.2.2 The Standard states that for external noise without a specific character, such as road traffic, it is desirable that the internal ambient noise level does not exceed the guideline values shown in Table 1, below.

6.2.3 The note to paragraph 7.7.1 states that where noise has a specific character (i.e. it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content) *"lower noise limits might be appropriate".*

[6] WHO Night Noise Guidelines for Europe 2009

[7] World Health Organisation Guidelines for Community Noise, 1999

Table 1: BS 8233: 2014 guideline indoor ambient noise levels for dwellings

Activity	Location	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB L_{AFmax}

6.2.4 Note 7 to Table 4 of BS 8233 states:

> *"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."*

6.2.5 Guidance on reasonable acoustic design criteria for individual noise events are also provided, and the Standard advises that:

> *"regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL[8] or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values".*

6.2.6 For Internal spaces, the Standard states that;

> *"..to avoid sleep disturbance, sound pressure levels at the outside facades of living spaces should not exceed 45 dB L_{Aeq} (taken as a façade level, and equating to a free-field external level of 42 dB L_{Aeq}) and 60 dB L_{AFmax} so that people may sleep with bedroom windows open."*

External Amenity

6.2.7 BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens, patios and private outdoor amenity spaces. BS 8233:2014 adopts guideline external noise level limits provided in WHO for external amenity areas such as gardens and patios. The standard states that it is "*desirable*" that the external noise does not exceed 50 dB $L_{Aeq,16hr}$ with an upper guideline value of 55 dB $L_{Aeq,16hr}$ whilst recognising in paragraph 7.7.3.2 that development in higher noise areas, such as urban areas or those close to the transport network, may require a compromise between elevated noise levels (i.e., above 55 dB $L_{Aeq,16hr}$) and other factors that determine if development in such areas is warranted. In such circumstances, the development should be designed to achieve the lowest practicable noise levels in external amenity areas but should not be prohibited.

[8] Sound exposure level or L_{AE}

6.3 ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development – May 2017

6.3.1 ProPG: Planning and Noise is new guidance with the aim of delivering sustainable development and promoting good health and well-being through the effective management of noise which may impact new residential developments, such as the student accommodation in Area 2.

6.3.2 The guidance aims to complement the national planning policy and encourages the use of good acoustic design at the earliest phase of the planning process. It builds upon the recommendations of various other guidance documents including NPPF, NPSE and PPG-Noise, BS 8233 and WHO.

6.3.3 The guidance applies to new residential developments which would be exposed predominantly to noise from existing transport sources. The ProPG advocates a risk-based approach to noise using a two-stage process:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements: –
  - Element 1 – demonstrating a 'Good Acoustic Design Process';
  - Element 2 – observing internal 'Noise Level Guidelines';
  - Element 3 – undertaking an 'External Amenity Area Noise Assessment'; and
  - Element 4 – consideration of 'Other Relevant Issues'.

6.3.4 The ProPG approach is underpinned by the preparation and delivery of an 'Acoustic Design Statement' (ADS), whereby the higher the risk for noise at the site, the more detailed the ADS. The ADS should, as necessary, address the following issues:

- Present the initial site noise risk assessment, including the pre-development acoustic conditions prior to development;
- Describe the external noise levels that occur across the site both before and after any necessary mitigation measures have been incorporated. The external noise assessment with mitigation measures in place should use an informed judgement of typical worst-case conditions;
- Demonstrate how good acoustic design is integrated into the overall design and how the proposed acoustic design responds to specific circumstances of the site;
- Confirm how the internal noise level guidelines will be achieved, including full details of the design measures and building envelope specifications;
- A detailed assessment of the potential impact on occupants should be undertaken where individual noise events are expected to exceed 45 dB L_{AFmax} more than 10 times a night inside bedrooms;
- Priority should be given to enable the use of openable windows where practical across the development. Where this is not practical to achieve the internal noise level guidelines with windows open, then full details of the proposed ventilation and thermal comfort arrangements must be provided;
- Present the findings of the external amenity area noise assessment;
- Present the findings of the assessment of other relevant issues;
- Confirm for a low-risk site how adverse impacts of noise will be mitigated and minimised;
- Confirm for a medium or high noise risk site how adverse impacts of noise will be mitigated and minimised and clearly demonstrate that a significant adverse noise impact has been avoided.

6.3.5 ProPG target noise levels are based on existing guidance from BS 8233 and WHO (see below). Table 2below outlines the guidance noise levels for different room types during the day and night.

Table 2: ProPG guideline indoor ambient noise levels for dwellings

Activity	Location	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB L_{AFmax}

6.3.6 The footnotes to this table suggest that internal noise level limits can be relaxed by up to 5 dB where development is considered necessary or desirable, and still represent "*reasonable*" internal conditions. They also suggest that in such cases, external levels which exceed WHO guidance target levels (see WHO section above) may still be acceptable provided that reasonable internal noise levels are achieved. Although, where the acoustic environment of external amenity areas is intrinsic to the overall design, *"noise levels should ideally not be above the range 50 – 55 dB* $L_{Aeq,16hr}$". The wording of ProPG (and BS 8233:2014) is clear that the exceedance of guideline noise levels in external areas should not prohibit the development of desirable developments in any event.

6.4 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

6.4.1 BS 4142:2014+A1:2019[9] provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. It replaced the 1997 edition of the Standard in October 2014 and was amended in June 2019. The amended version corrected a number of printing errors and further clarified that the standard is used to assess external noise levels, and not internal noise levels (although this can form part of the discussion regarding context). The key aspects of the Standard are summarised below.

6.4.2 The standard presents a method of assessing potential noise impact by comparing the noise level due to industrial sources (the Rating Level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the Background Sound Level).

6.4.3 The Specific Noise Level - the noise level produced by the source in question at the assessment location - is determined and a correction is applied for certain undesirable acoustic features such as tonality, impulsivity or intermittency. The corrected Specific Noise Level is referred to as the Rating Level.

6.4.4 In order to assess the noise impact, the Background Sound Level is arithmetically subtracted from the Rating Level. The standard states the following:

- *Typically, the greater this difference, the greater the magnitude of the impact,*

[9] BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context,*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on 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 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.*

6.4.5 In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014+A1:2019 edition places emphasis upon an appreciation of the context, as follows:

> *"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

6.5 Calculation of Road Traffic Noise and Design Manual for Roads and Bridges

6.5.1 Guidance and methodologies for predicting road traffic noise are detailed in the document Calculation of Road Traffic Noise (CRTN)[10]. This methodology combines data on road traffic flows, mean traffic speeds and traffic composition in terms of percentage of Heavy Goods Vehicles (HGV), road and site layouts in order to calculate and predict road traffic noise at a selected location. A methodology for the calculation of hourly road traffic noise is also presented. The $L_{A10(18\ hour)}$ parameter has historically shown a good correlation with community response to road traffic noise and is often referred to as the 'UK traffic noise index'.

6.5.2 With respect to changes in road traffic noise levels, the documents 'Calculation of Road Traffic Noise' (CRTN)[10] and the 'Design Manual for Roads and Bridges (DMRB)[11] which was updated in May 2020 are both relevant. Both of these documents contain guidance on predicting and assessing changes in road traffic noise due to factors such as increased traffic volumes, changes to the local road network, etc.

6.5.3 Guidance and a methodology for calculating changes in road traffic noise are detailed in CRTN. This methodology combines data on road traffic flows, mean traffic speeds and traffic composition in terms of percentage of Heavy Goods Vehicles (HGV), road and site layouts to calculate and predict road traffic noise at a selected location. A methodology for the calculation of hourly road traffic noise is also presented. The $L_{A10(18\ hour)}$ parameter has historically shown a good correlation with community response to road traffic noise and is often referred to as the 'UK traffic noise index'.

6.5.4 DMRB is the accepted standard methodology within the United Kingdom for evaluating the noise impacts of road traffic resulting from road projects and is considered to be relevant to the assessment of noise from the new access roads in Areas B and C.

