

A Noise Assessment For Plot H4, Heywood Distribution Park, Heywood

On behalf of Indurent Management Limited

July 2024



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Member of the Association of Noise Consultants

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I INTRODUCTION

- I.1 Resound Acoustics Limited has been appointed by Indurent Management Limited to undertake a noise assessment for Plot H4 at Heywood Distribution Park, Heywood, Rochdale. Indurent Management Limited is seeking outline planning permission for E(g)(iii) (industrial processes), B2 (general industrial), B8 (storage and distribution) uses at the site.
- I.2 This report sets out an assessment of potential noise impacts resulting from the use of the proposed development, taking account of the existing sound climate in the area, the potential noise emissions from the site, and national planning policy and guidelines on noise. Where required, mitigation measures are recommended to reduce identified impacts.
- I.3 Whilst reasonable efforts have been made to produce a report that is easy to understand, it is technical in nature. To assist the reader, an introduction to noise and an explanation of the terminology used in this report are contained in Appendix A.

2 SITE DESCRIPTION

Existing Site Conditions

- 2.1 The site is located on the south-western edge of Heywood, Rochdale, and forms part of Heywood Distribution Park. The site is located in the centre of the distribution park and is bounded by other employment units to the east, south and west, and by an access road to the north.
- 2.2 The eastern half of the site is currently in use as an HGV trailer park, with the western half of the site being scrubland.
- 2.3 The topography of the site slopes gently down from north to south, levelling off towards the southern edge of the site.
- 2.4 A site location plan is shown in Figure B.1 in Appendix B.
- 2.5 The noise-sensitive receptors closest to the site are:
- residential properties on Kelty Grove, Galloway Close, Greenock Drive, Glencoe Close, Dunbar Grove, and Dunrobin Close to the north-west, north and north-east of the site, the closest of which are approximately 125 metres from the site boundary, beyond the East Lancashire Railway, which forms the northern border of Heywood Distribution Park;
 - a small group residential properties at Coal Pits Farm, approximately 425 metres to the south of the site boundary.
- 2.6 Planning permission to demolish a former public house and construct a new public house with an ancillary first floor residential flat at the corner of Moss Hall Road and Pilsworth Road was granted by Rochdale Borough Council on 25th August 2022 (Rochdale Borough Council planning reference 22/00462/FUL). The old public house has been demolished, however the new development, which will be approximately 230 metres to the south of the site, is yet to be constructed.

Proposed Site Conditions

- 2.7 Indurent Management Limited is seeking outline planning permission to redevelop the site for flexible E(g)(iii)/B2/B8 uses.
- 2.8 The planning application will be made on the basis of the development parameters shown in the UMC architects' drawing *Plot H4 - Parameters Plan* (reference 23103-UMC-ZZZZ-SI-DR-A 0648 Rev P.07, dated 19th July 2024), which is included as Figure B.2 in Appendix B.
- 2.9 Three illustrative layouts that demonstrate how the site could be developed within the development parameters are shown in the following UMC architects' drawings:
- a single, cross-docked unit shown in *Illustrative Site Plan - Plot H4 - 1 Unit* (reference 23103-UMC-ZZZZ-SI-DR-A 0652 Rev P.04, dated 19th July 2024), which is included as Figure B.3 in Appendix B;

- a two unit scheme, shown in *Illustrative Site Plan - Plot H4 – 2 Units* (reference 23103-UMC-ZZZZ-SI-DR-A 0651 Rev P.03, dated 19th July 2024), which is included as Figure B.4 in Appendix B; and
- a single-sided unit shown in *Illustrative Site Plan - Plot H4 – 1 Unit – Option 2* (reference 23103-UMC-ZZZZ-SI-DR-A 0656 Rev P.04, dated 19th July 2024), which is included as Figure B.5 in Appendix B.

3 GUIDANCE

Local Planning Authority Consultation

- 3.1 Rochdale Borough Council (RBC) was contacted during the preparation of this report to agree an appropriate approach to the assessment.
- 3.2 RBC confirmed that baseline sound measurements at two locations on the edges of the wider Heywood Distribution Park were appropriate to establish background sound levels representative of the noise-sensitive receptors close to the site.
- 3.3 RBC also agreed that sound from operations at the proposed development should be assessed using British Standard 4142: 2014+A1: 2019, with short duration noise events considered against the night-time maximum noise level criterion in the World Health Organisation's *Guidelines for Community Noise*.

National Planning Policy Framework

- 3.4 The Department for Communities and Local Government published the *National Planning Policy Framework* (NPPF) on 27th March 2012. The NPPF was most recently revised in December 2023 and issued by the Department of Levelling Up, Housing and Communities.
- 3.5 The general guiding principle in the NPPF is contained in Section 15 under the heading *Conserving and enhancing the natural environment*. Paragraph 180 states:

“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;”*

- 3.6 The noise planning policy is contained in paragraph 191, which also appears in Section 15 of the NPPF:

“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;*

- 3.7 A footnote to the point paragraph 191(a) refers to the *Explanatory Note of the Noise Policy Statement for England*, which defines both “significant adverse impacts on health and quality of life” and “adverse impacts on health and quality of life.”

Noise Policy Statement for England

- 3.8 The Department for Environment, Food and Rural Affairs published the *Noise Policy Statement for England* (NPSE) in March 2010. The explanatory note of the NPSE defines the terms used in the NPPF:

“2.20 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

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 Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.”

- 3.9 The NPSE does not define the SOAEL numerically, stating at paragraph 2.22:

“2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”

- 3.10 There is no local or national guidance on how the three terms should be defined numerically.

- 3.11 There are three aims in the NPSE, two of which relate to the first bullet point in paragraph 191 of the NPPF:

“The first aim of the Noise Policy Statement for England

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

The second aim of the Noise Policy Statement for England

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that 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 (paragraph 1.8). This does not mean that such adverse effects cannot occur.

The third aim of the Noise Policy Statement for England

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2.25 This aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

Planning Practice Guidance

- 3.12 In March 2014, the Government released Planning Practice Guidance (PPG) on noise, titled Noise. This document sets out a number of principles in the form of questions and answers, and reinforces the guidance set out in the NPPF and the NPSE. The most recent version of this document was published in July 2019.

- 3.13 The noise PPG notes that:

“Noise needs to be considered when new development may create additional noise and when new developments would be sensitive to the prevailing acoustic environment

(including any anticipated changes to that environment from activities that are permitted but not yet commenced)."

3.14 It goes on to note that:

"Plan-making and decision taking need to take account of the acoustic environment and in doing so consider:

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

3.15 The noise PPG broadly repeats the NPSE definitions of the NOEL, LOAEL and SOAEL and it provides a summary table to explain how the terms relate to each other and to typical human reactions to sound. The table is replicated in Table 3.1.

Table 3.1: Planning Practice Guidance summary of noise exposure hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No observed effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep the 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 adverse effect	Avoid

Perception	Examples of Outcomes	Increasing Effect Level	Action
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable adverse effect	Prevent

3.16 It is noted that the text in paragraph 005 of the PPG for noise reiterates the point illustrated in Table 3.1, that there are degrees of adverse effect above the SOAEL. Table 3.1 defines two degrees of significant adverse effect: a significant observed adverse effect, which is deemed noticeable and disruptive, and an unacceptable adverse effect, which is deemed noticeable and very disruptive.

3.17 The distinction between these two degrees of significant adverse effect is expanded upon in the text in paragraph 005 of the PPG for noise:

“005 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 behaviour 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 behaviour 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.”

3.18 The PPG is clear that a significant adverse effect, which lies above the SOAEL but below an unacceptable adverse effect, can be addressed (or ‘avoided’ in the terms of the PPG) through the provision of mitigation, including noise insulation; it is not until an unacceptable adverse effect is reached that the cause of the effect should be prevented.

3.19 The noise PPG provides advice on how to mitigate the effects of noise, noting that there are options to reduce noise at source, to optimise site layouts, to use planning conditions, and providing insulation within affected properties.

3.20 The noise PPG also notes that:

“The noise impact may be partially offset if the residents of those dwellings have access to:

- a relatively quiet façade (containing windows to habitable rooms) as part of their dwelling, and/or*
- a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the*

intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or

- *a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or*
- *a relatively quiet, protected, external publically accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)."*

Local Planning Policy

3.21 Planning applications in the borough of Rochdale are considered against the adopted Development Plan for Rochdale. This includes saved policies from the Rochdale Core Strategy (2016), which sets out planning objectives for the borough.

3.22 Policy G9 *Reducing the impact of pollution, contamination and land instability* refers to noise, stating:

"We will reduce all forms of pollution, contamination and land instability in the borough, by:

- b. Requiring that development does not have impacts that lead to an unacceptable increase in air, water, noise, light and other pollution";*

3.23 The Rochdale Borough Unitary Development Plan, which was adopted in June 2006, also forms part of the overall local plan. Policy EM/2 *Pollution* states:

"If the emission of pollutants from a proposed development cannot readily be controlled by other environmental legislation, such development will not be permitted where it would be likely to result in an increase in air, water, noise, light or other pollution, which would be harmful to the environment, and to land uses and land users in the area.

Where permission is granted, it will be subject to appropriate conditions or obligations to ensure that air, water and noise pollution is kept to acceptable levels.

New housing or other environmentally sensitive development will not be permitted where existing pollution levels are unacceptable and cannot satisfactorily be reduced."

3.24 Noise from new development is also considered in Policy EM/3 *Noise and New Development*:

"Development will not be permitted where:

- a) It would lead to unacceptable levels of noise nuisance to nearby existing or future occupants of buildings, or users of open space; or*
- b) It involves a noise sensitive use (such as housing, a school or hospital) which would be sited in or close to an area that is, or is likely to become, subject to unacceptably high levels of noise generation.*

Where the effects of existing noise on proposed new development, or noise likely to be generated by new development, can be adequately controlled by design, landscaping and

other measures, as enforced by planning conditions, the Council will grant planning permission, provided the development is acceptable in all other respects.”

British Standard 4142

- 3.25 BS4142: 2014 + A1: 2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial or commercial nature, which includes:
- sound from industrial and manufacturing processes;
 - sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 3.26 In a BS4142: 2014 + A1: 2019 assessment, the industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes. The procedure is to quantify the “*specific sound level*”, which is the measured or predicted level of sound from the source in question over a one-hour period for the daytime and a 15-minute period for the night-time. Daytime and night-time are not stipulated in the standard, but it notes that daytime is typically 07:00 to 23:00 hours, and night-time 23:00 to 07:00 hours.
- 3.27 The preferred method for determining the specific sound level is measurement. However, where it is not possible to determine the specific sound by measurement alone, for example because the specific source does not yet exist, the standard allows for a calculated approach in clause 7.3.6:
- “Determine the specific sound level by calculation alone if measurement is not practicable, for example if the source is not yet in operation. In such cases, report the method of calculation in detail and give the reason for using it.”*
- 3.28 Once established, the specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements, using subjective judgement. The standard also sets out objective methods for determining the presence of tones or impulsive elements using measurements; however, the standard notes that these should be used where the subjective method is not sufficient and, in any event, it is not possible to use them where the sources do not yet exist in the acoustic climate in which they are assessed.
- 3.29 The penalty for tonal elements is between 0dB and 6dB, and the standard notes:
- “Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.”*

- 3.30 The penalty for impulsive elements is between 0dB and 9dB, and the standard notes:
- “Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.”*
- 3.31 The standard also states that if a source has identifiable on/off conditions, a penalty may be applied for intermittency. The penalty for sources that have intermittent elements is stated as:
- “If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”*
- 3.32 Where the specific sound features acoustic characteristics that are distinctive against the residual acoustic climate, but are not tonal, impulsive or intermittent in nature, a penalty of +3dB may be applied.
- 3.33 The background sound level is the L_{A90} of the residual sound, which is itself the sound remaining at the assessment location when the specific sound source being assessed is suppressed to such a degree that it does not contribute to the ambient sound.
- 3.34 The standard notes that the background sound level can include industrial and/or commercial sound in some circumstances:
- “Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.”*
- 3.35 The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15-minute intervals. The standard states that:
- “A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.”*
- 3.36 The initial assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- a) Typically, the greater this difference, the greater the magnitude of the impact.
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - d) 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.

NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

- 3.37 BS4142: 2014+A1: 2019 states that relevant contextual matters should be considered before reaching a final position on the assessment outcome. It is stated as important because:

“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.”

- 3.38 BS4142: 2014+A1: 2019 lists some of the contextual matters that might influence the assessment outcome:

“1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/ or commercial nature is likely to be perceived and how people react to it.

NOTE 3 Consideration should be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the “Effects on humans of industrial and commercial sound” portion of the “Further reading” list in the Bibliography.

