Noise Impact Assessment

Site Address: Nunbrook Mills, Huddersfield Road, Mirfield, WF14 0EH

Client Name: John Cotton Group Ltd.

Project Reference No: NP-009176

Authorisation and Version Control			
Revision	Date	Reported By	Approved By
001	23/03/2023	M. Caley, MIOA	A Martin, MIOA

Amendment History	
Revision	Summary of Amendments
001	--

Disclaimer

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Delivering sustainable development by promoting good health and well-being through effective management of noise.

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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment for a proposed storage unit ('the Proposed Development') at the John Cotton Group site at Nunbrook Mills, Huddersfield Road, Mirfield, WF14 0EH ('the Site').

The applicant is preparing a planning application ('the Application') to be submitted to Kirklees Metropolitan Council. This technical report has been prepared to support the planning application.

A noise survey has been undertaken to establish the prevailing background sound levels at the closest Noise Sensitive Receptors ('NSRs'). The report details the existing background sound climate and the predicted noise emissions associated with the Proposed Development. Measures required to mitigate noise impact from the Proposed Development have been recommended where necessary and assessed in accordance with the relevant performance standards, legislation, policy and guidance.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Standards, Legislation, Policy & Guidance

The following performance standards, legislation, policy and guidance have been considered to ensure good acoustic design in the assessment:

- National Planning Policy Framework (2021)
- Noise Policy Statement for England (2010)
- British Standard BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'

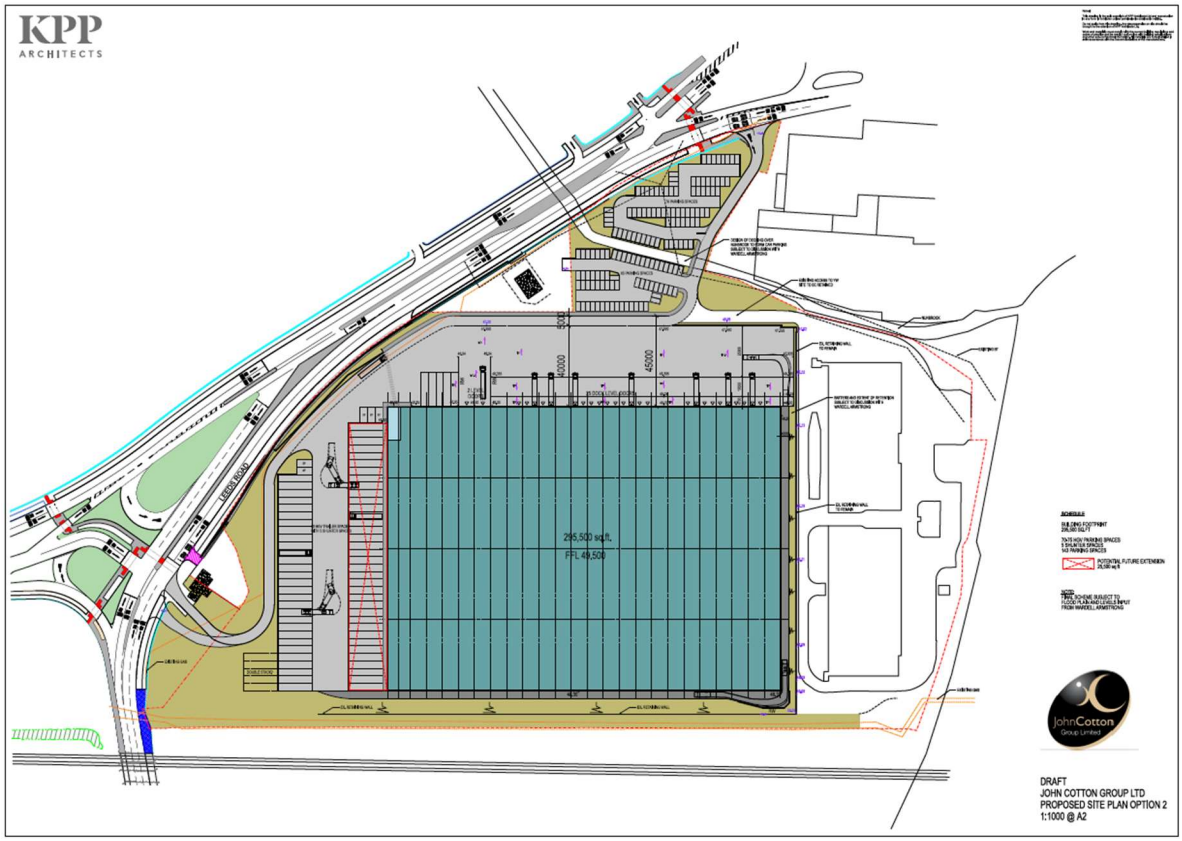
Further information on the legislation can be found in Appendix B.