[10] Calculation of Road Traffic Noise, DoT, 1988

[11] Design Manual for Roads and Bridges, LA111, Noise and Vibration, Revision 2, Noise and vibration, 2011

6.5.5 The assessment approach is designed to be proportionate to minimise unnecessary work, the level of assessment required dependant on the potential for impacts to occur. For example, a detailed assessment may be appropriate if the daytime noise level exhibits a permanent change in magnitude as a result of the new road scheme of 1 dB $L_{A10(18\ hour)}$ in the short term (i.e. the opening year) or a 3 dB $L_{A10(18\ hour)}$ change in the long term (typically 15 years after opening). A change in road traffic noise of 1 dB $L_{A10(18\ hour)}$ in the short term is the smallest that is considered perceptible; a change of 3 dB $L_{A10(18\ hour)}$ change in the long term is considered perceptible.

6.5.6 According to the guidance, a change in noise level of 1 dB $L_{A10(18\ hour)}$ is equivalent to a 25% increase or 20% decrease in traffic flow (assuming other factors remain unchanged). A change of 3 dB $L_{A10(18\ hour)}$ is equivalent to a 100% increase or 50% decrease in traffic flow.

6.5.7 This guidance provides a classification of the magnitude of impact for the daytime in terms of short-term changes in road traffic noise, as presented in Tables 3.54a of DMRB, reproduced below in Table 3. Greater increases in the long term are needed to result in a magnitude of impact and significant comparable to the short term, and therefore an assessment on the grounds of a short-term noise impact provides a reasonably worst-case assessment of the potential future impact of road traffic noise.

Table 3: DMRB classification of magnitude and initial assessment of significance of short-term noise impacts

Change in Noise Level dB $L_{A10(18\ hour)}$	Magnitude of Noise Impact	Initial Assessment of Significance
<1.0	Negligible	Not Significant
1.0 – 2.9	Minor	
3.0 – 4.9	Moderate	Significant
≥5	Major	

6.6 Possible LOAEL and SOAEL Noise Standards

6.6.1 It is acknowledged that the NPSE and the Planning Practice Guidance both advise caution when attempting to set objective standards in relation to LOAEL and SOAEL that may be applicable to new development.

6.6.2 That said, the guideline values for internal noise within the WHO documents are set at the level of the lowest adverse health effect (the critical health effect) and as such, the values could form the basis of the LOAEL as referenced in the NPSE and PPG. Targeting the WHO guideline levels as the LOAEL should, therefore, provide a robust basis for assessment. No levels are provided within the WHO guidance that may be directly applicable to the SOAEL and any such threshold levels will, as indicated in the above guidance, vary depending on the specific circumstances of the development and the noise climate in which it is located.

6.6.3 With reference to external noise levels in gardens/external amenity spaces, the WHO lower guideline value of 50 dB L_{Aeq} during the day is intended to protect the majority of people from moderate annoyance and could, therefore, equate to the LOAEL. The upper guideline value of 55 dB L_{Aeq} is intended to protect the majority of people from serious annoyance and whilst this does not necessarily imply that this guideline value would equate to the SOAEL, it would be reasonable to suggest that the SOAEL might occur at a level at or above the guideline value of 55 dB $L_{Aeq.}$

6.6.4 DMRB states that LOAELs and SOAEL shall be set for all noise-sensitive receptors, for the periods when they are in use, and sets the daytime (06:00-24:00hrs) LOAEL as 55 dB $L_{A10,18hr,\ facade}$, and the SOAEL as 68 $L_{A10,18hr,}$

façade, which are subject to a proportionate modification depending on a reduced or increased sensitivity and where there is a potential change in the outcome of the assessment.

6.6.5 Where an assessment of noise impact to BS 4142:2014+A1:2019 is undertaken, a Rating Level that is 10 dB or more above the prevailing Background Sound Level (BSL) could be indicative of the SOAEL, depending on the context. BS 4142:2014+A1:2019 does not provide guidance on what may constitute the LOAEL but suggests that a Rating Level that is 5 dB or more above the BSL could result in an adverse impact with a Rating Level at or below the BSL indicative of a low likelihood of adverse impact, again depending on the context. The LOAEL could, therefore, fall somewhere between 0 and + 5 dB above the BSL.

7 Environmental Noise Survey

7.1 Survey Details

7.1.1 Part attended monitoring has been undertaken to quantify existing noise levels around the site using the equipment detailed in Table 4. The noise monitoring was undertaken using 'Type 1' instrumentation calibrated to nationally traceable standards within two years of the survey, and in general accordance with BS 7445-1: 2003[12]. Prior to and following the noise measurements acoustic field calibration of the sound level meters, microphones and pre-amps used was performed using an acoustic calibrator that itself had been calibrated within the preceding 2 years. No significant drift (i.e., >0.1dB) in the field-calibrated noise level was observed. Calibration certificates can be provided on request. The measurement microphones were fitted with a suitable windshield for the duration of the noise monitoring, with the microphones orientated vertically, and at least 3.5m from any reflective surface other than the ground. The results of the measurements are therefore free-field noise levels. Noise levels were measured in terms of broadband and spectral levels. Details of the measurement locations, their purpose, and the existing prevailing noise sources at each location are summarised in Table 5. The measurement locations are shown in **Appendix A**. Noise data are sound pressure levels in dB re 20 μPa, and generally rounded to the nearest dB(A) as fractions of decibels are imperceptible to the human ear.

7.2 Survey Conditions

7.2.1 There were no abnormal/atypical local traffic restrictions (e.g., roadworks or temporary speed limits) in place during the surveys on any nearby roads. Weather conditions were observed at the start and on completion of the survey and were dry and calm. The prevailing local conditions during the survey were therefore judged to be acceptable for the survey and subsequent assessment.

[12] BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

Table 4: Noise survey equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1[13],[14] Integrating Real Time 1/3 Octave Sound Analyser	XL2-TA	NTi Audio	A2A-11111-E0	13/09/2021	05451/1
Microphone	MC230A		A14423	13/09/2021	N/A*
Class 1[13],[14]Integrating Real Time 1/3 Octave Sound Analyser	XL2-TA	NTi Audio	A2A-15860-E0	01/03/2021	05145/1
Microphone	MC230A		A16445	01/03/2021	N/A*
Class 1 Calibrator[15]	CAL 200	Larson Davies	14154	07/09/2020	04796/1

*No reference number available, but the certificate is available upon request.

Table 5: Description and purpose of noise measurement locations and noise sources

Measurement Location (Appendix A)	Location Description	Purpose	Main Noise Source(s)
NML1	2m above ground and 1m from boundary with rear garden of dwellings on Heather Bank	To establish existing daytime and night-time noise levels outside existing dwellings on Heather Bank, James Street and Heathcote Park, and noise-sensitive development in Area 2.	Distant road traffic
NML2A	1.5m above local ground, adjacent to rear garden of dwelling on Sanderson Park	To establish existing daytime and peak hour noise levels outside existing dwellings on Sanderson Park.	Distant road traffic
NML2B	1.5m above local ground, on access road to dwellings on Threaplands facing Bowthorn Road	To establish existing peak hour noise levels outside existing dwellings on Bowthorn Road and Threaplands.	Road traffic.
NML3	1.5m above local ground, towards northern site boundary	To establish existing noise levels outside rear of existing dwellings on Bowthorn Road.	Road traffic and some steady and very faint noise from industrial uses within Area 1
NML4A	1.5m above local ground, on southern site boundary	To establish existing noise levels outside rear of existing dwellings on Leconfield Street.	Steady fixed plant at rear of Capital Aluminium Extrusions.
NML4B		To establish existing noise levels outside rear of existing dwellings on Furnace Court	

[13] IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

[14] IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

[15] IEC 60942 (2003) Electroacoustics – Sound calibrators

7.3 Monitoring Results

7.3.1 Survey results and observations at each measurement location are summarised as follows.

NML1

7.3.2 Existing environmental noise levels were logged at NML1 from 13:00hrs on Tuesday 23rd November 2021 until 07:00hrs on Wednesday 24th November 2021. The results of these measurements are considered as being representative of existing noise levels outside dwellings on Heather Bank, James Street and dwellings on Heathcote Park that area set well back from Birks Road to the east of Area 2, and also any potential noise-sensitive development within in Area 2.