3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) facade insulation treatment;*
- ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
- iii) acoustic screening.”*

- 3.39 In terms of the first of these contextual considerations, BS4142: 2014 + A1: 2019 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low. However, it is considered that in this situation, the absolute levels may suggest a more acceptable outcome than would otherwise be suggested by the difference between the values.
- 3.40 BS4142: 2014 + A1: 2019 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS4142 defined very low background sound levels as being less than about 30dB L_{A90} , and low rating levels as being less than about 35dB $L_{A,r}$. It is considered that these definitions provide a reasonable reference point for the definition of 'low' in the context of the current version of the standard.
- 3.41 It is also noted that the consideration of absolute noise levels is not necessarily limited to those situations where background and rating levels are low, there is nothing in BS4142: 2014 + A1: 2019 that precludes consideration of absolute sound levels in a wider sense.
- 3.42 BS4142: 2014 + A1: 2019 is clear that the level of sound within a property can be taken into account as part of the contextual element of the assessment.
- 3.43 Other contextual matters that might be relevant, include:
- character of a particular neighbourhood;
 - former uses at or close to a site;
 - legitimacy of the industrial use, e.g. planning permissions or environmental permits;
 - implementation of best practicable means for a given process or activity; or
 - local convention or perceptions.
- 3.44 BS4142: 2014 + A1: 2019 requires uncertainties in data and associated calculations to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

World Health Organisation Guidelines

- 3.45 The World Health Organisation (WHO) *Guidelines for Community Noise* (1999) set out guidance on suitable internal and external maximum noise levels in and around residential properties. The WHO guidelines state:
- “For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night.”*
- 3.46 The internal target noise level of 45dB L_{AFmax} translates to an external target façade noise level of 60dB L_{AFmax} when a correction of 15dB is taken into account, which is the correction that the WHO guidance states is the effect of an open window.
- 3.47 The WHO published their *Environmental Noise Guidelines for the European Region* in 2018. The WHO states that the 2018 document supersedes the 1999 *Guidelines for Community Noise*; however, it advises that the indoor guideline values in the 1999 document, and any values in the 1999 document not covered by the 2018 document, such as industrial noise, remain valid.

ISO9613

- 3.48 The noise levels generated by the operation of the proposed development have been calculated in accordance with the noise prediction framework set out in ISO9613-2 *Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation*.
- 3.49 The noise calculations are based on individual noise sources acting as either point sources, where the noise level reduces by 6dB for every doubling of distance, as line sources, where the noise level reduces by 3dB for every doubling of distance or plane sources, where the noise level reduces by between 0 and 6dB for every doubling of distance, depending on the dimensions of the plane source and the proximity of the receptor.
- 3.50 The calculations take into account the distance between the sources and the receptors and the amount of attenuation due to atmospheric absorption. The model assumes downwind propagation, i.e. a wind direction that assists the propagation of noise from the source to all receptors.
- 3.51 The inherent uncertainty in ISO9613 is stated in the standard as being accurate to ± 1 dB for distances of up to 100 metres, or ± 3 dB for distances of between 100 metres and 1km, with an average height of propagation of up to 30 metres.

4 SOUND SURVEY

4.1 A sound survey has been undertaken to establish existing background sound levels representative of the key noise-sensitive receptors around the site. The measurements took place between 13:00 hours on Thursday 6th June 2024 and 12:00 hours on Thursday 13th June 2024.

4.2 The survey methodology and results are set out in this section of the report.

Sound Survey Methodology

4.3 The equipment used during the survey is summarised in Appendix C. The sound level meters were field-calibrated before the measurements using the listed acoustic calibrators, and the calibrations checked again upon completion of the measurements; no significant calibration drifts were found to have occurred.

4.4 All of the equipment had been laboratory-calibrated to a traceable standard within the year preceding the survey.

4.5 Measurements were made at two positions, which are shown in Figure D.1 in Appendix D and described as follows:

- Position 1: on the south-western edge of the wider Heywood Distribution Park, close to Moss Hall Road and considered representative of the receptors to the south of the site; and
- Position 2: on the north-western boundary of the wider Heywood Distribution Park, close to the East Lancashire Railway, and considered representative of the receptors to the north of the site, on the opposite side of the railway line.

4.6 The measurements at Position 1 were made with the microphone at a height of 1.5 metres above local ground level. The measurements at Position 2 were made with the microphone at a height of 2.15 meters above local ground level; this height was required to elevate the microphone above nearby structures to avoid any influence from screening effects or reflections.

4.7 The measurements at both positions were made with the microphones in free-field conditions, i.e. at least 3.5 metres away from any reflecting surfaces other than the ground.

4.8 A weather station was installed with the sound level meter at Position 1, to capture the meteorological conditions during the survey.

Sound Survey Results

- 4.9 The weather during the survey was generally suitable for noise measurement, it being mainly dry with low wind speeds. There were some periods of rain, as follows:
- intermittently between 20:00 hours on Friday 7th June 2024 and 07:30 hours on Saturday 8th June 2024;
 - very short periods of light rain at 07:15, 08:15 and 09:30 hours on Sunday 9th June 2024;
 - between 20:00 hours on Sunday 9th June 2024 and 00:30 hours on Monday 10th June 2024;
 - between 03:15 and 05:30 hours on Monday 10th June 2024;
 - intermittently between 20:00 hours on Monday 10th June 2024 and 01:45 hours on Tuesday 11th June 2024;
 - a very short period at 11:15 hours on Tuesday 11th June 2024;
 - a short period between 19:15 and 19:45 hours on Wednesday 12th June 2024.
- 4.10 Average windspeeds were less than 5m/s throughout the survey, predominantly in the arc from west to north, although they were from the arc from south to west on Friday 7th June 2024 and on the early morning of Sunday 9th June 2024, and in the arc from north to east on the evening of Sunday 9th June 2024 until the late afternoon of Monday 10th June 2024.
- 4.11 Temperatures were up to approximately 17°C during the day, dropping to around 5°C at night.
- 4.12 The dominant sound source at Position 1 was road traffic on Moss Hall Road. Other sound sources were aircraft passing overhead and vehicles moving within Heywood Distribution Park. Natural sounds such as rustling trees and bird song were audible.
- 4.13 The dominant sound source at Position 2 was distant road traffic noise from the M66 motorway, which lies to the west of Heywood Distribution Park. Sound from activities at the wider Heywood Distribution Park including vehicle movements and tonal reversing alarms were noted. Natural sounds such as rustling trees and bird song were also audible.
- 4.14 The baseline sound survey results are summarised in Table 4.1 (Position 1) and Table 4.2 (Position 2), aggregated over the daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) periods. The sound levels are set out in full graphically in Appendix E. Full tabulated data are available on request.

Table 4.1: Summary of measured sound levels at Position 1, free-field dB

Date	Period	Duration	L _{Aeq,T}	L _{A90,T} ⁽¹⁾	L _{A10,T} ⁽¹⁾	L _{AFmax}
Thursday 6 th June 2024	Day	10 hours	69.5	52.1	73.3	79.7 to 93.7
	Night	8 hours	65.0	42.0	64.3	77.2 to 89.5
Friday 7 th June 2024	Day	16 hours	69.9	53.7	73.7	79.0 to 94.7
	Night	8 hours	65.5	42.8	66.3	79.9 to 86.4
Saturday 8 th June 2024	Day	16 hours	69.5	53.6	73.5	78.8 to 98.1
	Night	8 hours	63.8	42.8	63.5	75.0 to 93.4
Sunday 9 th June 2024	Day	16 hours	69.7	51.0	73.9	78.8 to 94.2
	Night	8 hours	67.4	44.1	66.3	78.4 to 95.5
Monday 10 th	Day	16 hours	70.0	53.3	73.8	79.1 to 97.2

Date	Period	Duration	$L_{Aeq,T}$	$L_{A90,T}^{(1)}$	$L_{A10,T}^{(1)}$	L_{AFmax}
June 2024	Night	8 hours	65.8	40.0	65.3	76.6 to 91.4
Tuesday 11 th June 2024	Day	16 hours	70.2	53.2	73.8	80.1 to 92.4
	Night	8 hours	65.5	40.2	65.6	77.6 to 93.6
Wednesday 12 th June 2024	Day	16 hours	70.0	52.9	73.7	77.9 to 96.4
	Night	8 hours	65.4	44.2	64.3	76.1 to 92.6
Thursday 13 th June 2024	Day	4 hours	70.9	55.4	74.3	81.5 to 91.9

Notes:

⁽¹⁾ – The L_{A90} and L_{A10} values presented were calculated from the arithmetic mean of the $L_{A90,15min}$ and $L_{A10,15min}$ measurements for each period.

Table 4.2: Summary of measured sound levels at Position 2, free-field dB

Date	Period	Duration	$L_{Aeq,T}$	$L_{A90,T}^{(1)}$	$L_{A10,T}^{(1)}$	L_{AFmax}
Thursday 6 th June 2024	Day	9 hours	50.9	45.0	51.5	53.9 to 70.9
	Night	8 hours	48.8	40.3	47.6	42.3 to 75.5
Friday 7 th June 2024	Day	16 hours	51.6	46.0	53.5	57.5 to 79.4
	Night	8 hours	50.2	41.5	49.5	48.7 to 80.1
Saturday 8 th June 2024	Day	16 hours	52.2	45.4	52.6	55.8 to 79.9
	Night	8 hours	48.5	42.1	48.4	48.0 to 74.1
Sunday 9 th June 2024	Day	16 hours	51.4	45.4	51.6	53.6 to 82.4
	Night	8 hours	51.3	41.3	48.2	47.0 to 78.2
Monday 10 th June 2024	Day	16 hours	50.8	44.3	52.4	52.8 to 81.3
	Night	8 hours	52.0	38.5	48.0	44.3 to 75.9
Tuesday 11 th June 2024	Day	16 hours	52.3	42.8	52.1	53.6 to 83.4
	Night	8 hours	48.7	38.3	46.4	40.4 to 75.1
Wednesday 12 th June 2024	Day	16 hours	53.7	45.7	52.6	47.4 to 80.0
	Night	8 hours	47.3	40.5	47.1	45.8 to 70.8
Thursday 13 th June 2024	Day	5 hours	52.7	46.0	53.0	61.3 to 74.2

Notes:

⁽¹⁾ – The L_{A90} and L_{A10} values presented were calculated from the arithmetic mean of the $L_{A90,15min}$ and $L_{A10,15min}$ measurements for each period.

- 4.15 British Standard 4142: 2014+A1: 2019 indicates that a representative background sound level should be adopted, which should not automatically be assumed to be the lowest or most common value. For this assessment, the distribution of L_{A90} values in the measurement data has been analysed and representative values determined. The analysis is based on the time history, the arithmetic mean, the modal value, and the 25% cumulative percentage point, i.e. the value that indicates the lowest 25% of the dataset.
- 4.16 Periods where it was raining, or where it had stopped raining but surfaces may still have been wet, have not been included in the analysis. Where there were shorter periods of rain, the 30 minute period afterwards has been excluded, and where there were longer periods of rain, the one hour period afterwards has been excluded.
- 4.17 BS4142: 2014+A1: 2019 states that daytime is typically taken to be between 07:00 and 23:00 hours and night-time between 23:00 and 07:00 hours. However, the standard notes that it is important to determine representative values for particular time periods of interest.

- 4.18 For this assessment the following assessment periods have been adopted:
- daytime from 07:00 to 23:00 hours;
 - an 'early night' from 23:00 to 05:00 hours; and
 - a 'late night' from 05:00 to 07:00 hours.
- 4.19 This approach has been adopted because the background sound levels between 23:00 and 05:00 hours are lower than those between 05:00 and 07:00 hours, and the traffic profile for the proposed development suggests a greater number of movements is likely between 05:00 and 07:00 hours than between 23:00 and 05:00 hours.
- 4.20 By splitting the night-time period into two periods, the higher levels of activity expected between 05:00 and 07:00 hours are not compared with the lower background sound levels that occur during the earlier part of the night.
- 4.21 The representative L_{A90} values for use in the assessment are shown in Table 4.3. The representative values have been rounded to the nearest whole number as required by BS4142: 2014+A1: 2019. The distributions of the background sound levels are contained in Appendix E.