1.2 Proposal Brief

The proposal is for the erection of a storage unit at the existing John Cotton Group site in Mirfield. The company specialises in the production of textiles, and currently all products that are manufactured at the site are transported to an off-site sister facility via HGVs. It is intended for the storage unit to be operational 24/7 and the application will be for B2/B8 industrial use class.

The applicant has informed NOVA Acoustics that no external fixed plant is to be installed, however, in case of any alteration to the proposal, plant limit levels will be calculated to ensure all noise emissions fall significantly below the background sound level at the closest NSRs.

The figure below shows the layout of the Proposed Development.



Drawing Ref. KPP Architects – JOHN COTTON GROUP LTD PROPOSED SITE PLAN OPTION 2

Figure 1 – Proposed Development Layout

2. Environmental Noise Survey

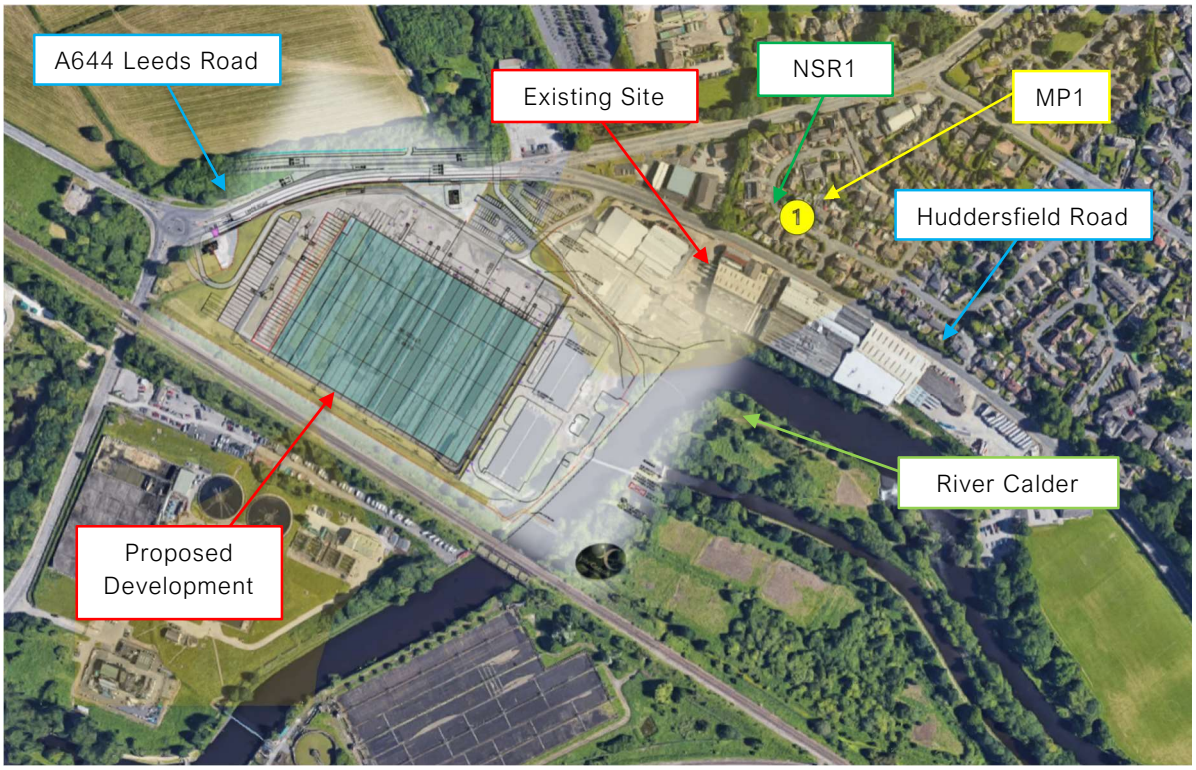
2.1 *Measurement Methodology*

The following table outlines the measurement dates and particulars.

Location	Survey Dates	Measurement Particulars
MP1	07/03/23 – 09/03/23	Equipment mounted on a lamppost along Manor Park approximately 3.5m above the ground at least 3.5m from any other large reflective surface.

Table 1 – Measurement Methodology

The figure below shows the site surroundings and measurement location:



Imagery ©2023 Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023

Figure 2 – Measurement Locations and Site Surroundings

2.2 *Context & Subjective Impression*

The Proposed Development is located to the south-west of the existing John Cotton Group site. During the set-up and collection of the monitoring equipment the acoustic environment at the surrounding NSRs was found to be low to moderate in level. The dominant sources of noise were found to be road traffic emissions from Huddersfield Road and infrequent vehicle pass-bys on Manor Park.

2.3 Environmental Noise Survey Results

Background Sound Level Analysis

The following section outlines the measured background sound levels that will be used as the baseline for the subsequent BS4142 noise assessment. The figures below show histogram graphs for the daytime and night-time periods. The complete time history results can be found in Appendix D.