7.3.3 A summary of the broadband noise levels measured at NML1 is provided in Table 6. Due to the volume of data obtained, the results are shown graphically (time-level history) in **Appendix B**. Raw data are held on file and can be provided on request.

Table 6: Range of measured broadband noise levels, NML1

Date	Period	Elapsed Time, T (hh:mm)	Range of Measured Noise Levels, dB			
			$L_{AFmax,15min}$	$L_{Aeq,15min}$	$L_{A10,15min}$	$L_{A90,15min}$
Thu 23/11/2021	Day	10:00	47 – 73	36 – 47	39 - 47	31 - 44
Fri 24/11/2021	Night	08:00	38 – 62	28 - 44	29 - 47	26 - 41

7.3.4 Noise levels at this location exhibit the diurnal characteristics expected of semi-urban locations exposed to road traffic. Statistical analysis of the measured background sound levels ($L_{A90,15min}$) data has also been undertaken and histogram of the measured data is provided in **Appendix C**. The mode of the measured day and night-time L_{A90} data has been taken as being representative of the prevailing background sound level at NML1.

7.3.5 In summary, at NML1;

- The dominant source of noise was road traffic throughout the survey.
- The measured daytime noise exposure level ($L_{Aeq,10hr}$) and the daytime road traffic noise exposure level were calculated in accordance with the shortened method of CRTN (using the measured L_{A10} noise levels between 13:00-16:00hrs) are both 43 dB L_{Aeq}.
- The measured noise level during the PM Peak hour (17:00-18:00hrs) was 44dB $L_{Aeq,1hr}$.
- The measured night-time noise exposure level was 38dB $L_{Aeq,8hr}$
- The typical free-field night-time L_{AFmax} sound levels were typically below 60dB L_{AFmax}.
- The typical free-field background sound level (**Appendix C**) is taken as being;
  - 42 dB $L_{A90,1hr}$ in the daytime (07:00-23:0hrs); and,
  - 28 dB $L_{A90,15min}$ at night (07:00-23:00hrs) which is low in absolute terms.

NML2A/2B, NML3, NML4A/4B

7.3.6 The results of the noise survey at these locations are summarised in the following table. Full results are provided in **Appendix D**.

Table 7: Range of measured daytime broadband noise levels, NML2A-NML4B

Measurement Location	Period	Range of Measured Noise Levels, dB			
		$L_{AFmax,15min}$	$L_{Aeq,15min}$	$L_{A10,15min}$	$L_{A90,15min}$
NML2A	Daytime	62-67	45-47	47	40-43
	PM Peak hr	57-59	43	46	39
NML2B	PM Peak hr	73	59-60	65	42
NML3	Daytime	54-57	46	47-48	43-44
NML4A	Daytime	60	52	53	51
NML4B	Daytime	68	56	58	55

7.3.7 The survey results are summarised as follows:

7.3.8 At NML2A;

- The main source of noise was road traffic throughout the survey.
- The daytime road traffic noise exposure level calculated in accordance with the shortened method of CRTN (using the measured L_{A10} noise levels between 13:30-15:58hrs) was 44 dB $L_{Aeq,16hr}$.
- Road traffic noise levels decreased slightly during PM Peak hour to 43dB $L_{Aeq,1hr}$.
- The typical daytime free-field background sound level is taken as being 40 dB $L_{A90,1hr}$ in the daytime.

7.3.9 At NML2B;

- The main source of noise was road traffic throughout the survey.
- The PM Peak hour road traffic noise levels were 59-60 dB $L_{Aeq,15min}$, and has been taken as being 60 dB $L_{Aeq,1hr.}$ and daytime road traffic noise levels are likely to exceed 50dB $L_{Aeq,16hr}$ at this location.
- Regular peaks in noise were attributable to passing traffic and were up to 73 dB L_{AFmax}.
- The typical daytime free-field background sound level is taken as being 42 dB $L_{A90,1hr}$.

7.3.10 At NML3;

- The main source of noise was road traffic throughout the survey, although some very faint and steady fixed plant was audible from one existing premises in Area 1 of the Site.
- The daytime road traffic noise exposure level calculated in accordance with the shortened method of CRTN (using the measured L_{A10} noise levels between 13:55-16:16hrs) was 45 dB L_{Aeq}.
- The typical daytime free-field background sound level is taken as being 43 dB $L_{A90,1hr}$.

7.3.11 At NML4A;

- The main source of noise was steady fixed plant at the rear of Capital Aluminium Extrusions (**Appendix A**).
- The measured ambient noise level was 52 dB $L_{Aeq,T.}$
- The typical daytime free-field background sound level is taken as being 51 dB $L_{A90,1hr}$.

7.3.12 At NML4B;

- The main source of noise was steady fixed plant at the rear of Capital Aluminium Extrusions (**Appendix A**).
- The measured ambient noise level was 56 dB $L_{Aeq,T}$, 4 dB louder than at NML4A, a short distance away.
- The typical daytime free-field background sound level is taken as being 55 dB $L_{A90,1hr}$

8 Impact of Existing Noise Sources on Noise-Sensitive Development in Area 2

8.1.1 The existing noise climate at NML1 has been assessed against the ProPG noise risk levels to determine the potential effect of noise on any proposed noise-sensitive development in Area 2 in the absence of any specific noise mitigation measures

8.1.2 As can be seen in Table 8, the noise levels measured at NML1 indicate “no adverse effect”.

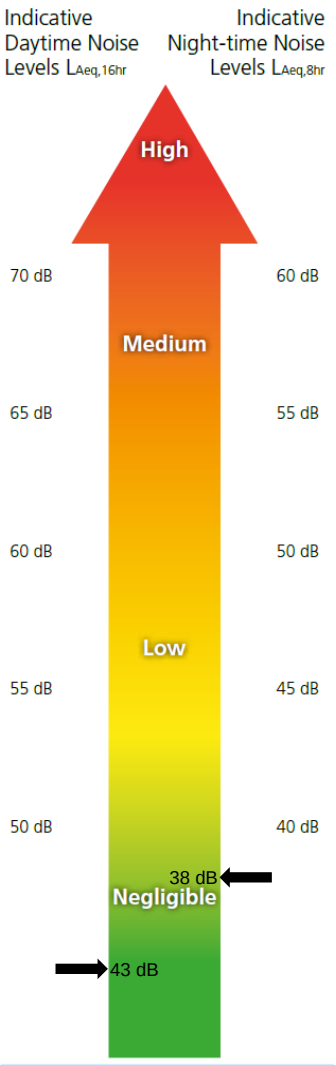
8.1.3 The generally accepted rule of thumb is that a window left open for ventilation provides 10 - 15 dB attenuation from external noise sources with the WHO Guidelines for Community Noise suggesting 15 dB. The DEFRA report NANR116: Open/Closed Window Research[16] suggests the figure to be between 12 and 18 dB for road and rail traffic. ProPG indicates that where external noise levels are more than 15 dB higher than the internal noise targets, openable windows should not be relied upon as the sole means of ventilation and some form of acoustically attenuated ventilation may be required. This equates to an external noise level of 45 dB L_{Aeq} / 60 dB L_{Amax} during the night or 50 dB L_{Aeq} during the day.

8.1.4 External noise levels measured at the site are below the threshold levels below which internal noise levels remain achievable with the use of open windows for ventilation, and therefore no additional noise mitigation measures are considered necessary to achieve the guideline internal or external level limits of BS8233 or WHO GCN.

8.1.5 Noise from football matches at CMCFC will, inevitably, generate some noise. However, we understand that no formal noise complaints relating to matches held at CMCFC have been received, and, if necessary, any noise impact on any noise-sensitive development in Area 2 can be dealt with by a suitably worded planning condition, that requires a supplementary survey and assessment. Consequently, noise risk in Area 2 is considered to be low.

[16] NANR116: ‘Open/closed window research’ Sound Insulation through ventilated open windows, Defra April 2007

Table 8: ProPG Noise Risk Level Assessment, Area 2

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.
		As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
		At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No Adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Typical Night-time L_{Amax} (dB)	> 60 dB?	L_{Amax} Level Comment
<60	No	An indication that that there is fewer than 10 noise events at night-time with L_{Amax} > 60 dB means the site should be regarded as negligible risk.

Table Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is not dominant.