Table 4.3: Representative background sound levels, free-field dB

Position	Period	Background Sound Levels, L_{A90}	
		Range	Representative Value
1	Daytime (07:00-23:00)	35 to 63	45
	Early night-time (23:00-05:00)	31 to 48	35
	Late night-time (05:00-07:00)	42 to 55	45
2	Daytime (07:00-23:00)	36 to 62	42
	Early night-time (23:00-05:00)	32 to 51	36
	Late night-time (05:00-07:00)	40 to 48	43

5 ASSESSMENT

Assessed Layouts

- 5.1 The planning application for the development will be made on the basis of a series of development parameters, rather than a specific and detailed layout plan. The development parameters are shown in Figure B.2 in Appendix B.
- 5.2 Three illustrative layouts have been produced, as shown in Figures B.3, B.4 and B.5 in Appendix B, which show how the site could be developed within these development parameters.
- 5.3 The final layout that comes forward could be different to these illustrative masterplans, so this noise assessment considers both the illustrative masterplans, and reasonable worst-case interpretations of the development parameters. So that a workable layout is considered, as opposed to a layout that could not possibly work in the real world, the worst-case interpretations of the development parameters are based on two of the illustrative layouts, adjusted to make them 'worse' from a noise impact perspective.
- 5.4 The 'amended' illustrative layouts are based on the two-unit scheme shown in Figure B.4 in Appendix B, but with the units flipped so that their service yards are facing outwards, and on the single-sided unit shown in Figure B.5, flipped so that the service yard is facing east instead of west.
- 5.5 There are not considered to be any realistic amendments that could be made to the single cross-dock unit scheme shown in Figure B.3 in Appendix B as this layout already has service yards to the east and west extremities of the site. Given the size and shape of the plot, rotating the building ninety degrees so that the yards are to its north and south is not possible without significantly reducing the size of the building, which will in turn reduce the number vehicle movements and consequently the reduce the noise too.
- 5.6 The five layouts considered in the assessment are summarised as follows:
- Layout 1: a single cross-dock unit, as per Figure B.3 in Appendix B;
 - Layout 2: a two unit scheme, as per Figure B.4 in Appendix B;
 - Layout 3: a two unit scheme, as per Figure B.4 in Appendix B, amended so that buildings are swapped with the service yards, so the yards are on the outer edges of the plot rather than in the centre;
 - Layout 4: a single-sided unit, as per Figure B.5 in Appendix B;
 - Layout 5: single-sided unit, as per Figure B.5 in Appendix B, amended so that the building and service yard are flipped, with the yard to the east of the building. The open storage remains as shown in Figure B.5.

Calculation Parameters

- 5.7 Use Class E(g) is, by definition, acceptable close to residential areas and no specific assessment of operational noise is considered necessary for them, aside from that associated with external vehicle movements.

5.8 Developments that fall into a distribution use class (B8) are, to a large degree, predictable in terms of their likely noise emissions. Noise from vehicle movements is generally similar and provided the traffic volumes are known, the overall noise emissions can be calculated and assessed.

5.9 A database of typical vehicle noise emission levels is shown in Table 5.1. These values have been taken from similar but unrelated developments.

Table 5.1: Summary of vehicle source noise data, free-field dB

Source	Distance (metres)	L _{AE}	L _{AFmax}
HGV ⁽¹⁾ air brakes	10	77	81
HGV start up and pull away	10	76	74
HGV reversing alarm	10	82	73
HGV dropping off trailer	10	79	85
HGV picking up trailer	10	84	86
HGV pass-by	10	80	71
Diesel-powered refrigerated trailer	-	96 ⁽³⁾	-
Shunter pass-by with trailer	10	80	78
Shunter pass-by without trailer	10	79	72
Shunter dropping off trailer	10	75	77
Shunter picking up trailer	10	87	92
Forklift load/unload ⁽²⁾	10	82	70
Forklift pass-by ⁽²⁾	10	77	69
Car door slam	10	65	72
Car engine starting	10	62	66
Car pulling away	10	67	64
Car pass-by	10	70	63

Notes:

⁽¹⁾ HGV = heavy goods vehicle

⁽²⁾ Gas-powered forklift

⁽³⁾ Stated value is SWL, not L_{AE}

5.10 Developments that fall into a general industrial use class (B2) are less predictable since their noise emission levels depend to a large degree on the exact uses proposed. The assessment of potential B2 uses is therefore based on traffic generation figures in a similar manner as for a B8 use and based on an assumed internal noise level to represent potential processes within the units.

5.11 The traffic movements likely to be generated at the proposed development have been confirmed by the traffic consultant for the project, PJA. The peak hourly vehicle movements in each of the periods used in the assessment are shown in Table 5.2.

Table 5.2: Peak hourly two-way vehicle movements

Period	Vehicle Movements (peak hour flows)	
	Car	HGV
Daytime (07:00-23:00)	249	63
Early Night-time (23:00-05:00)	40	18
Late Night-time (05:00-07:00)	202	72

5.12 Each of the vehicle movements is assumed to give rise to each of the relevant noise-generating events set out in Table 5.1, to derive the overall vehicle noise emissions.

- 5.13 The assessment periods are taken to be one hour for the daytime, and 15 minutes for the early and late night-time periods, which is consistent with the approach recommended in BS4142: 2014+A1: 2019. It has been assumed that the 15-minute night-time periods contain one quarter of the peak hourly vehicle movements, rounded up to a whole number where a fraction results.
- 5.14 The vehicle movements in Table 5.2 are for the whole development; therefore, when assessing a layout that includes more than one unit, the number of vehicles accessing each unit has been determined based on the floor areas of each unit, relative to the overall development floorspace.
- 5.15 The number of fork-lift truck movements at each unit assumes that a proportion of HGVs accessing each unit will use the level access doors, determined according to the ratio of level access doors to dock levellers, as shown on the illustrative layouts. Based on experience of other similar sites, 20 no. forklift movements are assumed per lorry.
- 5.16 Shunters have been assumed to operate at the site, on a one-to-one basis with HGV movements.
- 5.17 The use of refrigerated trailers at the site has also been tested, with 50% of HGV movements assumed to use a refrigerated trailer, rounded up to a whole number where a fraction results. Based on experience of similar sites and of operators that utilise refrigerated fleets, it is considered highly unlikely that as many as 50% of the HGVs will have an idling refrigerated trailer, and therefore the assumed number of refrigerated trailers operating at the site results in a robust, reasonably worst-case assessment. The refrigerated trailers during each assessment period are assumed to idle at full duty for the duration of that period.
- 5.18 In addition to the vehicle movements, it has been assumed that activities within warehouse areas of proposed buildings generate reverberant noise levels of 80dB(A), which is the lower exposure action value set out in the *Control of Noise at Work Regulations 2005* and considered to be representative of a generic B2 use.
- 5.19 Measurements at existing storage and distribution facilities suggest that typical B8 uses generate internal noise levels in the region of 75dB(A), with typical E(g) uses generating internal noise levels lower still; an internal noise level of 80dB(A) is therefore considered reasonable and robust to represent the full range of uses proposed at the site.
- 5.20 It is understood that the warehouse areas of units will be constructed using a *Euroclad Elite PLUS 51/55/58* built-up cladding system. Manufacturer's data for these systems show they provide a sound reduction performance of at least 40dB R_w and therefore, this level of sound reduction performance has been assumed for proposed units.
- 5.21 For the roofs, the effect of rooflights has been considered, resulting in a lower overall composite sound reduction performance of 31dB $R_{w,1}$, based on rooflights covering 15% of the roof area and manufacturers' data showing that the proposed *Zenon GRP* rooflights have a sound reduction performance of at least 23dB $R_{w,1}$.
- 5.22 Unit heights have been modelled at the maximum shown on the parameters plan.
- 5.23 The effect of opening the doors of the buildings has also been considered, to test the sensitivity of the assessment outcome to the status of the doors. The doors that are

- modelled as open are level access doors, which are assumed to have a sound reduction of 0dB when open.
- 5.24 The noise levels generated by the activities have been calculated using the prediction framework set out in ISO9613 as implemented by the noise modelling software CADNA/A. The predicted noise levels from each source have been logarithmically summed to derive the overall noise levels from the site.
- 5.25 The vehicle activities at the application site have been modelled as acoustic point or line sources, with the source heights set to match the item being modelled. The sources have been located around the site based on the site layout. Activities within the proposed buildings have been modelled using acoustic area sources to represent the façades of the building, with the dimensions set to match the façade element being modelled.
- 5.26 The topography on and around the site has been modelled using OS mapping, LIDAR data obtained from the DEFRA data services platform⁽¹⁾, and topographical information for the proposed development provided by the client.
- 5.27 The acoustic absorbency of the ground at the site has been modelled as 100% acoustically hard, and the acoustic absorbency of the ground around the site has been modelled as 75% acoustically soft/25% acoustically hard ground. All buildings have been modelled as approximately 70% acoustically reflective.

BS4142 Assessment

- 5.28 The sound levels due to the proposed development have been calculated at the following locations, which are a representative sample of the noise-sensitive receptors closest to the site:
- Kelty Grove;
 - Glencoe Close;
 - Greenock Drive;
 - Galloway Close;
 - Dunbar Grove;
 - Dunrobin Close;
 - Moss Hall Road; and
 - Coal Pits Farm.
- 5.29 The exact assessment locations are shown in Figure F.1 in Appendix F.
- 5.30 The receptor Moss Hall Road represents a future residential receptor in the form of an ancillary first floor flat associated with a proposed new public house at the corner of Moss Hall Road and Pilsworth Road. Although the new building has yet to be constructed, the planning permission for the development (RBC planning reference 22/00462/FUL) has been partly implemented with the demolition of the previous building at the site.

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- 5.31 The predictions have been undertaken at 4 metres above local ground level to represent a bedroom window or an upper storey. To be consistent with the measured background sound levels, the predictions are free-field values at the façade of the property.
- 5.32 The predicted values have been rounded to the nearest whole number to obtain predicted specific sound levels, as required by BS4142: 2014+A1: 2019; these are shown in Table 5.3 for all five of the assessed layouts.

Table 5.3: Predicted specific sound levels, free-field dB

Location	Assessment Period	Specific Sound Level ($L_{Aeq,T}^{(1)}$) for Layout:				
		1 ⁽²⁾	2 ⁽²⁾	3 ⁽²⁾	4 ⁽²⁾	5 ⁽²⁾
Kelty Grove	Daytime (07:00-23:00)	31	28	33	33	27
	Early night-time (23:00-05:00)	26	23	28	28	23
	Late night-time (05:00-07:00)	32	28	34	33	28
Glencoe Close	Daytime (07:00-23:00)	37	30	40	36	38
	Early night-time (23:00-05:00)	32	25	35	31	33
	Late night-time (05:00-07:00)	37	30	41	36	38
Greenock Drive	Daytime (07:00-23:00)	43	35	46	38	47
	Early night-time (23:00-05:00)	38	29	41	33	42
	Late night-time (05:00-07:00)	43	34	47	38	47
Galloway Close	Daytime (07:00-23:00)	45	36	49	40	50
	Early night-time (23:00-05:00)	40	30	44	35	45
	Late night-time (05:00-07:00)	45	36	50	40	51
Dunbar Grove	Daytime (07:00-23:00)	45	37	47	33	47
	Early night-time (23:00-05:00)	40	32	42	27	42
	Late night-time (05:00-07:00)	45	37	48	33	47
Dunrobin Close	Daytime (07:00-23:00)	48	46	47	38	49
	Early night-time (23:00-05:00)	43	41	42	32	44
	Late night-time (05:00-07:00)	49	46	48	38	50
Moss Hall Road	Daytime (07:00-23:00)	27	25	26	28	24
	Early night-time (23:00-05:00)	22	20	21	24	20
	Late night-time (05:00-07:00)	28	26	27	29	25
Coal Pits Farm	Daytime (07:00-23:00)	39	34	38	41	35
	Early night-time (23:00-05:00)	34	29	34	36	30
	Late night-time (05:00-07:00)	39	35	39	41	35

Notes:

(1) - T is 1 hour for daytime and 15 minutes for night-time.

(2) – Layouts described as follows:

- 1 = Layout 1, which is a single cross-dock unit, as per Figure B.3 in Appendix B.
- 2 = Layout 2, which is the two unit scheme, as per Figure B.4 in Appendix B.
- 3 = Layout 3, which is the two unit scheme as per Figure B.4 in Appendix B, amended with the buildings swapped with their service yards, so their yards are outside them.
- 4 = Layout 4, which is the single-sided unit, as per Figure B.5 in Appendix B.
- 5 = Layout 5, which is the single-sided unit, as per Figure B.5 in Appendix B, amended with the building swapped with the service yard, so the yard is to the east of the building.

- 5.33 Even before the specific sound levels are assessed in line with BS4142, it can be seen from Table 5.3 that where amended layouts have been considered (Layout 3 and Layout 5), they are predicted to give rise to materially higher sound levels than their respective illustrative layouts (Layout 2 and Layout 4).