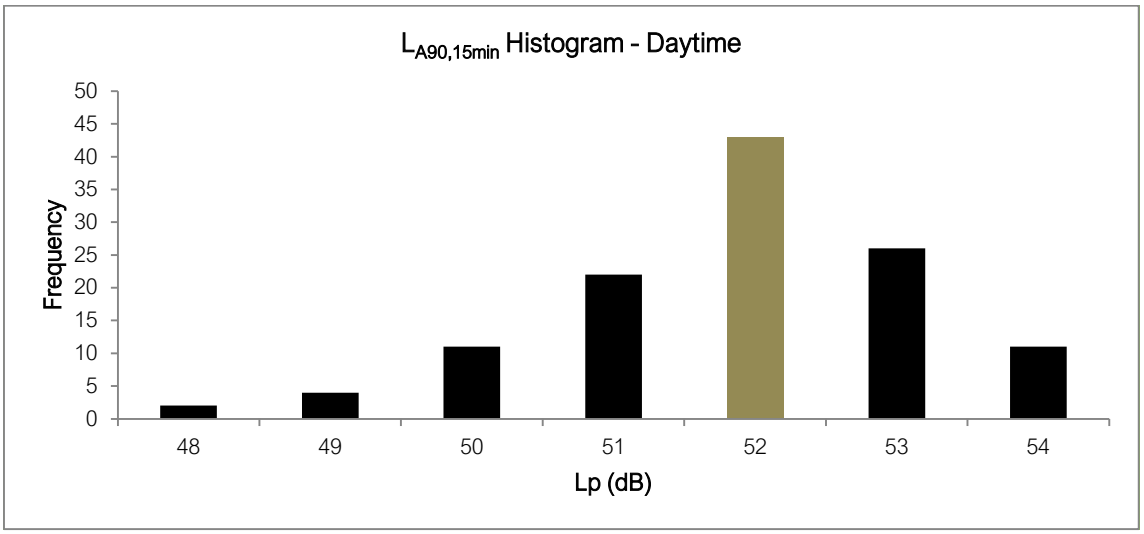


Figure 3 – Background Sound Level Analysis – Daytime

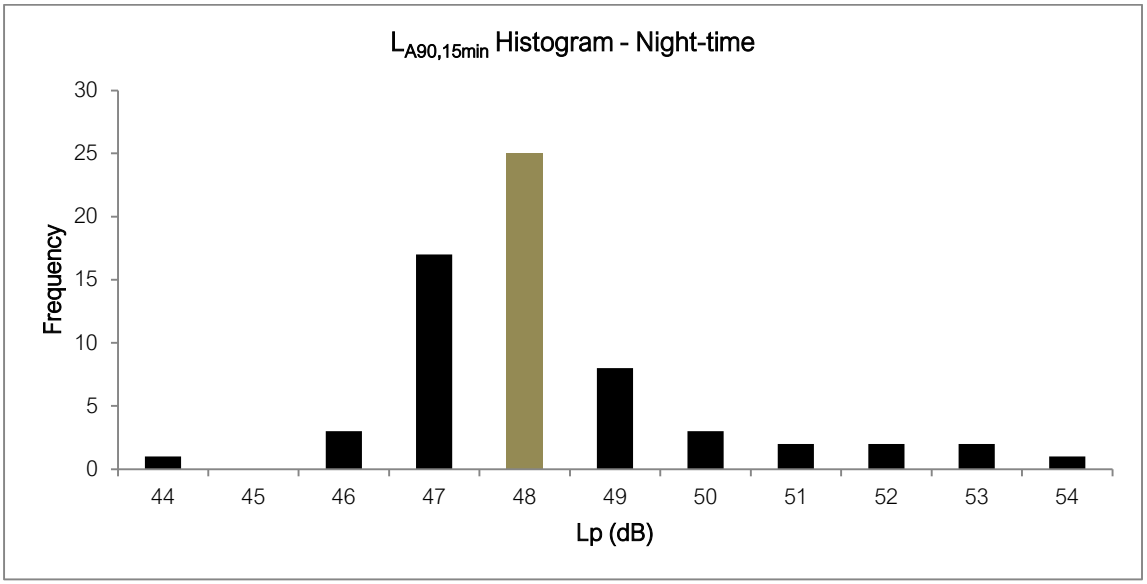


Figure 4 – Background Sound Level Analysis – Night-time

As can be seen in the figures above, the modal $L_{A90,15min}$ measurements are the significantly most repeated values. Considering the distribution of measurements, the modal values are deemed to be typical and robust.

3. BS4142 Noise Impact Assessment

In the following section of the report, the impact of the noise emissions generated by the Proposed Development are assessed.