9 Prediction of Noise from the Proposed Development

9.1.1 Future noise from the site is needed to be calculated as far as reasonably practicable. The operator of any new industrial buildings cannot be established at this early stage. Consequently, as agreed with CBC, the prediction of noise from the proposed development has been limited to the prediction of road traffic noise levels from Areas 2 and 3, and has been undertaken using the CadnaA noise prediction software/

9.2 Modelling Parameters

9.2.1 The general horizontal plan information of the area surrounding and including the proposed development site was imported from Google Maps and OpenStreetMap. This was used to determine building footprint areas and relative locations and is considered accurate to within 5%. Building height information was based on a combination of assumptions, on-site observations or plans provided by the client architects. Existing site topography has been obtained from the National LIDAR Programme DEFRA Data Services Portal.

9.2.2 Specific model parameters were applied as follows;

- Propagation model: ISO 961317.
- Default ground absorption: 0.8.
- Two orders of reflection.
- No adverse weather.
- Buildings are reflecting (smooth, non-structured facade).

9.3 Road Traffic Input Data

9.3.1 Traffic flow data been provided by the projects Transport Consultant (Tetra Tech Ltd) was in the form of 18-hour AAWT flows for the access roads into Areas 2 and 3 for the baseline year (2019) and 2032 with the full development. The AAWT traffic flow data and posted road speeds used in the noise assessment are provided in **Appendix G**. The traffic data shows that;

- Area 3 access road will generate an 18hr AAWT traffic flow of 1366, with 10% HGV's
- For Area 3, a higher HGV flow is predicted in the AM peak hour, equivalent to around 14% of the daily predicted HGV flows into Area 3.
- Area 2 traffic flows are predicted to increase significantly.

9.3.2 The traffic data has been used to calculate the highest free-field noise levels at the façade of existing noise-sensitive receptors (NSRs) closest to Areas 2 and 3 utilising the building evaluation function of CadnaA. The NSRs have been grouped based on their proximity to the access roads serving Areas 2 and 3, as summarised in the following table, and indicated in **Appendix G.**

[17] ISO 9613-2: 1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation

Table 9: NSR Grouping

NSR Reference	NSR
NSR1	Dwellings on Threaplands
NSR2	Dwellings on Sanderson Park
NSR3	Dwellings on Heather Bank
NSR4	Dwellings on Heatcote Park

9.3.3 Noise levels calculated for two scenarios in the absence of any additional noise mitigation measures as follows;

- the daytime road traffic noise level ($L_{Aeq,16hr}$) from the access roads into Area 2 and 3 using the methodology set out in CRTN; and
- the AM Peak hour noise level attributable to HGVs.

9.3.4 The AM peak noise from HGV movements has been modelled as a moving point source (at 30mp/h or 48km/h), 0.5m above local ground. Source noise data adopted for HGVs is shown in Table 10 and is derived from L_{AFmax} pass-by noise levels contained in BS 5882 (Table C.6 Ref. 21).

Table 10: HGV source noise used within CadnaA

Source Description	Location	Sound Power Level, L_W dB at Octave Band Centre Frequency, Hz								L_{WA} dB(A)
		63	125	250	500	1k	2k	4k	8k	
HGV	On access roads to service areas of new units in Area 3	124	110	102	101	105	100	99	92	108.6

10 Impact of Noise from the Proposed Development

10.1 Peak Hour Assessment of HGV movements

10.1.1 The highest calculated AM peak hour HGV noise level at each NSR group is summarised in Table 11. Note that the traffic data provided (**Appendix E**) shows that there will be no HGVs to/from Area 2.

BS 4142:2014

10.1.2 A BS 4142 noise impact assessment of HGV movements has been undertaken in order to assist in assessing the potential noise impact at the identified NSRs closest to the proposed development site during the AM Peak hour when HGV trips to/from the site are expected to be at their highest. Predicted noise contours for this scenario are provided in **Appendix G**.

10.1.3 The following BS 4142 assessment has only considered the daytime impact (between 07:00-23:00hrs) as the proposals only includes daytime operations. Noise from HGVs will be comparable in character to that of the existing noise climate at the NSRs that is attributable to existing road traffic and should not contain tonal components or impact noise that could be perceptible at the NSRs. Therefore a +3dB acoustic feature correction

has been applied for '*other characteristics'* as noise from the site, whilst not being tonal or impulsive and comparable to the existing noise climate, would likely be new and audible against the underlying noise climate.

10.1.4 Table 11 details the results of the initial assessment of noise associated with HGV movements during the AM peak hour in the absence of any additional noise mitigation measures incorporated into the layout of the site considered in this assessment and identifies a **low impact**. However, the results show that the rated sound level exceeds the background sound level by up to 3dB and also, therefore, the Councils standard BS4142 noise criterion. Consequently, a reduction of noise from the access road serving Area 3 is necessary in order to achieve the Councils criterion.

10.1.5 Table 12 details the results of the initial assessment of noise associated with HGV movements during the AM peak hour, with a 2.0m high (relative to the access road and car parking areas) non-absorbent noise barrier along the access road and around the southern and western boundaries of the car park of Plot B1 and service yard of Plot B7 as shown in **Appendix F**. The results of the assessment show that CBC's standard BS 4142 noise criterion is capable of being achieved provided suitable acoustic screening is incorporated into the design of the site. At all other times of the day, noise impact from HGV movements is expected to be lower and CBC's standard noise criterion for industrial sources achieved by default with the 2.0m noise barrier.

Table 11: BS 4142:2014 assessment of HGV movements, AM Peak Hour, no additional mitigation

NSR Reference	Background Sound Level $L_{A90,15min}$	Specific Sound Level dB $L_{Aeq,1hr}$	Acoustic Feature Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
NSR1	42 (NML2B)	40	+3 (other characteristics)	43	+1	Low impact
NSR2	40 (NML2A)	41		44	+4	
NSR3	42 (NML1)	39		42	0	
NSR4		40		43	+1	

Table 12: BS 4142:2014 assessment of HGV movements, AM Peak Hour, with mitigation

NSR Reference	Background Sound Level $L_{A90,15min}$	Specific Sound Level dB $L_{Aeq,1hr}$	Acoustic Feature Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
NSR1	42 (NML2B)	39	(other characteristics)	42	0	Low impact
NSR2	40 (NML2A)	37		40	0	
NSR3	42 (NML1)	37		40	-2	
NSR4		38		41	-1	

Comparison to Peak Hour Road Traffic Noise Levels

10.1.6 The highest calculated daytime road traffic noise level from access roads into Areas 2 and 3 at each NSR group are summarised in Table 13, and includes the acoustic screening considered above.

Table 13: Comparative assessment of HGV movements, AM Peak Hour, with mitigation

NSR Reference	*Existing Peak Hour* $L_{Aeq,1hr}$	HGV Specific Sound Level dB $L_{Aeq,1hr}$	Difference between Existing Peak Hour and Specific $L_{Aeq,1hr}$, dB
NSR1	60 (NML2B)	39	-21
NSR2	43 (NML2A)	37	-6
NSR3	44 (NML1)	37	-7
NSR4		38	-6

10.1.7 A comparative assessment of the results in Table 13 shows that during the AM peak hour, noise from HGVs will be significantly lower than that of the existing noise climate and a further indication that vehicular noise from the site should not give rise to unacceptable impact on the amenity of existing residential areas.

10.2 Assessment of Daytime Road Traffic Noise

10.2.1 The highest calculated daytime road traffic noise level ($L_{Aeq,16hr}$) at each group of NSRs are summarised in Table 14. The calculation includes the acoustic screening for Area 3 considered above, and the use of the access road and car park in Area 2.