- 5.34 Whether those higher specific sound levels result in a materially different impact will be considered as part of the full BS4142 assessment, however, based on the specific sound levels alone, there is a clear benefit in developing the site on the basis of the illustrative layouts, without the assessed amendments.
- 5.35 The specific sound levels from the proposed development have been assessed using the method set out in BS4142: 2014+A1: 2019; this requires that where appropriate, the specific sound levels are corrected to account for distinctive acoustic characteristics that may be perceptible at receptors above the residual acoustic climate.
- 5.36 The receptors to the north on Kelty Grove, Glencoe Close, Greenock Drive, Galloway Close, Dunbar Grove and Dunrobin Close are between approximately 125 and 400 metres from the site. The receptors to the south at Moss Hall Road and Coal Pits Farm are between approximately 230 and 425 metres from the site respectively. Based on these distances, it is considered unlikely that distinctive acoustic characteristics that may be associated with activities at the proposed development, such as tonal reversing alarms, will be clearly perceptible at receptors.
- 5.37 The site is also within an existing industrial/commercial area, and therefore any potentially distinctive characteristics may be less perceptible against the residual acoustic climate, since it already includes sound of similar character.
- 5.38 However, to adopt a precautionary approach, it is considered appropriate to apply an acoustic character correction of +2dB to account for tonal elements such as reversing alarms that may just be perceptible above the residual acoustic climate, and to apply an acoustic character correction of +3dB to account for impulsive elements such as HGVs or shutters connecting to trailers that may just be perceptible above the residual acoustic climate.
- 5.39 The total acoustic character correction of +5dB has been added to the specific sound levels to obtain rating levels, which have been compared with the representative background sound levels set out in Table 4.3.
- 5.40 The initial numerical BS4142 assessment outcomes for Layout 1 (the single cross-dock unit), Layouts 2 and 3 (the two unit scheme as per the illustrative layout and the amended two unit scheme), and Layouts 4 and 5 (the single-sided unit scheme as per the illustrative layout and the amended single-sided unit scheme) are shown in the following three tables.
- 5.41 The initial BS4142 numerical assessment for Layout I is shown in Table 5.4.

Table 5.4: Initial BS4142 numerical assessment for Layout I, free-field dB

Receptor	Period	Background Sound Level, L_{A90}	Rating Level, $L_{A,r,T}^{(1)(2)}$
Kelty Grove	Daytime (07:00-23:00)	42	36 (-6)
	Early night-time (23:00-05:00)	36	31 (-5)
	Late night-time (05:00-07:00)	43	37 (-6)
Glencoe Close	Daytime (07:00-23:00)	42	42 (0)
	Early night-time (23:00-05:00)	36	37 (+1)
	Late night-time (05:00-07:00)	43	42 (-1)
Greenock Drive	Daytime (07:00-23:00)	42	48 (+6)
	Early night-time (23:00-05:00)	36	43 (+7)
	Late night-time (05:00-07:00)	43	48 (+5)
Galloway Close	Daytime (07:00-23:00)	42	50 (+8)
	Early night-time (23:00-05:00)	36	45 (+9)
	Late night-time (05:00-07:00)	43	50 (+7)
Dunbar Grove	Daytime (07:00-23:00)	42	50 (+8)
	Early night-time (23:00-05:00)	36	45 (+9)
	Late night-time (05:00-07:00)	43	50 (+7)
Dunrobin Close	Daytime (07:00-23:00)	42	53 (+11)
	Early night-time (23:00-05:00)	36	48 (+12)
	Late night-time (05:00-07:00)	43	54 (+11)
Moss Hall Road	Daytime (07:00-23:00)	45	32 (-13)
	Early night-time (23:00-05:00)	35	27 (-8)
	Late night-time (05:00-07:00)	45	33 (-12)
Coal Pits Farm	Daytime (07:00-23:00)	45	44 (-1)
	Early night-time (23:00-05:00)	35	39 (+4)
	Late night-time (05:00-07:00)	45	44 (-1)

Notes:

⁽¹⁾ T is 1 hour for daytime and 15 minutes for night-time.

⁽²⁾ Values shown are the rating levels for each period for each receptor, with the difference between the rating level and the background sound level in brackets.

5.42 It can be seen from Table 5.4 that the initial numerical outcomes for Layout I are predicted to be:

- low impacts at Kelty Grove and Moss Hall Road, where the rating levels are predicted to be no higher than the background sound levels;
- adverse impacts at Greenock Drive, where the rating levels are predicted to be 'around 5dB above the background sound level';
- between a low impact and an adverse impact at Glencoe Close and Coal Pits Farm; and
- significant adverse impacts at Galloway Close, Dunbar Grove and Dunrobin Close, where the rating levels are predicted to be 'around 10dB or more above the background sound level'.

5.43 The initial BS4142 numerical assessments for Layouts 2 and 3 (the two unit scheme as per illustrative layout and the amended two unit scheme) are shown in Table 5.5.

Table 5.5: Initial BS4142 numerical assessment for Layouts 2 and 3, free-field dB

Receptor	Period	Background Sound Level, L_{A90}	Rating Level, $L_{Ar,Tr}^{(1)(2)}$	
			Layout 2	Layout 3
Kelty Grove	Daytime (07:00-23:00)	42	33 (-9)	38 (-4)
	Early night-time (23:00-05:00)	36	28 (-8)	33 (-3)
	Late night-time (05:00-07:00)	43	33 (-10)	39 (-4)
Glencoe Close	Daytime (07:00-23:00)	42	35 (-7)	45 (+3)
	Early night-time (23:00-05:00)	36	30 (-6)	40 (+4)
	Late night-time (05:00-07:00)	43	35 (-8)	46 (+3)
Greenock Drive	Daytime (07:00-23:00)	42	40 (-2)	51 (+9)
	Early night-time (23:00-05:00)	36	34 (-2)	46 (+10)
	Late night-time (05:00-07:00)	43	39 (-4)	52 (+9)
Galloway Close	Daytime (07:00-23:00)	42	41 (-1)	54 (+12)
	Early night-time (23:00-05:00)	36	35 (-1)	49 (+13)
	Late night-time (05:00-07:00)	43	41 (-2)	55 (+12)
Dunbar Grove	Daytime (07:00-23:00)	42	42 (0)	52 (+10)
	Early night-time (23:00-05:00)	36	37 (+1)	47 (+11)
	Late night-time (05:00-07:00)	43	42 (-1)	53 (+10)
Dunrobin Close	Daytime (07:00-23:00)	42	51 (+9)	52 (+10)
	Early night-time (23:00-05:00)	36	46 (+10)	47 (+11)
	Late night-time (05:00-07:00)	43	51 (+8)	53 (+10)
Moss Hall Road	Daytime (07:00-23:00)	45	30 (-15)	31 (-14)
	Early night-time (23:00-05:00)	35	25 (-10)	26 (-9)
	Late night-time (05:00-07:00)	45	31 (-14)	32 (-13)
Coal Pits Farm	Daytime (07:00-23:00)	45	39 (-6)	43 (-2)
	Early night-time (23:00-05:00)	35	34 (-1)	39 (+4)
	Late night-time (05:00-07:00)	45	40 (-5)	44 (-1)

Notes:

(1) T is 1 hour for daytime and 15 minutes for night-time.

(2) Values shown are the rating levels for each period for each receptor, with the difference between the rating level and the background sound level in brackets..

5.44 It can be seen from Table 5.5 that the initial numerical outcomes for Layouts 2 and 3 are predicted to be:

- low impacts at the majority of receptors for Layout 2, with a significant adverse impact at Dunrobin Close;
- worse for Layout 3, relative to Layout 2, with significant adverse impacts at Greenock Drive, Galloway Close, Dunbar Grove and Dunrobin Close.

5.45 The initial numerical BS4142 assessment for Layouts 4 and 5 (the single-sided unit scheme as per illustrative layout and the amended single-sided unit scheme) are shown in Table 5.6.

Table 5.6: Initial BS4142 numerical assessment for Layouts 4 and 5, free-field dB

Receptor	Period	Background Sound Level, L_{A90}	Rating Level, $L_{Ar,Tr}^{(1)(2)}$	
			Layout 4	Layout 5
Kelty Grove	Daytime (07:00-23:00)	42	38 (-4)	32 (-10)
	Early night-time (23:00-05:00)	36	33 (-3)	28 (-8)
	Late night-time (05:00-07:00)	43	38 (-5)	33 (-10)
Glencoe Close	Daytime (07:00-23:00)	42	41 (-1)	43 (+1)
	Early night-time (23:00-05:00)	36	36 (0)	38 (+2)
	Late night-time (05:00-07:00)	43	41 (-2)	43 (0)
Greenock Drive	Daytime (07:00-23:00)	42	43 (+1)	52 (+10)
	Early night-time (23:00-05:00)	36	38 (+2)	47 (+11)
	Late night-time (05:00-07:00)	43	43 (0)	52 (+9)
Galloway Close	Daytime (07:00-23:00)	42	45 (+3)	55 (+13)
	Early night-time (23:00-05:00)	36	40 (+4)	50 (+14)
	Late night-time (05:00-07:00)	43	45 (+2)	56 (+13)
Dunbar Grove	Daytime (07:00-23:00)	42	38 (-4)	52 (+10)
	Early night-time (23:00-05:00)	36	32 (-4)	47 (+11)
	Late night-time (05:00-07:00)	43	38 (-5)	52 (+9)
Dunrobin Close	Daytime (07:00-23:00)	42	43 (+1)	54 (+12)
	Early night-time (23:00-05:00)	36	37 (+1)	49 (+13)
	Late night-time (05:00-07:00)	43	43 (0)	55 (+12)
Moss Hall Road	Daytime (07:00-23:00)	45	33 (-12)	29 (-16)
	Early night-time (23:00-05:00)	35	29 (-6)	25 (-10)
	Late night-time (05:00-07:00)	45	34 (-11)	30 (-15)
Coal Pits Farm	Daytime (07:00-23:00)	45	46 (+1)	40 (-5)
	Early night-time (23:00-05:00)	35	41 (+6)	35 (0)
	Late night-time (05:00-07:00)	45	46 (+1)	40 (-5)

Notes:

(1) T is 1 hour for daytime and 15 minutes for night-time.

(2) Values shown are the rating levels for each period for each receptor, with the difference between the rating level and the background sound level in brackets.

5.46 It can be seen from Table 5.6 that the initial numerical outcomes for Layouts 4 and 5 are predicted to be:

- low impacts at Kelty Grove, Glencoe Drive, Dunbar Grove and Moss Hall Road for Layout 4, an adverse impact possible at Coal Pits Farm, and outcomes between a low impact and an adverse impact at the remaining receptors;
- worse for Layout 4, relative to Layout 5, with significant adverse impacts at Greenock Drive, Galloway Close, Dunbar Grove and Dunrobin Close. However, the adverse impact at Coal Pits Farm is removed.

5.47 BS4142 is clear that the numerical outcomes only provide the initial assessment, and the standard requires relevant contextual matters to be considered before reaching a conclusion on the potential impact. In this instance, the relevant contextual matters are:

- the assessment considers several worst-case assumptions:
 - B2 use across the site, with all level access doors open at all times;

- peak hourly traffic flows for cars and HGVs occurring in every assessment period;
 - the use of shunters across the site at a one-to-one ratio with HGV movements;
 - the use of refrigerated trailers across the site.
 - the residual acoustic climate is dominated by road traffic noise from Pilsworth Road, Moss Hall Road and the M66 motorway, with industrial/commercial sound from other parts of Heywood Distribution Park also audible. This is similar in character to key noise sources likely to operate at the proposed development, i.e. vehicle movements and HGV loading/unloading activities in service yards, and they are likely to mask sound from the proposed development to some degree;
 - part of the site is currently used as a HGV trailer park, and therefore there is existing industrial/commercial uses at the site.
- 5.48 Taking into account all of these contextual factors, it is considered that the initial numerical assessment outcomes, do not underestimate the potential impacts, and may overestimate them.
- 5.49 Notwithstanding this, it is considered that overall adverse impacts could still occur at some receptors, with potential significant adverse impacts if the site layout is similar to the amended layouts (Layouts 3 and 5). Mitigation measures to reduce potential impacts are considered in Section 6 of this report.
- 5.50 BS4142: 2014+A1: 2019 requires consideration of uncertainty in data and associated calculations, although it does not require uncertainty to be quantified. In this assessment uncertainty has been reduced as far as considered practicable through the implementation of high quality source data and a robust calculation process including a number of worst-case operational assumptions. Uncertainty has also been reduced by using background sound data gathered during both a weekday and a weekend, and covering the most sensitive time periods, i.e. the middle of the night.
- 5.51 Overall, it is considered that any uncertainty in the measurement data and calculations is unlikely to adversely affect the assessment outcomes and that those outcomes are considered to be robust.