3.1 Building Envelope Construction

The following assumptions have been made within the noise model:

- As the Proposed Development is currently in the outline stages, construction details are not yet decided. For this reason, it is assumed that the building will be constructed from metal sandwich panelling (such as Kingspan KS1000 panels) as this is a common construction material for buildings of this type.
- The exact locations and sizes of the roller shutter doors are not yet decided. It is recommended that the shutters provide a minimum sound reduction that is equal to that of the building façades (KS1000 panels). If this cannot be achieved, then further analysis will need to be undertaken.
- The applicant has informed NOVA Acoustics that the building will be approximately 12m tall at top of the façades, rising to a ridge height of 14m in the centre of the roof.

The sound reduction provided by Kingspan KS1000 panelling, taken from the manufacturer's datasheets is shown in the table below.

Description	1/1 Octave Frequency Band (Hz, SRI, dB)								R_w (dB)
	63	125	250	500	1k	2k	4k	8k	
Kingspan KS1000 Metal Sandwich Panelling	20	18	20	24	20	29	39	47	25

Table 2 – Kingspan KS1000 Sound Reduction

3.2 HGV Movements and Deliveries / Collections

The applicant has informed NOVA Acoustics that the Proposed Development will not increase the number of HGVs entering / leaving the site. However, instead of the HGVs travelling to unload products at the sister site, the deliveries will be made to the new storage facility. For this reason, HGV movement noise will be modelled at the proposed site exclusively and not on the road adjacent to the site.

As can be seen in Figure 1, there are a total of 27 docking doors. It is assumed that during worst-case 1-hour daytime and 15-minute night-time assessment periods, a third of these docks may be used. As such, 9no. point source emitters will be included in the noise model to represent deliveries / collections, and a line source emitter will be used to represent 9no. HGV movements.

3.3 *Specific Sound Levels & Noise Modelling Assumptions*

The Proposed Development has been modelled within SoundPlan 9.0 and the following assumptions have been made within the noise modelling software:

- For the purposes of the assessment, the ground between the source and receivers is considered to be a mixture of acoustically 'soft' and 'hard' surfaces.
- Where source data was provided with octave band data, it was used to facilitate noise modelling in accordance with ISO 9613-2. Where only A-weighted noise levels were provided, a frequency spectrum profile of a similar source(s) was used and adjusted as so the A-weighted sum of the octave frequency band levels equalled that of target A-weighted level. See Appendix F for further details.
- ISO 9613-2 assumes a 'downwind' model to the NSRs.
- The sound map grid height has been set to 1.5m, however, the noise levels used in the assessment has been taken from the most exposed point of each façade.
- The Proposed Development has been modelled in accordance with the proposed scheme plan, 'JOHN COTTON GROUP LTD PROPOSED SITE PLAN OPTION 2' by KPP Architects.
- The building fabric elements are deemed to be behave as area noise sources which is calculated in the software assuming: $L_W = L_{P@1m} + 10*Log(S)$.
- Full calculations and all sound power levels used within the noise model can be found in Appendix F.

The noise maps showing the specific sound level emissions from the Proposed Development can be seen in the figures below.