Table 14: Summary of predicted daytime road traffic noise levels from Area 2 and 3 Access Roads

NSR Reference	Highest Predicted dB $L_{Aeq,16hr}$ Road Traffic Noise Level	Measured/Calculated dB $L_{Aeq,16hr}$ Noise Level	Calculated Cumulative dB $L_{Aeq,16hr}$ Noise Level	Predicted increase in daytime road traffic noise	DMRB Assessment of Significance in the Short-term
NSR1	40	> 50 (NML2B)	50.4	<0.4 dB	Not Significant
NSR2	37	44 (NML2A)	44.8	0.8 dB	
NSR3	38	42 (NML1)	43.5	1.5 dB	
NSR4	39		43.8	1.8 dB	

10.2.2 With acoustic screening;

- the predicted increase in daytime noise levels at all identified NSRs is less than 2 dB, which when assessed to the short-term significant criteria of DMRB, is ‘not significant’;
- the cumulative noise level is approximately 10 below the LOAEL of DMRB at NSR1 and well below the LOAEL at all other NSRs;
- is well below the 50 dB $L_{Aeq,16hr}$ guideline level limit advocated by BS8233 / WHO GCN at NSR2-4, and well below the existing L_{Aeq} noise level at NSR1; and,
- resulting daytime noise levels within dwellings attributable to access roads to Areas B and C would be well below the guideline values of BS8233 / WHO GCN.

10.2.3 Therefore, based on the layout and traffic data provided and suitable noise mitigation, an increase in daytime road traffic noise as a result of the operation of Area 2 and 3 should not give rise to unacceptable noise impact at the nearest dwellings.

10.3 Night-time L_{AFmax} Assessment

10.3.1 It is common to assess the potential impact of individual night-time noise events from, for example, traffic pass-bys on new residential developments, where such events have the potential to disrupt an individual's sleep. The normal criterion applied is an indoor maximum of 45 dB L_{AFmax} at night; this is referenced within both BS 8233 and WHO GCN.

10.3.2 No existing or proposed industrial areas will operate at night. Therefore, the potential for disturbance at night is limited to car parking associated with the residential uses in Area 2, the closest receptor to which is NSR3.

10.3.3 CadnaA has been used to predict the highest L_{AFmax} pass-by noise level attributable to moving vehicles in the car park within Area 2 as shown in the layout in Appendix A. The highest L_{AFmax} noise level predicted by the model was 56 dB $L_{AFmax.}$ Assuming an attenuation across a window opened for ventilation of 12 dB (WHO suggests an allowance of 10 – 15 dB), the predicted indoor noise level at night would be in the region of 44 dB L_{AFmax}, 1 dB less than the guideline limit.

10.3.4 Therefore, the benefit of acoustic screening around/towards the boundary of the Area 2 with CMCFC and dwellings on Heather Bank has been investigated. Where a 2.0m high acoustic screen (i.e. solid, imperforate noise barrier) is located in Area 2' as shown in **Appendix F**, the highest L_{AFmax} noise level predicted by the model was 52 dB $L_{AFmax,}$ and consequently, the predicted indoor noise level would be in the region of 40 dB L_{AFmax}, 5 dB less than the recommended limit.

10.3.5 Therefore, it is considered that some noise mitigation measures are necessary to reduce car parking noise from Area 2 at existing dwellings.

11 Outline Recommended Mitigation Measures

11.1 Area 1 – General Recommendations

11.1.1 Whilst any new Use Class E development in Area 1 would not generate significant levels of noise, some new industrial uses are proposed. Furthermore, there will be an increase in road traffic on existing access roads, and the redevelopment of the site provides an opportunity to reduce noise from an existing and significant source of noise within Area 1.

11.1.2 Therefore, the following outline noise mitigation and reduction measures are recommended;

- Ideally, new traffic attracted to the site for Area 1, should be routed away from the internal road close to existing dwellings on Sanderson Park to the north of Area 1. Where this is not practicable or otherwise, there may be a need to incorporate acoustic screening to sections of the access road in this Area of the site.
- Any new service yards should be located away from and should not have a direct view to existing dwellings.
- There should be no external tannoys used in any new development except in emergencies.

- The occupier of each of the units in Area 1 submit and Noise Management Plan (NMP) for approval.

11.2 Area 3 - General Recommendations

11.2.1 The massing, layout, orientation and future uses of proposed units in Area 3 may change through the design process, and therefore to minimise the potential for unacceptable noise impact, the following outline measures are recommended;

- As shown in **Appendix A,** open land to the west of Sanderson Park should be retained as such in future iterations of the layout in order to ensure the viability of the use of the proposed units for the whole of Area 3 (as noise impact would be cumulative).
- The access road should be located as far away as practicable from, and not be located any closer to existing dwellings.
- As indicated in **Appendix F**, acoustic screening should be incorporated into the design of Area 3, and include as a minimum;
  - the outer boundary of the service yard for Plot B1 and B7 and other plot designations in future layouts of equal or closer proximity to existing dwellings;
  - the length of the access road and be staggered where necessary (as indicated in Appendix F) to allow pedestrian access and maximise acoustic screening.
- Service yards should be located away from existing dwellings to the south of Area 3.

11.3 Area 2 - General Recommendations

11.3.1 As with Area 3, the massing, layout, orientation and future use of Area 2 is in outline and may alter in future. Nevertheless, the assessment indicates that mitigation measures will be necessary for any office development to ensure vehicular noise does not result in unacceptable noise impact. Furthermore, noise from CMCFC during a match may be significant and acoustic glazing/ventilation may be warranted for any noise-sensitive development in this area. Therefore, the following outline mitigation measures are recommended.

- Access to any new buildings should be located on elevation(s) away from existing dwellings on Heather Bank and Thompson Close.
- Car Parking should not be any closer to existing dwellings than as shown in Appendix D unless proposed buildings provide a significant reduction (by acoustic screening) in vehicular noise
- Where there is a clear line of sight to the access road or car parking areas, acoustic screening around/towards the outer boundary of Area 2 with existing dwellings and CMCFC grounds will likely be necessary. **Appendix F** indicates the potential full extent of the acoustic screen that may be necessary.
- At the detailed design stage, and where noise-sensitive development is proposed in Area 2, noise from CMCFC should be measured and assessed to ensure that the proposals do not prejudice its legally permitted use.
- Any fixed plant, equipment, or louvred elements on the building envelopes should be located on elevations facing away from existing nearby dwellings to the east of Area 2.
- Rooftop plant may require acoustic screening and should be incorporated into the designs at an early stage.
- Servicing of any uses in Area 2 should take place in the daytime only.

11.4 All Areas

Noise Level Limits

11.4.1 The final use of any proposed noise generating areas of any new development associated with the project is not known at this stage and consequently, the associated potential noise impact cannot be readily and reliably established, predicted and assessed. Therefore, in line with CBC's standard noise criteria, and provided all other necessary noise mitigation measures are incorporated into the design and use of the development, we recommend that the following outline cumulative noise rating level limits should not be exceeded in the daytime.

Table 15: Outline recommended daytime cumulative noise rating level limits for new plant, equipment and operational activities

NSR Reference	NSR	Outline Recommended Noise Rating Level Limit, dB $L_{Ar,1hr}$
NSR1	Dwellings on Threaplands	42 (NML2B)
NSR2	Dwellings on Sanderson Park	40 (NML2A)
NSR3	Dwellings on Heather Bank	42 (NML1)
NSR4	Dwellings on Heatcote Park	
NSR5	Rear of Dwellings on Bowthorn Road	43 (NML3)
NSR6	Rear of Dwellings on Leconfield Street and Furnace Court	50 (NML4A)

11.4.2 It must be noted that the daytime limits above are;

- cumulative and apply to operational noise (excluding traffic) from the development as a whole, and some apportionment of the noise limits ought to be applied to each unit where necessary.
- are absolute levels, must account for any characteristics such as tonality, impulsivity, intermittency in accordance with BS4142.

11.4.3 Any deviation from the outline recommended daytime noise level limits ought to be justified in full, within the context of the wider development and surrounding area and its existing noise climate, and account for cumulative noise impact from new development any existing significant sources of noise.

11.4.4 For the night, existing background sound levels are low, and therefore, any noise from fixed plant, equipment and machinery that may be required to operate at night in any area of the site must also be low to ensure that it does not result in an adverse and unacceptable noise impact on the amenity of existing and proposed noise sensitive receptors within the site. Ideally, the rated cumulative noise level of any new fixed plant and equipment associated with any night-time uses in Area 2 (offices and student accommodation) should not exceed the existing underlying background sound level of 28dB $L_{Aeq,15min}$ in order to meet CBC's standard plant noise criterion. This is a very low level of noise and a deviation (i.e. slight increase) in this limit may be permissible without resulting in unacceptable noise impact and should be agreed in advance with CBC.