Night-time Maximum Noise Levels

- 5.52 The highest or noisiest short duration noise events due to the use of the site, in the form of night-time $L_{A_{Fmax}}$ maximum noise levels, are likely to relate to shunters or HGVs picking up trailers in service yards, or slamming vehicle doors in car parks. The highest maximum noise levels associated with these events are likely to be in the region of 92dB for a shunter connecting to a trailer, 86dB for HGVs connecting to trailers, and 72dB for a vehicle door slam, all measured at a distance of 10 metres.
- 5.53 The noise model described previously has been used to calculate the maximum noise levels likely to occur at the surrounding receptors; the calculated maximum sound levels have been adjusted by +3dB to convert from free-field to façade values, as the 60dB night-time maximum noise level criterion set out in the WHO guidelines is a façade value.
- 5.54 The calculated maximum noise levels for each of the five assessed layouts are shown in Table 5.7; the noise levels have been rounded to the nearest whole number.

Table 5.7: Night-time maximum noise level assessment, dB façade

Receptor	Noise Level (L _A F _{max}) for Layout:				
	1 ⁽¹⁾	2 ⁽¹⁾	3 ⁽¹⁾	4 ⁽¹⁾	5 ⁽¹⁾
Kelty Grove	43	42	51	44	44
Glencoe Close	52	39	57	48	54
Greenock Drive	63	47	66	50	63
Galloway Close	57	50	69	58	65
Dunbar Grove	60	51	63	44	60
Dunrobin Close	65	62	65	55	65
Moss Hall Road	41	38	40	41	39
Coal Pits Farm	53	51	54	55	48

Note: ⁽¹⁾ - Layouts described as follows:

- 1 = Layout 1, which is a single cross-dock unit, as per Figure B.3 in Appendix B.
- 2 = Layout 2, which is the two unit scheme, as per Figure B.4 in Appendix B.
- 3 = Layout 3, which is the two unit scheme as per Figure B.4 in Appendix B, amended with the buildings swapped with their service yards, so their yards are outside them.
- 4 = Layout 4, which is the single-sided unit, as per Figure B.5 in Appendix B.
- 5 = Layout 5, which is the single-sided unit, as per Figure B.5 in Appendix B, amended with the building swapped with the service yard, so the yard is to the east of the building.

- 5.55 It can be seen from Table 5.6 that the calculated maximum noise levels are predicted to be below the 60dB criterion set out in the World Health Organisation's *Guidelines for Community Noise* at Kelty Grove, Glencoe Close, Moss Hall Road and Coal Pits Farm. On this basis, no adverse impacts are considered likely at these receptors as a result of maximum noise levels.
- 5.56 At Greenock Drive, Galloway Close, Dunbar Grove and Dunrobin Close, the 60dB criterion is predicted to be exceeded for at least one of the assessed layouts.
- 5.57 The exceedances are predicted to generally be due to shunters picking up trailers, and so will only occur if shunters are used at the site; the exception is for Layout 3 (the amended two-unit scheme), where exceedances are also predicted for HGVs picking up trailers.
- 5.58 The WHO guidelines state that the 60dB criterion should not be exceeded more than 10 to 15 times per night and therefore the number of events is also relevant to whether WHO guidelines are likely to be met, in addition to the actual noise level of those events. In this instance, the traffic data provided for the assessment shows that there are expected to be a total of 217 no. HGV movements across the night-time period, and with shunters assumed to operate on a one-to-one basis with HGV movements, the 60dB criterion is likely to be exceeded more than 10 to 15 times per night, unless mitigation is applied.
- 5.59 Mitigation to reduce night-time maximum noise levels is considered in Section 6 of this report.

Fixed Plant Noise

- 5.60 The proposed development may include plant to control the internal climate or provide ventilation within the proposed units, although at this stage no firm details are available as to what plant is to be included, if any.
- 5.61 Therefore, recommended building services plant noise limits are shown in Table 5.8, set so that plant noise does not increase the existing background sound levels at surrounding receptors.

Table 5.8: Recommended noise limits for fixed building services plant, free-field dB

Position	Period	Measured Background Sound Level, L_{A90}	Proposed Noise Limit $L_{A,r,T,r}^{(1)(2)}$
Receptors to the south	Daytime (07:00-23:00)	45	35
	Early night-time (23:00-05:00)	35	25
	Late night-time (05:00-07:00)	45	35
Receptors to the north	Daytime (07:00-23:00)	42	32
	Early night-time (23:00-05:00)	36	26
	Late night-time (05:00-07:00)	43	33

Notes:

⁽¹⁾ The proposed noise limit is a free-field value at the façade of the property.

⁽²⁾ T is one hour for daytime, and 15 minutes for night-time.

- 5.62 The noise limits in Table 5.8 are rating levels, and the design and specification of plant should take into account any acoustic characteristics, as might be experienced at the receptors.
- 5.63 The limits are deemed to apply to the total plant noise emission levels from the whole development, so individual plant items may need to be designed to a lower limit to consider the cumulative effects of noise.

6 MITIGATION

- 6.1 An assessment in accordance with BS4142: 2014+A1: 2019 has shown that without mitigation measures in place, overall, adverse impacts could occur due to the operation of the site, with significant adverse impacts possible, depending on the site layout. Night-time maximum noise levels are predicted to exceed the WHO's guidelines at four of the assessed receptors.
- 6.2 There are typically three opportunities to reduce noise at a site such as this; at source, between a source and receptor, and at a receptor.
- 6.3 In this instance, the receptors are existing residential properties, or in the case of the receptor Moss Hall Road, a property that has planning permission but has not yet been constructed, and Management Limited has no control over them; no consideration is therefore given to any mitigation that might be applied at the receptor.
- 6.4 Reducing noise at source typically involves adopting a suitable layout, or substitution or modification of noise sources.
- 6.5 The first of these measures is considered the most effective strategy, as it typically reduces the extend of other mitigation required, such as acoustic barriers.
- 6.6 The assessment has tested five site layouts, these being the three illustrative layouts that are shown in Appendix B, and the two amended layouts to determine whether there is a workable alternative layout that could give rise to overall higher noise levels.
- 6.7 The two amended layouts (Layouts 3 and 5) are predicted to result in significantly worse outcomes than their respective illustrative layouts (Layouts 2 and 4) due to the location of service yards, so it is recommended that these are located away from the northern, eastern and southern boundaries, as per Layouts 2 and 4, unless adequate mitigation can be provided. This would apply to any similar layout that places a service yard along the northern or southern edges of the site, or places a single service yard on the eastern side of the site.
- 6.8 The further mitigation considered in this section is based on Layouts 1, 2 and 4.
- 6.9 Reducing noise at source by modification is considered the most effective strategy to reduce noise from refrigerated trailers, by using electric hook-ups which remove the need for the trailer to be powered by its own internal diesel engine. Electric hook-ups typically reduce noise emissions from refrigerated trailers by approximately 5dB.
- 6.10 Reducing noise between a source and receptor is typically achieved by using acoustic barriers.
- 6.11 In this instance, the key sources affecting receptors for each of the three illustrative layouts are activities in service yards, including HGV and shunter movements. Shunters connecting to trailers are the events causing exceedances of the WHO's night-time maximum noise level criterion. Therefore, acoustic barriers screening parts of service yards have been considered.
- 6.12 A suitable mitigation strategy may include a combination of these measures.

Assessment With Mitigation

6.13 To illustrate the effect that a combination of mitigation measures could achieve, the following measures have been tested for Layouts 1, 2 and 4, which are the three illustrative layouts considered in this assessment:

- use of electrical hook-ups for refrigerated trailers;
- acoustic barriers to screen service yards:
 - for Layout 1 (Figure B.3 in Appendix B), a 4.5 metre high barrier around the north-eastern corner of the service yard and HGV perimeter road, as shown in Figure F.2 in Appendix F;
 - for Layout 2 (Figure B.4 in Appendix B), a 3 metre high barrier along the eastern edge of the service yard of the northern unit, as shown in Figure F.3 in Appendix F.

6.14 Any acoustic barriers erected at the site should be imperforate, sealed at the base, and have a superficial minimum density of at least 20kg/sq.m.

6.15 The updated BS4142 initial numerical assessments are set out in Table 6.1, with the listed mitigation included.

Table 6.1: Updated initial BS4142 numerical assessments with mitigation for Layouts 1, 2 and 4, free-field dB

Receptor	Period	Background Sound Level, L_{A90}	Rating Level, $L_{A,Tr}^{(1)(2)}$		
			Layout 1	Layout 2	Layout 4
Kelty Grove	Daytime (07:00-23:00)	42	34 (-8)	31 (-11)	35 (-7)
	Early night-time (23:00-05:00)	36	29 (-7)	26 (-10)	30 (-6)
	Late night-time (05:00-07:00)	43	34 (-9)	31 (-12)	35 (-8)
Glencoe Close	Daytime (07:00-23:00)	42	39 (-3)	34 (-8)	38 (-4)
	Early night-time (23:00-05:00)	36	34 (-2)	29 (-7)	33 (-3)
	Late night-time (05:00-07:00)	43	39 (-4)	34 (-9)	39 (-4)
Greenock Drive	Daytime (07:00-23:00)	42	43 (+1)	38 (-4)	41 (-1)
	Early night-time (23:00-05:00)	36	38 (+2)	33 (-3)	35 (-1)
	Late night-time (05:00-07:00)	43	43 (0)	38 (-5)	41 (-2)
Galloway Close	Daytime (07:00-23:00)	42	45 (+3)	41 (-1)	44 (+2)
	Early night-time (23:00-05:00)	36	39 (+3)	34 (-2)	38 (+2)
	Late night-time (05:00-07:00)	43	45 (+2)	40 (-3)	44 (+1)
Dunbar Grove	Daytime (07:00-23:00)	42	45 (+3)	39 (-3)	37 (-5)
	Early night-time (23:00-05:00)	36	40 (+4)	34 (-2)	31 (-5)
	Late night-time (05:00-07:00)	43	46 (+3)	39 (-4)	37 (-6)
Dunrobin Close	Daytime (07:00-23:00)	42	45 (+3)	44 (+2)	43 (+1)
	Early night-time (23:00-05:00)	36	40 (+4)	39 (+3)	37 (+1)
	Late night-time (05:00-07:00)	43	46 (+3)	44 (+1)	42 (-1)
Moss Hall Road	Daytime (07:00-23:00)	45	30 (-15)	27 (-18)	30 (-15)
	Early night-time (23:00-05:00)	35	25 (-10)	23 (-12)	26 (-9)
	Late night-time (05:00-07:00)	45	30 (-15)	28 (-17)	31 (-14)
Coal Pits Farm	Daytime (07:00-23:00)	45	41 (-4)	36 (-9)	42 (-3)
	Early night-time (23:00-05:00)	35	37 (+2)	32 (-3)	38 (+3)

Receptor	Period	Background Sound Level, L_{A90}	Rating Level, $L_{A_r,Tr}^{(1)(2)}$		
			Layout 1	Layout 2	Layout 4
	Late night-time (05:00-07:00)	45	42 (-3)	37 (-8)	43 (-2)

Notes:

⁽¹⁾ T is 1 hour for daytime and 15 minutes for night-time.

⁽²⁾ Value in brackets is the difference between the rating level and the background sound level.

6.16 It can be seen from Table 6.1 that the updated initial numerical outcomes for Layouts 1, 2 and 4 are predicted to be:

- low impacts at Kelty Grove, Glencoe Close, Greenock Drive, Dunbar Grove and Moss Hall Road for Layout 2 and Layout 4, with impacts between a low impact and an adverse impact for at least one of these assessed layouts at the remaining receptors Galloway Close, Dunrobin Close and Coal Pits Farm;
- low impacts at Kelty Grove, Glencoe Close and Moss Hall Road for the Layout 1, with outcomes between a low impact and an adverse impact at the remaining receptors.

6.17 As noted previously, the numerical outcomes only provide the initial assessment outcomes, and BS4142 requires relevant contextual matters to be considered before reaching a final conclusion on the potential impacts. In this instance, the same contextual factors previously identified remain relevant, namely:

- the assessment considers several worst-case assumptions:
 - B2 use across the site, with all level access doors open at all times;
 - peak hourly traffic flows for cars and HGVs occurring in every assessment period;
 - the use of shunters across the site at a one-to-one ratio with HGV movements;
 - the use of refrigerated trailers across the site.
- the residual acoustic climate is dominated by road traffic noise from Pilsworth Road, Moss Hall Road and the M66 motorway, with industrial/commercial sound from other parts of Heywood Distribution Park also audible. This is similar in character to key noise sources likely to operate at the proposed development, i.e. vehicle movements and HGV loading/unloading activities in service yards, and they are likely to mask sound from the proposed development to some degree;
- part of the site is currently used as a HGV trailer park, and therefore there is existing industrial/commercial uses at the site.