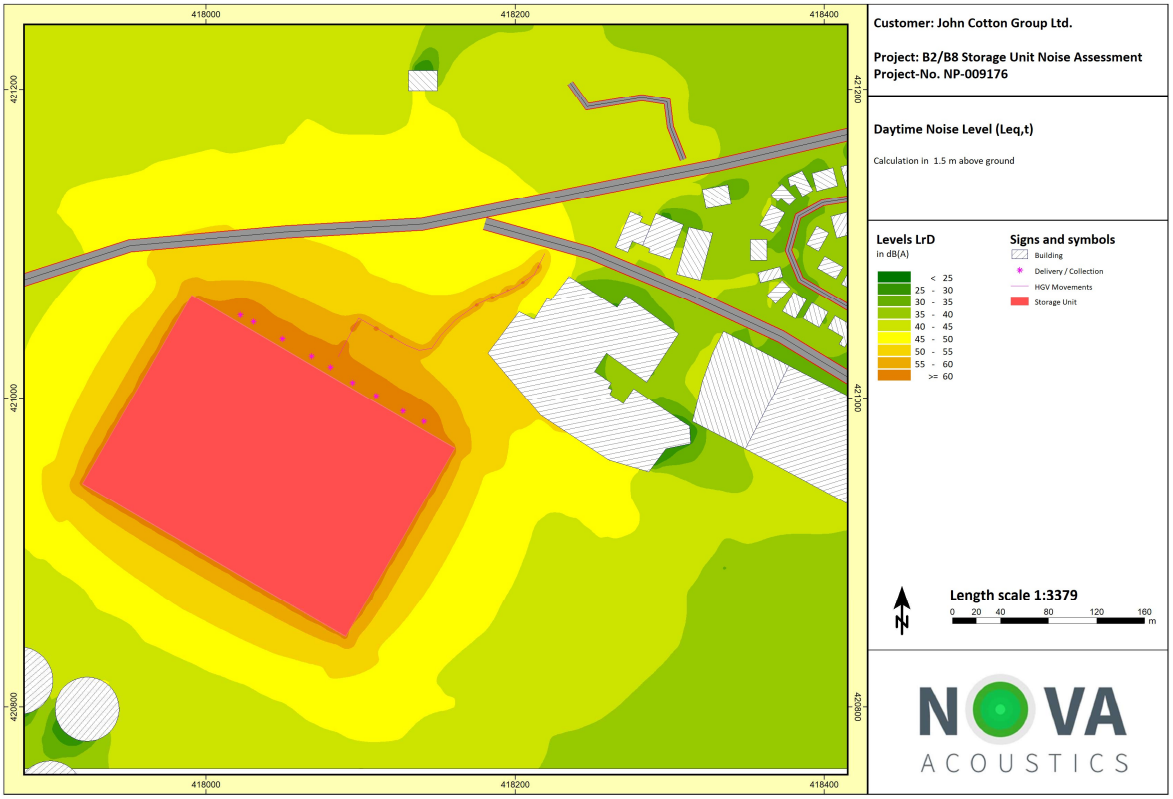


Figure 5 – Daytime Specific Sound Level Map – 1.5m Grid Map Height

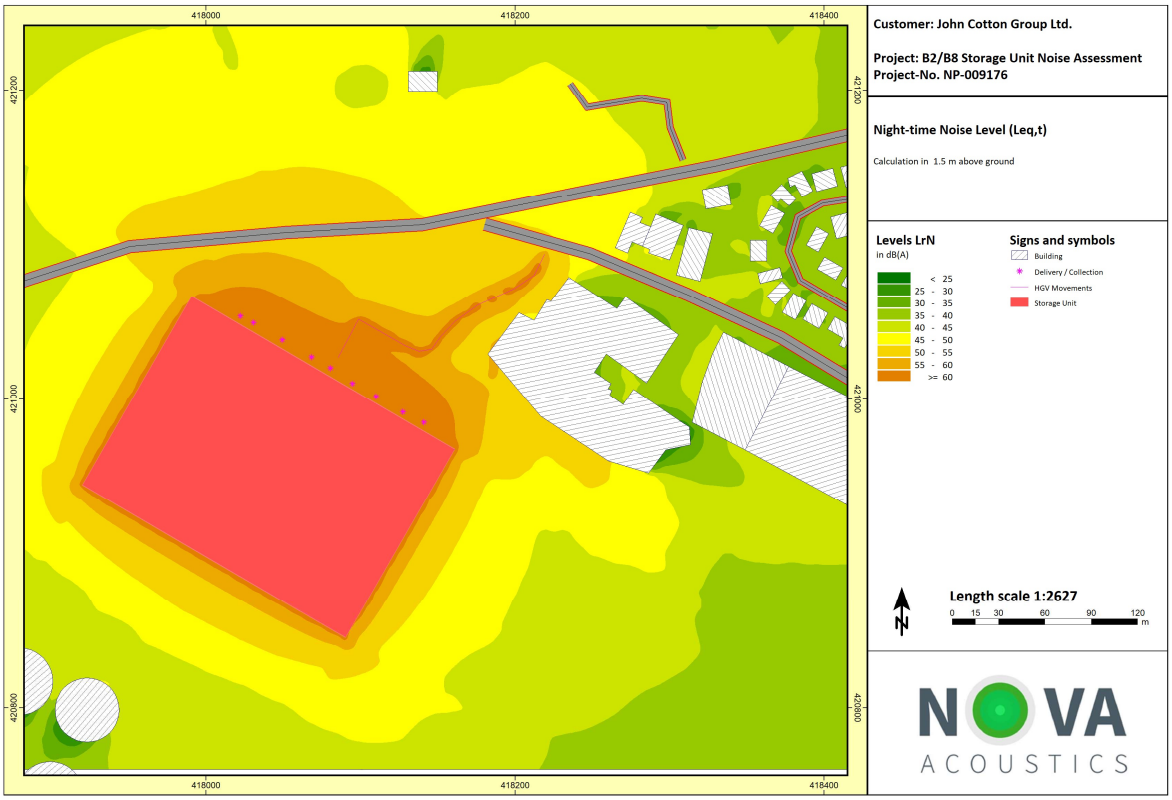


Figure 6 – Night-time Specific Sound Level Map – 1.5m Grid Map Height

3.4 BS4142 Noise Impact Assessment

The BS4142:2014 noise impact assessments at the most affected NSR are presented in the tables below.