Reduction and Management of Noise

11.4.5 In order to further minimise noise emission from the site the following outline measures should be considered to secure the viability of the development;

- There should be no external tannoys in any new premises/uses except in emergencies.
- Use of electrically powered external mobile plant and equipment.
- Broadband (white noise) reverse warning alarms (i.e. not tonal bleepers that are most common);
- un/loading activities are carried out internally, or via docking bays;
- the movement of materials externally is carried out carefully, and diligently, and are not dropped or banged to avoid generating significant levels of impact type noise.
- any roller shutter doors in the building envelope of building within which significant levels of noise are present are fast action, sectional overhead roller shutter doors and are specified to achieve a good level of sound insulation performance (e.g. around 25 dB Rw).
- roller shutter doors remain closed at all times unless in use, with their opening height-restricted where feasible to reduce noise egress from internal activities.
- external access doors should be solid type, and be well maintained, and not left open.
- all plant and equipment should be appropriately maintained and be located away from existing dwellings are far as reasonably practicable.

11.5 Acoustic Screening

11.5.1 As discussed above, acoustic screening is considered necessary for some areas of the site to safeguard the amenity of existing residential areas. The location, extent, height, and construction of any acoustic screening will need to be fully explored and determined at the reserved matters stage when the final development layout is known. Nevertheless, the locations and heights of the recommended acoustic screens should be regarded as the minimum required at this stage and should be reviewed early in the detailed design stage.

11.5.2 Developmental constraints of any acoustic mitigation will need to be determined, but acoustic screening can be delivered in the form of one or more, or a combination of;

- continuous, imperforate fencing with a minimum mass of 12 kg/m^2 that extends from the ground to the minimum height required (usually relative to the ground height of the source(s) being mitigated. Close-boarded or overlapped timber panelling would normally be suitable; hit-and-miss fencing would not.
- a proprietary acoustic fence with a minimum weighted sound reduction index of 25 dB R_w
- a baffle mound or bund of the same minimum height which are generally considered to be more favourable in terms of visual impact, although logistical or other limitations/constraints may negate the use of a baffle mound.

11.6 Consideration of Other Discipline Requirements

11.6.1 The suitability of any noise mitigation measures will need to be determined with the project planning consultants and architects, structural/civil engineers, contractors, fire and health and safety consultants and material manufacturers prior to procurement and field application so that the relevant noise mitigation and control measures satisfy the requirements of all disciplines.

12 Conclusions

12.1 Miller Goodall Ltd has on behalf of Copeland Borough Council, undertaken a noise assessment in connection with an outline planning application for the refurbishment and extension of Leconfield Industrial Estate, Cleator Moor, Copeland, CA25 5QB.

12.2 The site falls within the administrative boundary of Copeland Borough Council (CBC) who have requested a noise assessment be submitted in connection with the application to ensure that a reasonable degree of amenity is capable of being secured for both existing nearby, and proposed noise-sensitive areas of the development from both existing and proposed noise-generating areas of the site and wider area.

12.3 Noise surveys have been undertaken at locations representative of existing dwellings and proposed noise-sensitive development that would be closest and most exposed to any noise associated with the proposals.

12.4 Potential road traffic noise emissions from the new access roads in Areas 2 and 3 have been predicted using computer noise modelling which has then been assessed against a range of guidance, standards and policies.

12.5 The assessment found that, provided appropriate noise mitigation measures are incorporated in the design and use of the development, that the predicted increase in noise levels attributable to proposed new access roads should not result in an adverse or unacceptable noise impact on the amenity of existing or proposed noise-sensitive receptors.

12.6 As the project is being submitted in outline terms, full details of the location, number, type and operating hours of any fixed plant, equipment, machinery or operational activities cannot be readily established and assessed.

12.7 Therefore, to safeguard the amenity of existing and any proposed noise-sensitive development and ensure the viability of the development, a collection of outline noise mitigation and control measures have been provided that aim to minimise potential noise emission from the site. These measures include inter-alia, acoustic screening, the location and orientation of buildings, and noise level limits.

12.8 Fixed plant at existing premises within the site generates a significant level of noise and, in line with the aims of the NPPF, consideration should be given to a reduction of noise from this plant at the nearest existing dwellings.

12.9 Provided appropriate noise mitigation and control measures are incorporated in the design and use of the site, an acceptable degree of residential amenity should be secured at both existing and proposed noise-sensitive receptors dwellings.

12.10 The requirement to incorporate mitigation measures into the design and use of the site can be secured by a suitably worded planning condition.