6.18 In addition, the tested acoustic barriers for Layouts 1 and 2 will also reduce night-time maximum noise levels to meet the WHO's 60dB criterion at all receptors. For Layout 4, the night-time maximum noise levels were already predicted to achieve the WHO's requirement without mitigation.

6.19 Taking into account all of these contextual factors, it is considered that the initial numerical assessment outcomes do not underestimate the potential impacts, and are likely to overestimate them to some degree.

6.20 On balance, it is therefore concluded that providing appropriate mitigation is incorporated into the final design of the site, adverse impacts are unlikely.

- 6.21 The mitigation measures considered in this report are indicative, based on the five layouts assessed in this report to demonstrate that a design solution is achievable at the site. The extent and design of mitigation required will ultimately be linked to the final site layout, and so will only be confirmed at Reserved Matters stage. A suitably worded planning condition is considered the most appropriate means of securing the correct mitigation, such as:

“Any applications for Reserved Matters shall be accompanied by a noise assessment to confirm the need for and extent of noise mitigation measures. The approved mitigation measures shall be installed prior to the first use of the development and maintained thereafter, unless agreed otherwise in writing by the local planning authority.”

7 CONCLUSION

- 7.1 Resound Acoustics Limited has been appointed by Management Limited to undertake a noise assessment for the H4 site at Heywood Distribution Park, Heywood, Rochdale. Indurent Management Limited is seeking outline planning permission for E(g)(iii) (industrial processes), B2 (general industrial), B8 (storage and distribution) uses at the site.
- 7.2 An assessment in accordance with British Standard 4142: 2014+A1: 2019 has shown that providing appropriate mitigation is incorporated into the final design of the site, the operation of the site is overall unlikely to lead to adverse impacts at the receptors around the site.
- 7.3 Appropriate mitigation will also result in night-time maximum noise levels achieving the requirements of the World Health Organisation's *Guidelines for Community Noise*.
- 7.4 The extent of mitigation required will ultimately be linked to the final site layout, and so will only be confirmed at Reserved Matters stage. However, an appropriate level of mitigation could be secured through a suitably worded planning condition attached to any outline planning permission.
- 7.5 Noise limits have been recommended for any fixed building services plant items that may be installed at the site.
- 7.6 On the basis of this report, providing appropriate mitigation is incorporated into the final design of the site, noise should not pose a constraint to the proposed development.

Appendices

Appendix A – Introduction to Noise and Glossary of Terminology

Noise is defined as unwanted sound. The human ear is able to respond to sound in the frequency range 18Hz (deep bass) to 18,000Hz (high treble) and over the audible range of 0dB (the threshold of perception) to 140dB (the onset of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting (filtering) mechanism is used. This reduces the importance of lower and higher frequencies, approximating the response of the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. Noise can be perceived to be louder or more noticeable if the source of the noise is observed; e.g. roads, trains, factories, building sites etc. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. Various noise indices have been derived to describe the fluctuation of noise levels that vary over time. Usually, these noise indices relate to specific types of noise, and as such different noise indices are used to describe road traffic noise, background noise, construction noise, etc.

The weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement and the levels are denoted as dB(A) or L_{Aeq} , L_{A10} , etc, according to the parameter being measured.

Noise is measured on the decibel scale, which is logarithmic rather than linear. As a result of this, a 3dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3dB(A) is generally regarded as the minimum difference needed to perceive a change. Table A.1 sets out examples of noise levels typically experienced during everyday activities. Table A.2 sets out an explanation of the terminology used in this report.

Table A.1: Typical sound levels found in the environment

Sound Level	Location
0 to 10dB(A)	Threshold of hearing
10 to 20dB(A)	Broadcasting studio
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside a factory or noisy pub
100 to 110dB(A)	Burglar Alarm at 1m
110 to 130dB(A)	Pneumatic drill at 1m away
140dB(A)	Threshold of Pain

Table A.2: Terminology relating to noise

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of $20\mu\text{Pa}$ (20×10^{-6} Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L_w	The L_w , or sound power level, is a measure of the total noise energy of a source.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$ or Background Noise Level	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 metres
Façade	At a distance of 1 metre in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS EN 61672.

Appendix B: Site Plans

Figure B.1: Site location plan

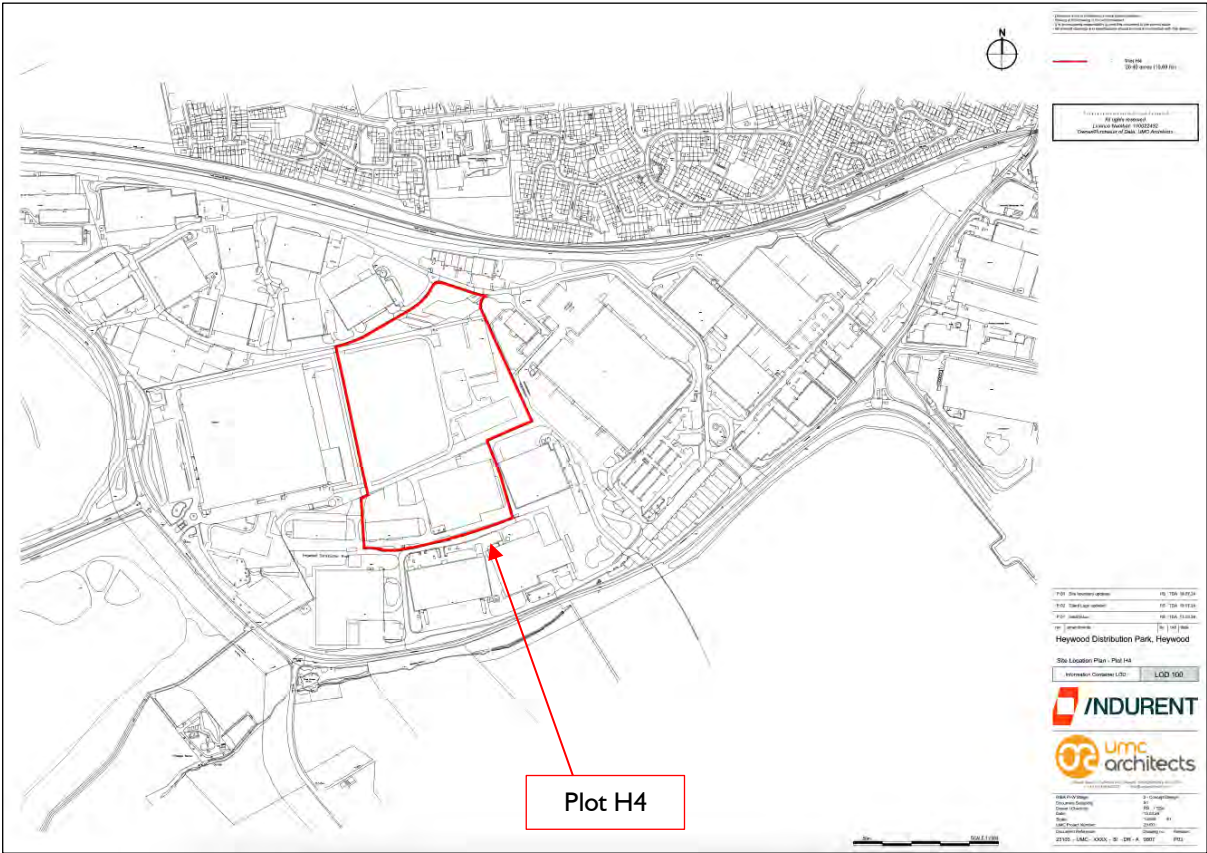


Figure B.2: Parameters plan

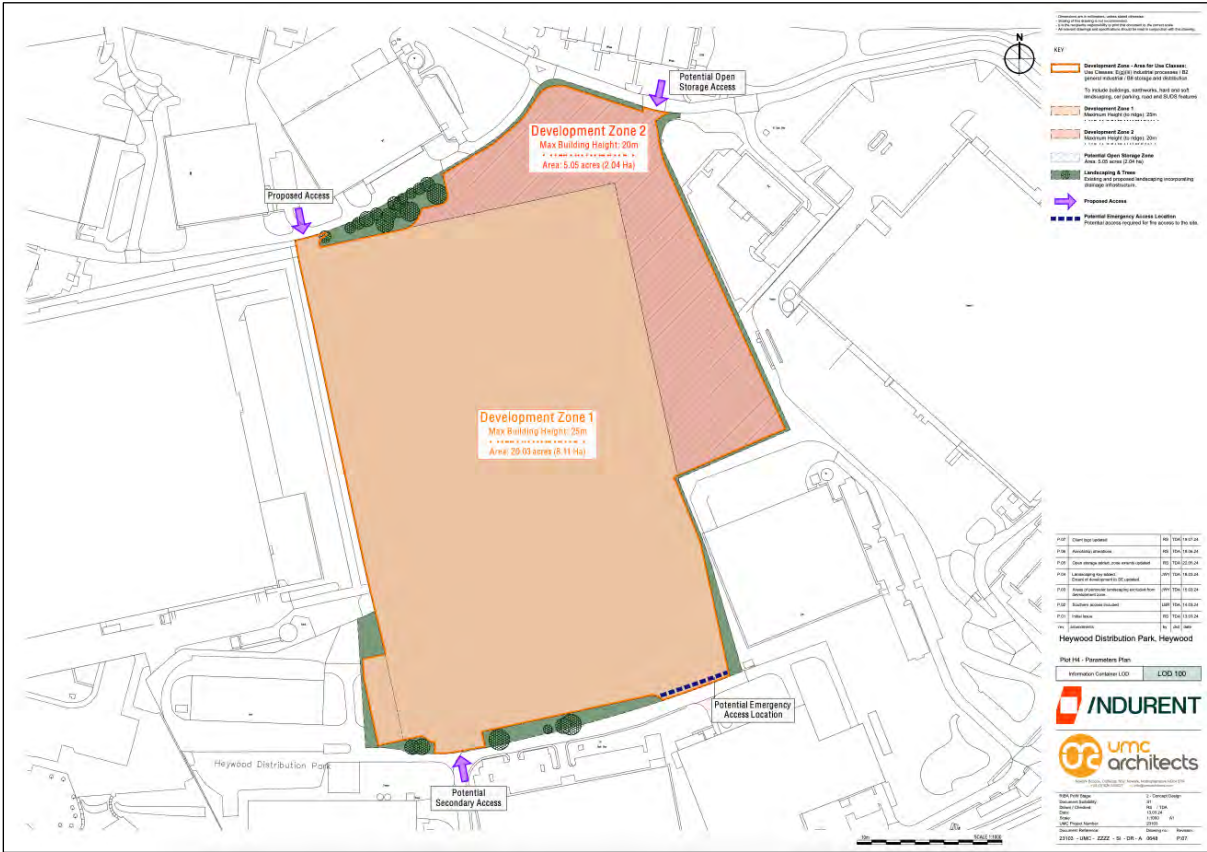


Figure B.3: Illustrative layout – single cross-dock unit scheme



Figure B.4: Illustrative layout - two unit scheme



Figure B.5: Illustrative layout – single-sided unit scheme



Appendix C – Sound Monitoring Equipment

Table C.1: Sound survey monitoring equipment

Position	Equipment	Serial Number	Calibration Date
Position 1	01dB Fusion type I sound level meter	14025	25/07/2023
	01dB PRE22N pre-amplifier	2105013	
	Gras 40CD microphone	428433	
	Cirrus CR515 acoustic calibrator	96159	20/07/2023
Position 2	01dB Fusion type I sound level meter	14026	25/07/2023
	01dB PRE22N pre-amplifier	2105017	
	Gras 40CD microphone	446532	
	Cirrus CR515 acoustic calibrator	96172	20/07/2023

[illegible]

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Appendix E – Sound Survey Results