BS4142 Noise Impact Assessment – Daytime									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at NSR1	45	41	41	36	37	27	12	-21	40
Acoustic Feature Correction	Just Perceptible Impulsivity & Intermittency of Operations								+6
Rating Sound Level ($L_{Ar,T}$)									46
Background Sound Level (L_{A90})									52
Exceedance									-6
BS4142 Assessment Outcome	The assessment indicates 'Low Impact, dependent on context' in accordance with BS4142 at the most affected NSR (NSR1).								
NPPF & NPSE Outcome	The assessment indicates 'No Observed Effect level ('NOEL') in accordance with the NPPF and NPSE.								
No further mitigation measures are deemed necessary.									

Table 3 – BS4142 Noise Impact Assessment (Daytime)

BS4142 Noise Impact Assessment – Night-time									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at NSR1	48	43	43	38	38	30	15	-17	41
Acoustic Feature Correction	Just Perceptible Impulsivity & Intermittency of Operations								+6
Rating Sound Level ($L_{Ar,T}$)									47
Background Sound Level (L_{A90})									48
Exceedance									-1
BS4142 Assessment Outcome	The assessment indicates 'Low Impact, dependent on context' in accordance with BS4142 at the most affected NSR (NSR1).								
NPPF & NPSE Outcome	The assessment indicates 'No Observed Effect level ('NOEL') in accordance with the NPPF and NPSE.								
No further mitigation measures are deemed necessary.									

Table 4 – BS4142 Noise Impact Assessment (Night-time)

3.5 BS4142:2014 Fixed Plant Noise Limit Levels

Currently, no external fixed plant has been specified for the Proposed Development, however, it is thought that it is possible that plant may be required in the future. For this reason, plant noise limit levels have been defined to ensure that the noise emissions do not exceed the background sound levels at the closest NSRs. The limit levels are inclusive of any rating penalties that should be applied to account for audible characteristics of the noise which could be deemed to cause increased annoyance, such as intermittency, impulsivity, or tonality. The limit levels have been calculated for the daytime and night-time periods, depending on when the plant will be operational.

The calculated plant noise limit levels are shown in the table below.

Description	Daytime Period (dB)	Night-time Period (dB)
Background Sound Level ($L_{A90,T}$)	52	48
Cumulative Plant Noise Limit Level at NSR ($L_{Aeq,T}$)	42	38

Table 5 – External Plant Limit Levels

Discussion

As can be seen in the assessment above, provided the plant limit levels are adhered to all noise emissions from the external plant units should not exceed the existing background sound levels. When assessed in accordance with BS4142:2014 this indicates 'Low Impact', and when assessed with the NPPF and NPSE this is classed as 'No Observed Effect Level' (NOEL). Once the plant units are specified the noise emissions should be calculated by an appropriately qualified person to ensure that the limit levels are achieved.

4. Conclusion and Action Plan

The proposed development has been assessed against the requirements of BS4142 and a mitigation scheme has been provided to ensure the criteria can be achieved.

The following 'Action Plan' is outlined to ensure the design considerations and specifications from this report are duly implemented:

1. The minimum sound insulation requirements set out in Section 3.1 should be adhered to and retained thereafter.
2. All roller shutter doors must remain closed during all noisy internal operations.
3. The plant noise limit levels shown in Section 3.5 should be adhered to if external fixed plant is installed.

The findings of this report will require written approval from the Local Authority prior to work commencing.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Background Sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for N% of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10\log_{10}(p/p_0)^{2.}$ Where: p is the root-mean-square sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Standards, Legislation, Policy, and Guidance

This report is to be primarily based on the following standards, legislation, policy and guidance.

B.1 – National Planning Policy Framework (2021)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2021. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 174e, it states:

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;

Paragraph 185 states:

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 impact 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; and*
c) *Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 185 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

To achieve this vision the Statement identifies the following three aims:

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

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

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

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. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, 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."

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the

specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

a) subjective method;
b) objective method for tonality;
c) reference method."

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) Intermittency

BS4142:2014 states that when the "specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time … if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied."

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a 'typical' background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night time period for sleep purposes.

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.

Assessment of Impact

BS4142:2014 states: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- "Typically, the greater this difference, the greater the magnitude of the impact."
- "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."
- "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."
- "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 negligible impact, depending on the context."

Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;
- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound 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 sound level does not exceed the background sound level, this is an

indication of the specific sound source having a negligible impact and would therefore classified as No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

Appendix C – Site Plans

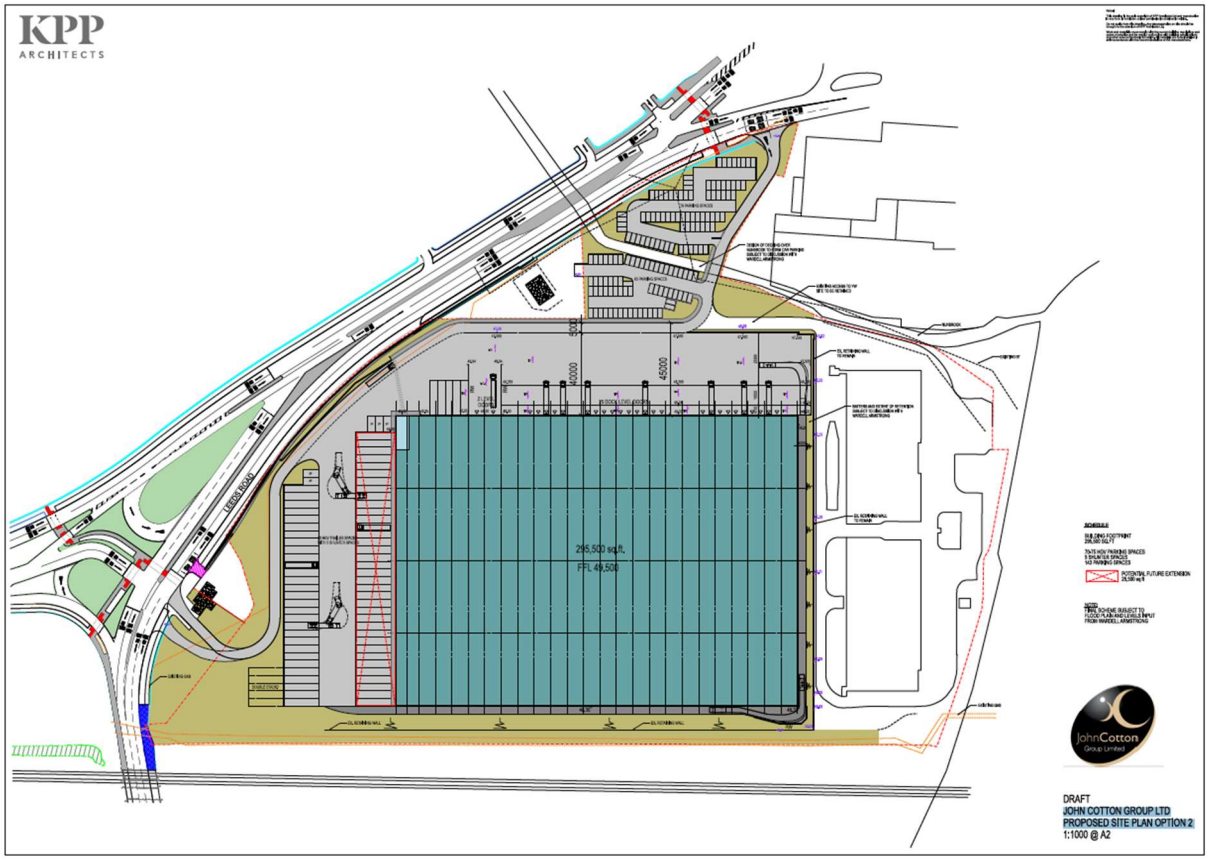


Figure 7 – Site Plan

Appendix D – Environmental Survey

D.1 – Time History Noise Data

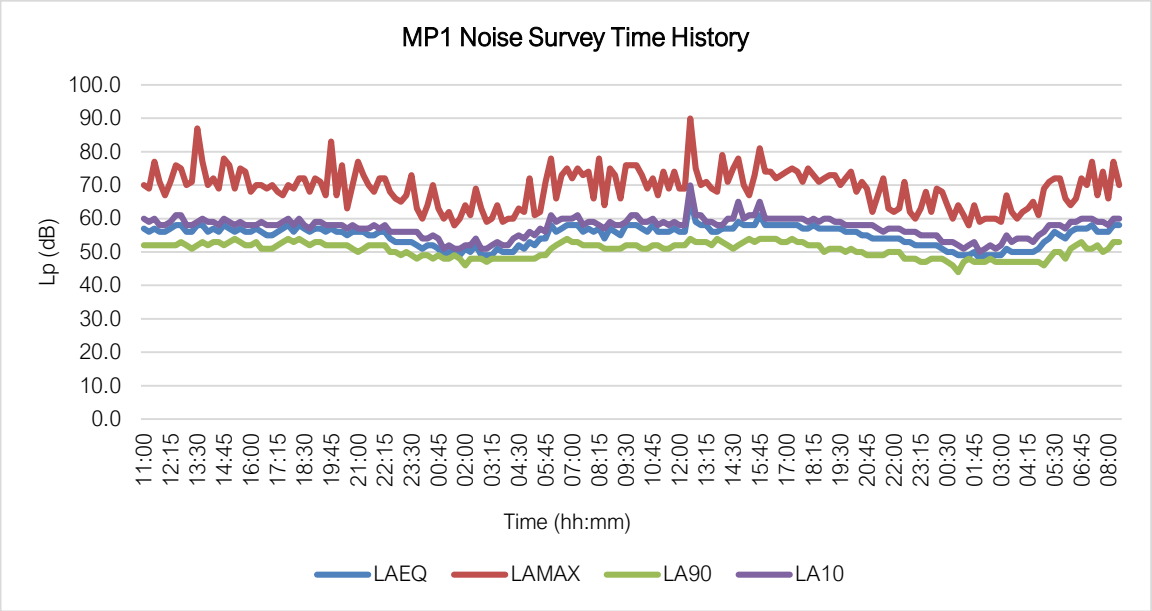


Figure 8 – MP1 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
CESVA SC250 Class 1 Sound Level Meter	T252860	≤0.1
Svantek SV33B Class 1 Calibrator	T253524	

Table 6 – Surveying Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.1 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 – Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localised records of weather conditions were taken. However, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Kirkheaton (Approx. 3km South of Site)				
Time Period	Air Temp (^{0}C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
07/03/23 – 00:00 – 23:59	-2.9 – 5.7	0.0	SSE	0.0 – 3.5
08/03/23 – 00:00 – 23:59	-4.0 – 2.4	0.0	ENE	0.0 – 3.6
09/03/23 – 00:00 – 23:59	-0.4 – 0.7	0.0 – 0.2	E	0.0 – 3.2

Table 7 – Weather Conditions

Appendix E – Manufacturers' Datasheets

QuadCore™
RW Trapezoidal Roof Panel

Insulation Core
KS1000 RW insulated roof panels are manufactured with an HCFC, CFC and HFC free QuadCore insulation core.

Fire
Reaction to Fire

- Classified B-s1,d0 according to the European Reaction to Fire classification system (Euroclasses) BS EN 13501–1:2007+A1:2009 when tested on the internal liner. Please contact Technical Services for information relating to the external face
- B_{ROOF} (t4) to BS EN 13501-5:2016

Insurer Approvals

- LPS 1181 Part 1: Issue 1, series of fire growth tests for LPCB approval and is certified to LPS 1181 Grade EXT-B
- FM 4471 Class 1 panel roofs*
- FM 4880 Class 1 fire rating of building panels or interior finish materials, unlimited height
- FM 4882 Class 1 interior wall panels in smoke sensitive occupancies (pharmaceutical manufacturing & storage areas, and food preparation & storage areas or similar occupancies)

*1.5m maximum span only. Please contact Technical Services for more information.