APPENDICES

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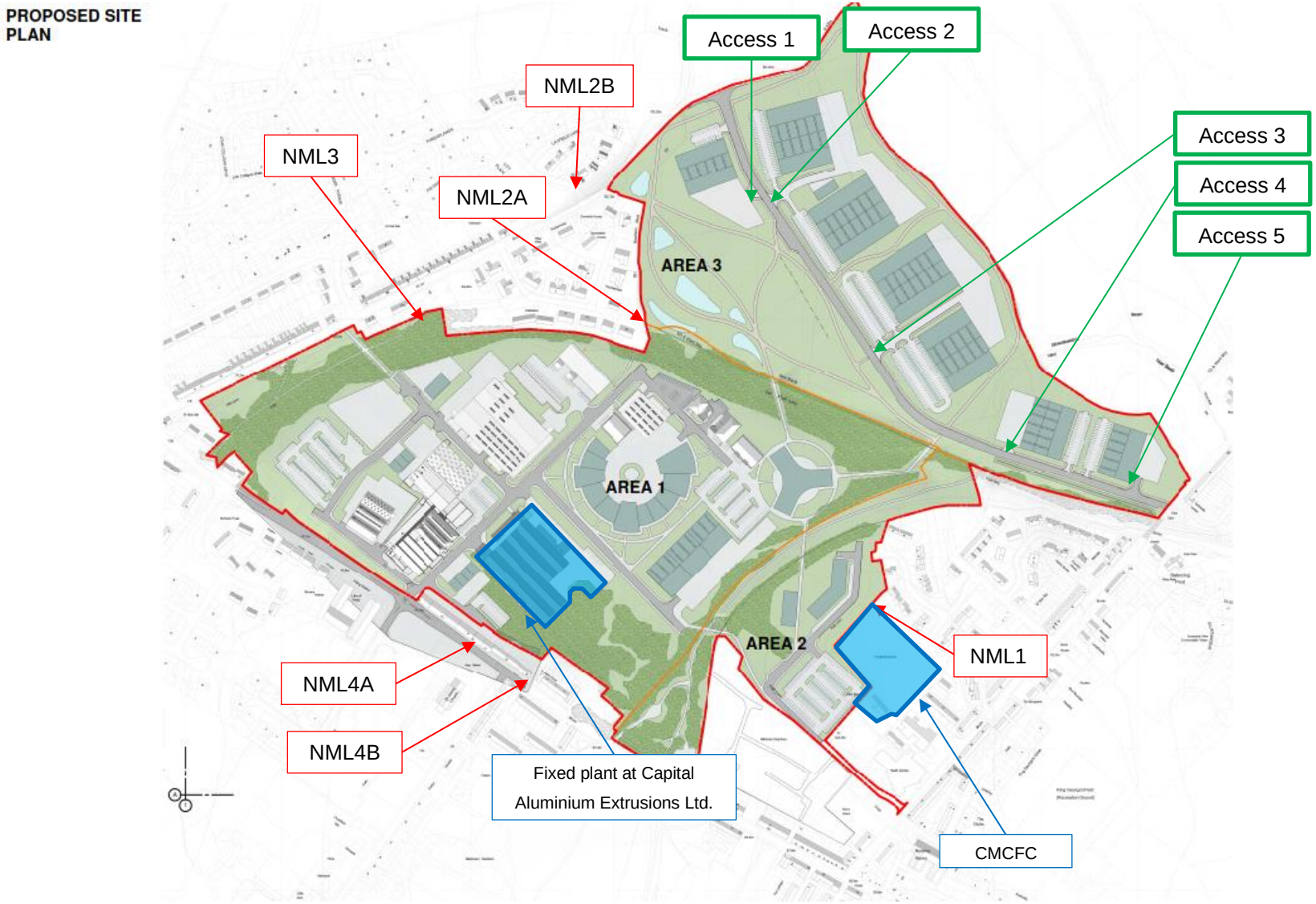
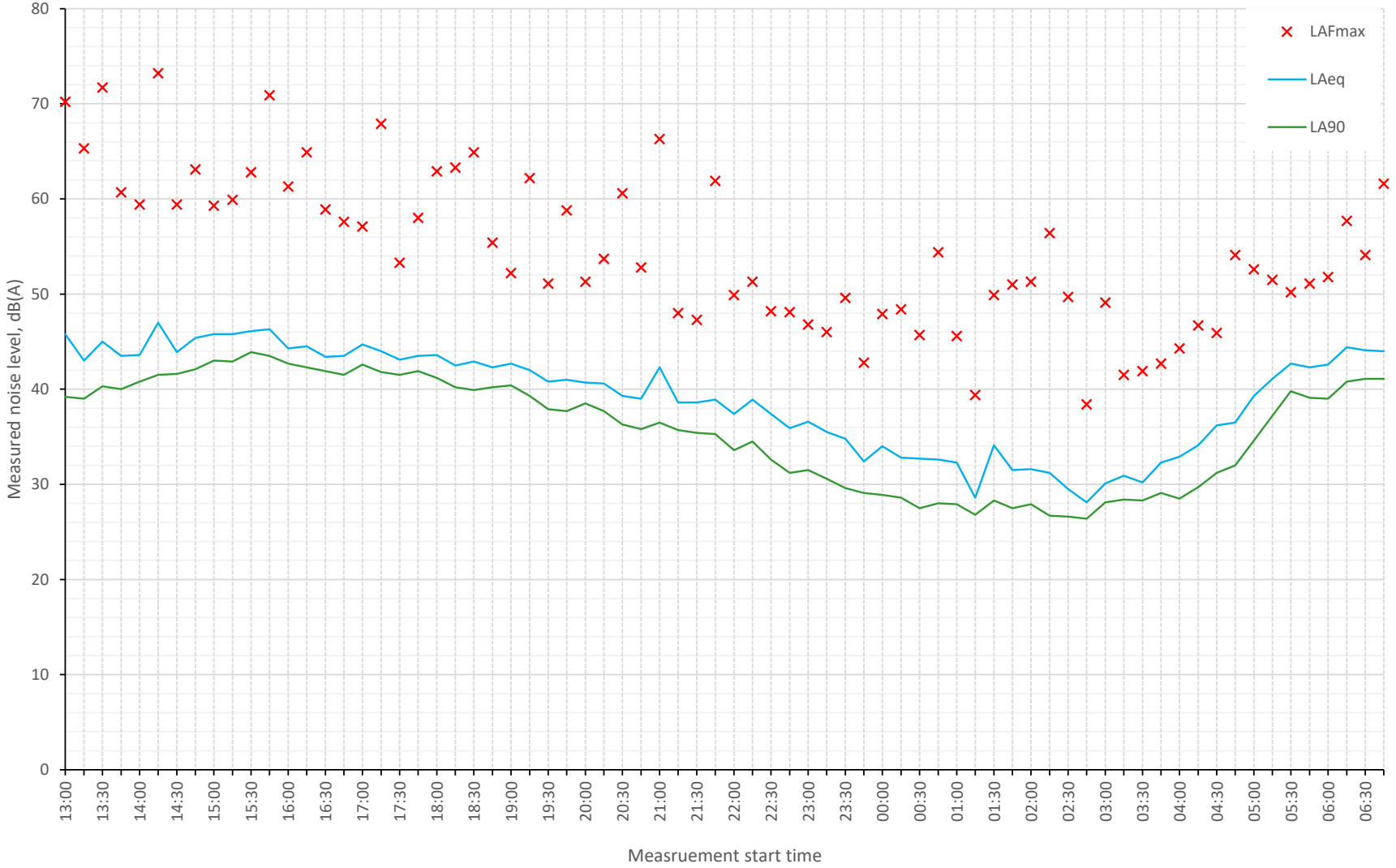
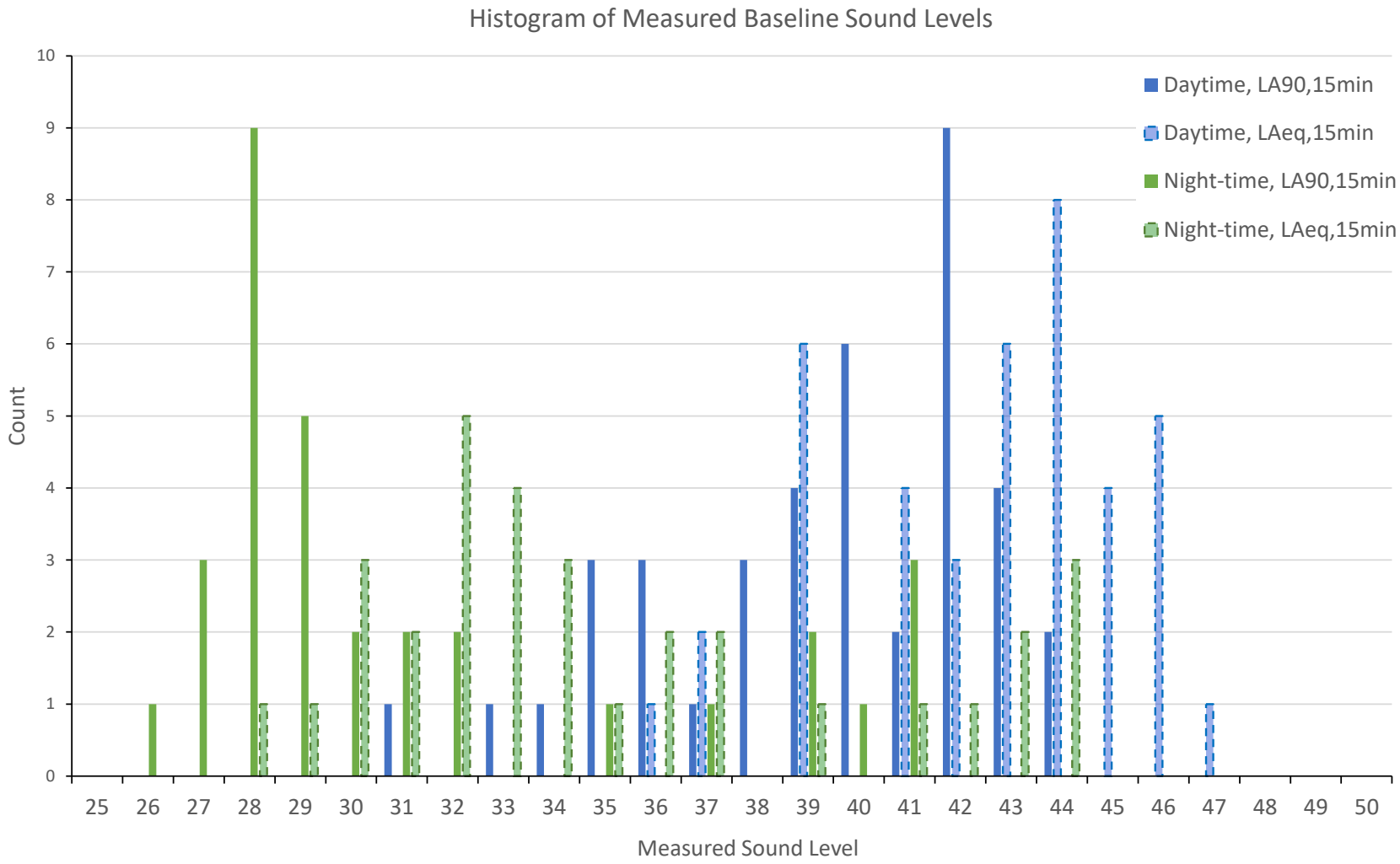
Appendix A: Proposed Layout and Noise Measurement Positions