Figure E.1: Sound levels measured at Position 1, free-field dB

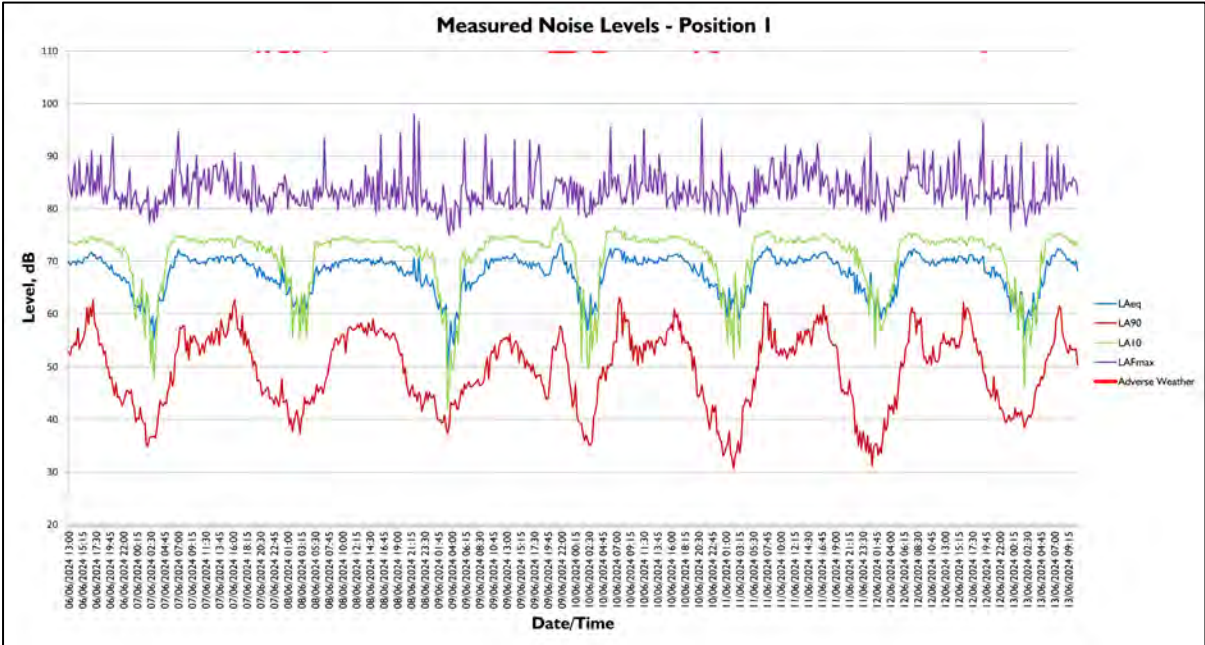


Figure E.2: Sound levels measured at Position 2, free-field dB

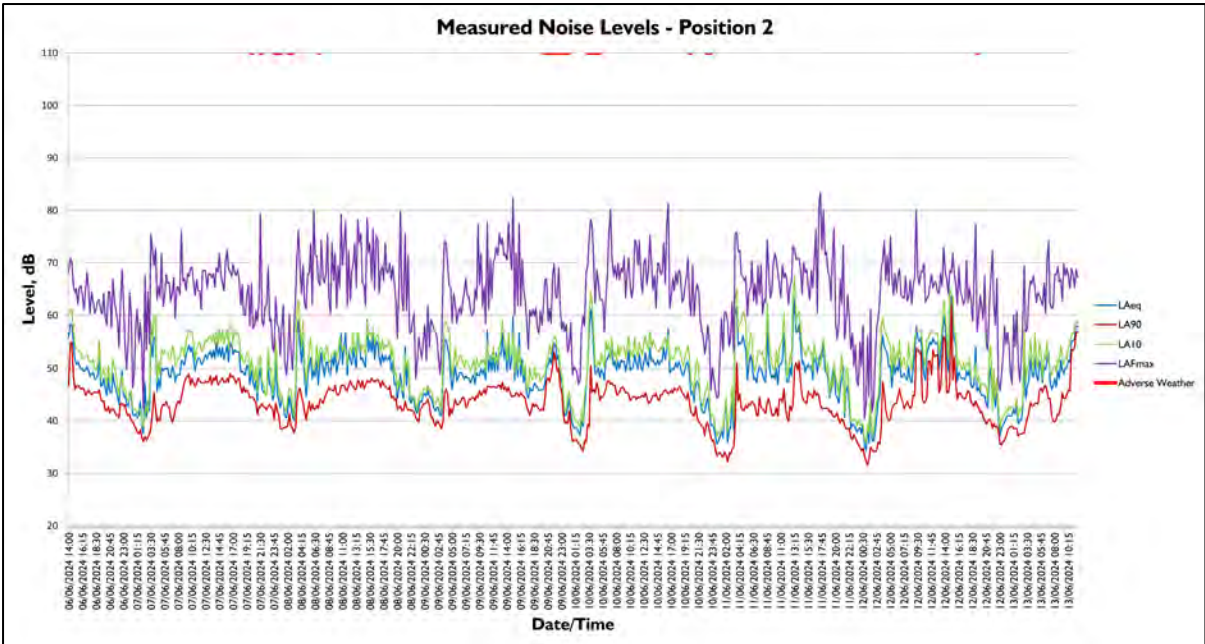


Figure E.3: Distribution of background sound levels at Position I, daytime (07:00-23:00), free-field dB L_{A90}

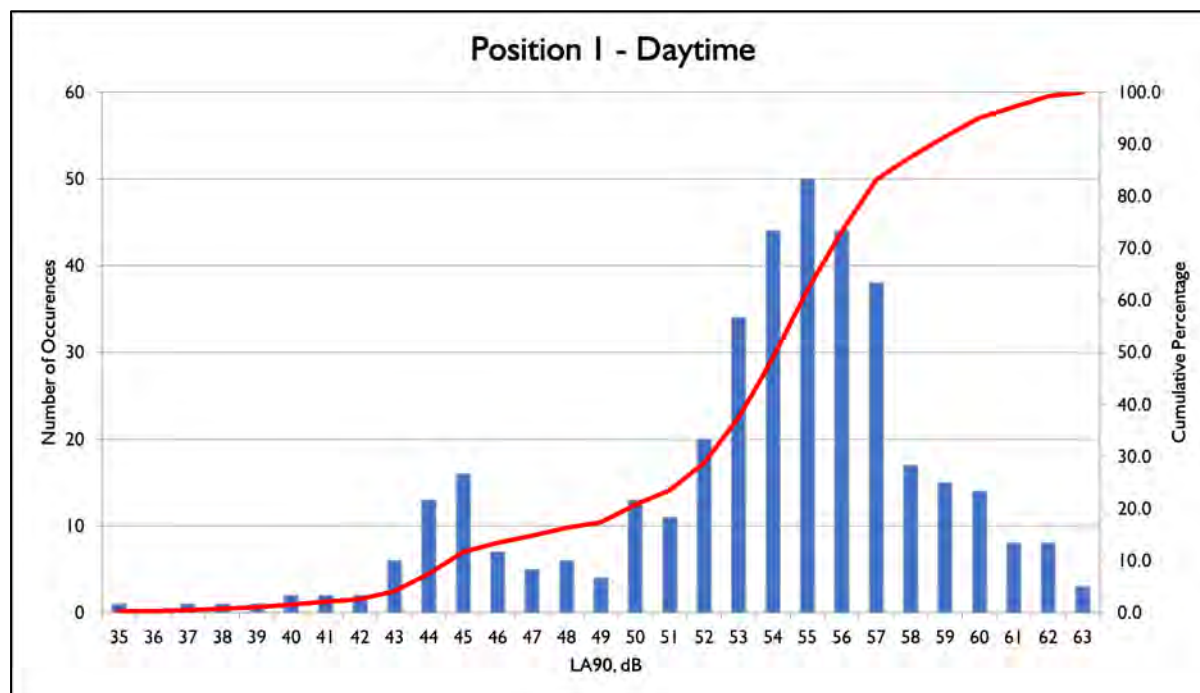


Figure E.4: Distribution of background sound levels at Position I, early night-time (23:00-05:00), free-field dB L_{A90}

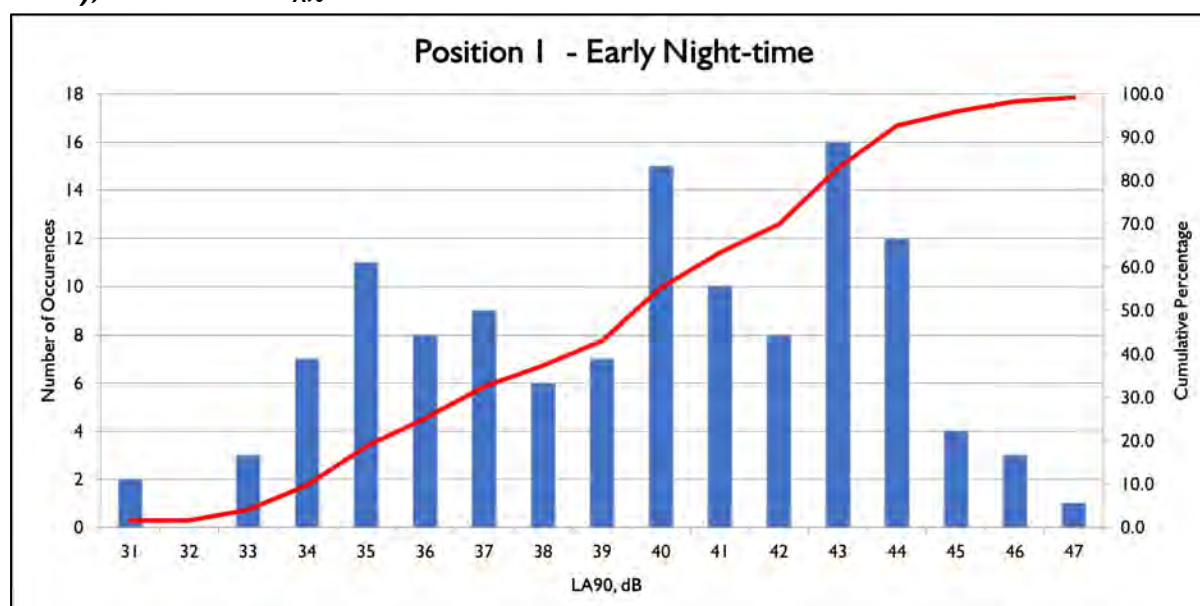


Figure E.5: Distribution of background sound levels at Position 1, late night-time (05:00-07:00), free-field dB LA90

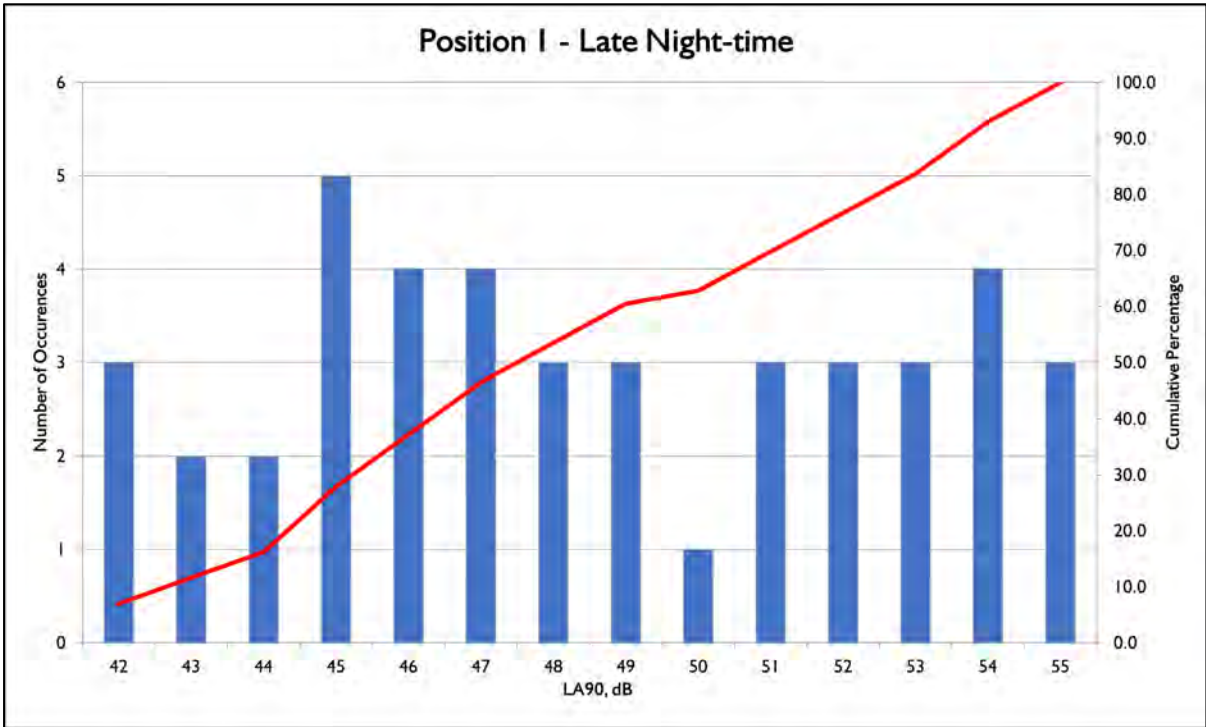


Figure E.6: Distribution of background sound levels at Position 2, daytime (07:00-23:00), free-field dB LA90