Appendix B: Time-level history, NML1



Appendix C: Statistical Analysis of Measured Sound Levels, NML1



Appendix D: Noise Survey Measurement Data, NMl2A-NML4B

Description	Start Time	Elapsed Time (min:sec)	L_{AFmax} (dB)	L_{Aeq} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	Comments
NML2A	13:35	15:00	68.6	47.3	47.3	40.4	Road traffic. Occasional vehicle on Area 1 access Road
	14:42	15:00	62.3	45.7	47.2	40.1	
	15:43	15:00	67.4	45.4	47.0	42.9	
	17:09	14:04	57.2	43.3	46.0	39.0	
	17:46	14:24	58.6	43.2			
NML2B	16:50	14:35	73.4	59.3	64.8	42.1	Road traffic
	17:26	14:52	73.4	59.8			
NML3	13:55	15:00	53.8	45.5	47.5	42.8	Road traffic. Faint steady plant at nearby unit.
	15:10	15:00	56.8	46.2	48.0	43.8	
	16:01	14:56	56.6	45.6	47.2	43.6	Road traffic
NML4A	14:16	15:00	59.6	52	52.9	51.1	Steady fixed plant at rear of Capital Aluminium Extrusions Ltd. Distant Road traffic.
	15:29	10:00	59.7	52.2			
NML4B	14:32	04:20	68.2	56.6	58.1	55.2	

Appendix E: Traffic data

Traffic Data for Existing (Area 2) and Proposed (Area 3) Roads

Posted Speed Limit	Link Name	2019 Base Year			2032 Site Generated Traffic		
		AAWT	HGV	HGV %	AAWT	HGV	HGV %
32 km/h	Area 2 Access Road	321	0	0.0	1155	0	0.0
48 km/h	Area 3 Access Road	-	-	-	1366	138	10

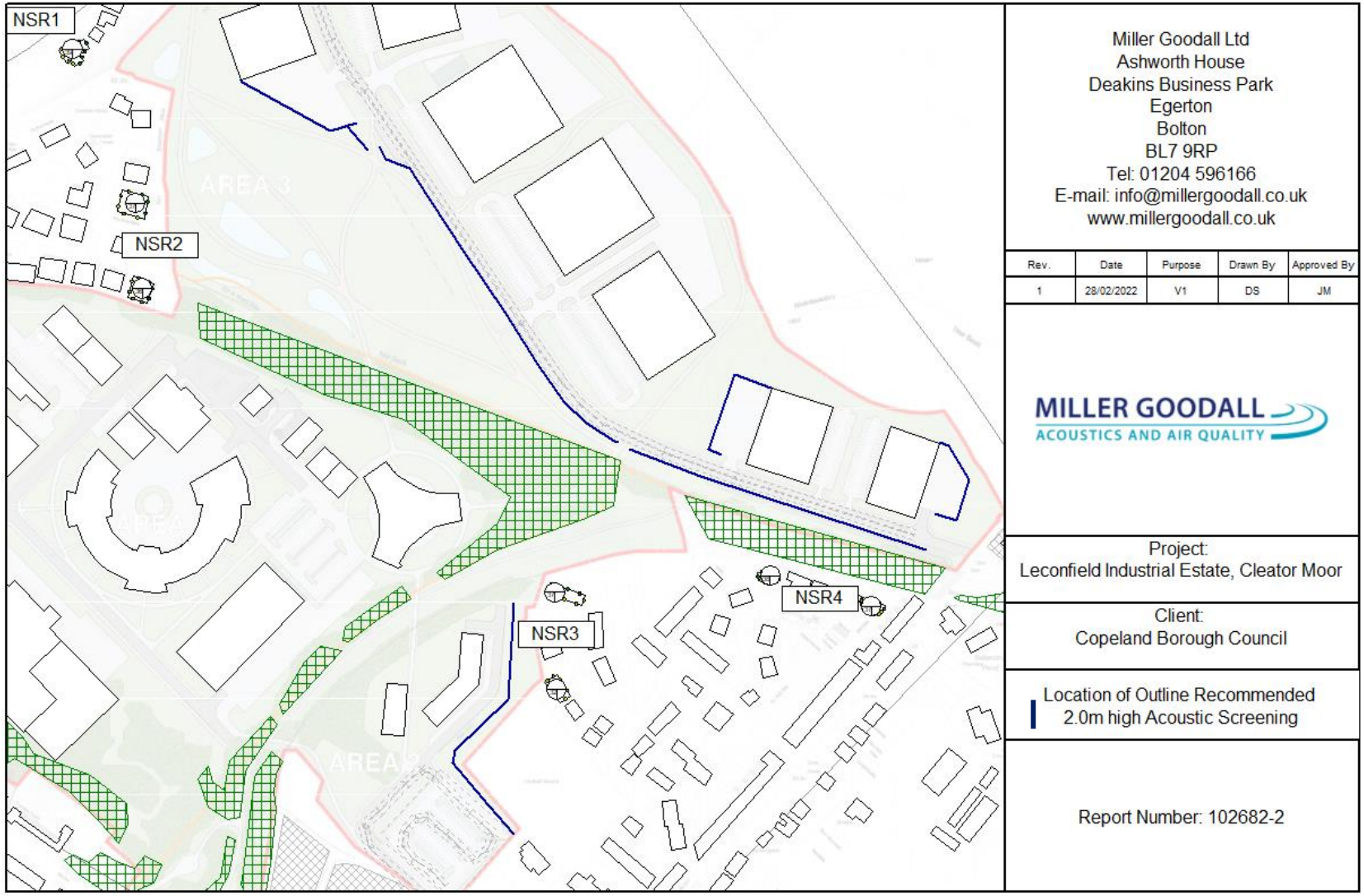
Area 3 - AAWT 18hr Vehicle Generation at Each Access

Access Number	Car Park Spaces	% of Car Parking at Site 3	AAWT Flow into Access/Car Park	AAWT Flow on Road to Access	Assumed Speed Limit
1	25	5%	74	1366	48 km/h
2	118	26%	351	1297	48 km/h
3	226	49%	673	945	48 km/h
4	45	10%	134	269	48 km/h
5	45	10%	134	135	48 km/h
Total	**459**	**100%**	**1366**		

Area 3 - HGV Vehicle Generation at Each Service Yard

Service Yard	Units	Combined GEA (m^2)	AM Peak Hour	PM Peak Hour	HGV Flow on Road to Access/Service Yard (AM PEAK)	AAWT Flow into Service Yard	Assumed Speed Limit
1	B1	9145	3	1	20	21	48 km/h
2	B2 & B3	25100	7	2	16	50	48 km/h
3	B4 & B5	23495	7	2	9	49	48 km/h
4	B6	6870	2	1	3	14	48 km/h
5	B7	4990	1	0	1	8	48 km/h
Total		**69600**	**20**	**6**			

Appendix F: Location of outline recommended 2.0m high acoustic screen, Area 2 & 3



Appendix G: Calculated AM Peak dB $L_{Aeq,1hr}$ HGV Noise Levels, 4m above local ground height

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Glossary of Terms

Decibel (dB) The unit used to quantify sound pressure levels; it is derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 µPa, the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is usually only perceptible under controlled conditions.

dB L_A Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB L_A broadly agree with an individual's assessment of loudness. A change of 3 dB L_A is the minimum perceptible under normal conditions, and a change of 10 dB L_A corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB L_A; normal conversation about 60 dB L_A at 1 meter; heavy road traffic about 80 dB L_A at 10 meters; the level near a pneumatic drill about 100 dB L_A.

$L_{A90,T}$ The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014+A1:2019 it is used to define background noise level.

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

L_{Amax} The highest A weighted noise level recorded during the time period. It is usually used to describe the highest noise level that occurred during the event.

$L_{A10(18\ hour)}$ Often referred to as the UK road traffic noise index, this is the arithmetic average of the values of L_{A10} hourly for each of the 18 one-hour periods between 06:00 and 00:00.

NOEL No observed effect level: the level of noise exposure below which no effect at all on health or quality of life can be detected.

LOAEL Lowest observed adverse effect level: the level of noise exposure above which adverse effects on health or quality of life can be detected.

SOAEL Significant observed adverse effect level: the level of noise exposure above which significant adverse effects on health or quality of life can be detected.

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