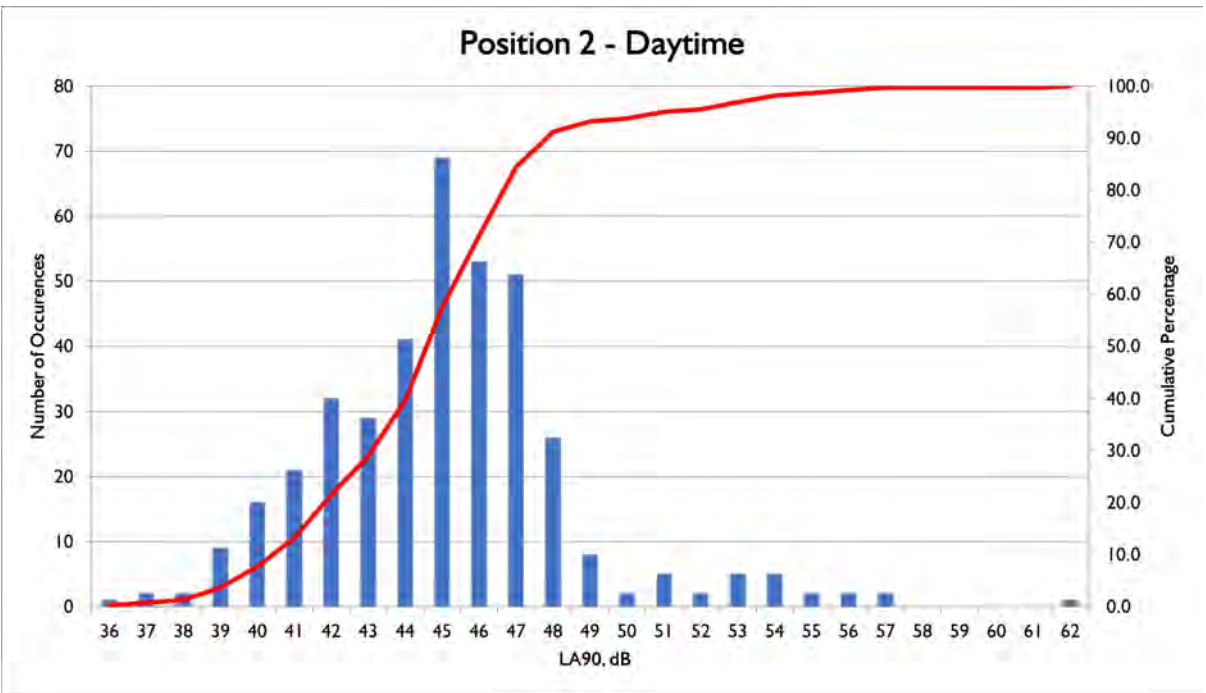


Figure E.7: Distribution of background sound levels at Position 2, early night-time (23:00-05:00), free-field dB LA90

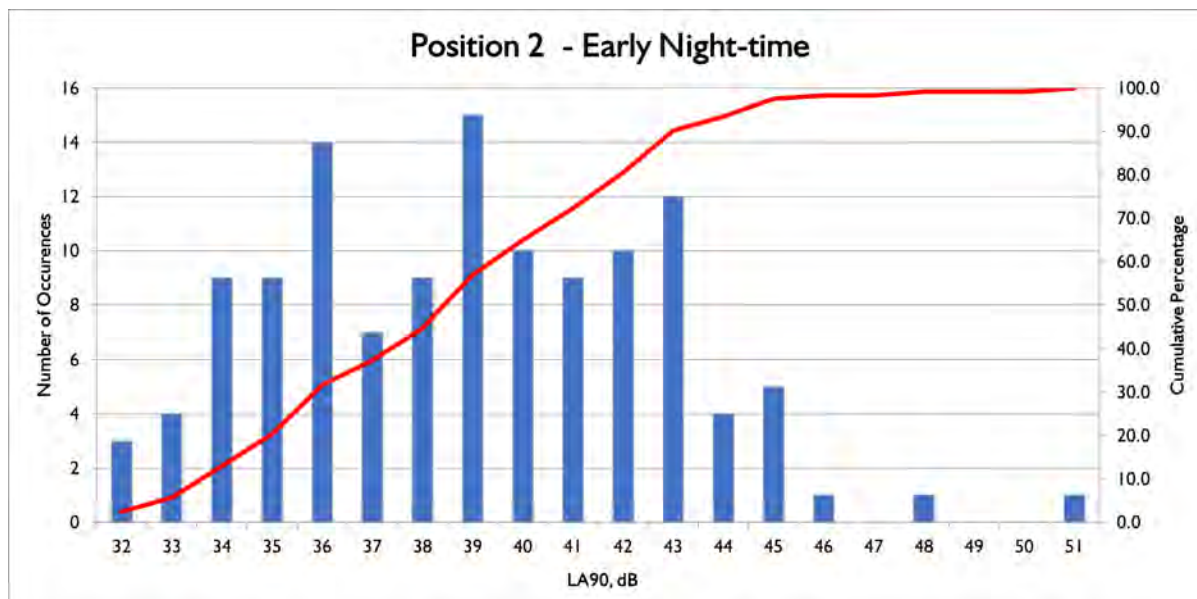
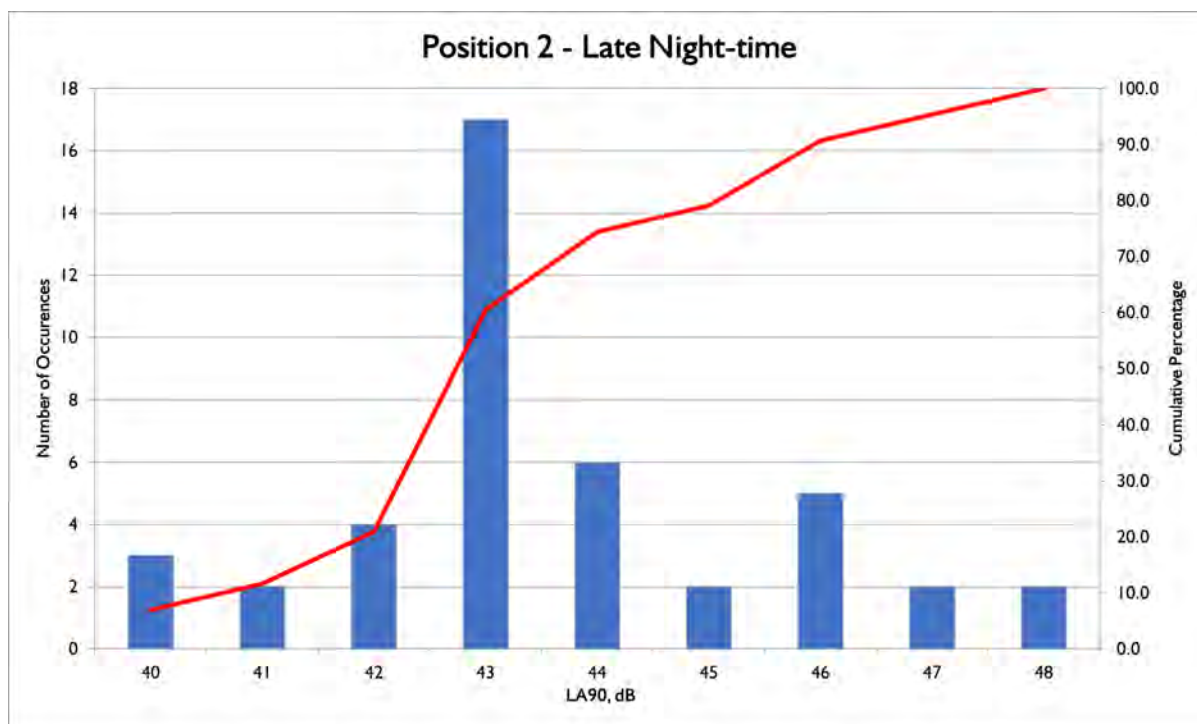


Figure E.8: Distribution of background sound levels at Position 2, late night-time (05:00-07:00), free-field dB LA90



Appendix F – Noise Assessment Figures

Figure F.1: Assessment locations

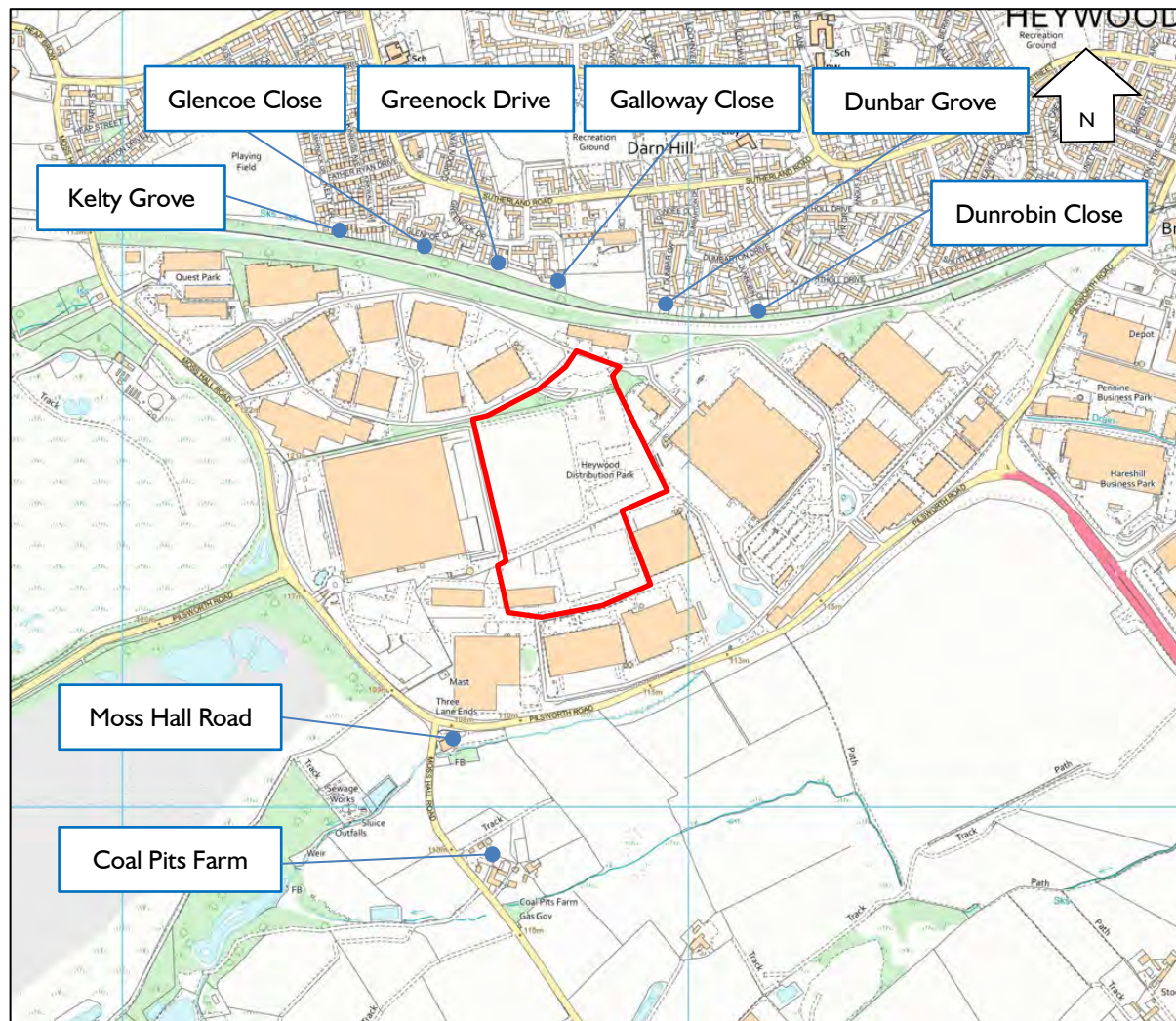


Figure F.2: Layout I - acoustic barrier alignment

Figure F.3: Layout 2 - acoustic barrier alignment





Resound Acoustics Limited, Elizabeth Court, Church Street, Stratford-upon-Avon, Warwickshire CV37 6HB
Telephone: (01789) 387979
www.resoundacoustics.co.uk

Registered Address: Resound Acoustics Limited, One Eastwood, Harry Weston Road, Binley Business Park, Coventry, Warwickshire CV3 2UB
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