FM APPROVED

LPCB

LPS 1181 : Issue 1.2
Cert. No: 260f & 186f

Environmental
Kingspan Insulated Panels produced in the UK are certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Very Good'. Kingspan Insulated Panels directly contribute to BREEAM/LEED credits.

Air Leakage
An air leakage rate of 3m³/hr/m² at 50Pa or less can be achieved when using Kingspan insulated roof and wall panels.

Acoustic
Sound Reduction Index (SRI)

Hz*	63	125	250	500	1K	2K	4K	8K
SRI (dB)	20	18	20	24	20	29	39	47

* Frequency

The KS1000 RW insulated roof panel has a single figure weighted sound reduction Rw = 25dB.

Biological
Kingspan panels are normally immune to attack from mould, fungi, mildew and vermin. No urea formaldehyde is used in the construction, and the panels are not considered deleterious

Materials
Substrate

- Kingspan XL Forté, Kingspan Spectrum, Kingspan AQUA*safe*, Kingspan AQUA*safe55* and Kingspan CLEAN*safe*: Metallic protected steel to BS EN 10346:2015.thickness 0.5mm.
  CLEAN*safe* 15: Metallic protected steel to BS EN10346:2015.thickness 0.4mm
- Stainless Steel: Austenitic Grade 316 stainless steel to BS EN 10088: Part 2: 2014, thickness 0.4mm.
- Aluminium: Please contact Kingspan envirocare Technical Services.

Coatings - External Weather Sheet

- Kingspan XL Forté: Consists of a multi-layer organic coating, embossed with a traditional leather-grain finish.
- Kingspan Spectrum: Consists of a coated semi-gloss finish with slight granular effect.

Coatings - Internal Liner Sheet

- Kingspan CLEAN*safe* 15: The coating has been developed for use as the internal lining of insulated panels. Standard colour is "bright white" with an easily cleaned surface.
- Kingspan AQUA*safe*: The coating has been developed for use as the internal lining of insulated panels to suit high humidity internal environments.
- Kingspan AQUA*safe 55*: The coating has been developed for use as the internal lining of insulated panels to swimming pool internal environments.
- Kingspan CLEAN*safe 120*: The coating has been developed for use as the internal lining of insulated panels where a high level of cleanliness and hygiene is required, and the panels are to be cleaned down on a regular basis.
- Stainless Steel: The stainless steel liner has been developed for use as the internal lining of insulated panels in buildings with a very aggressive/corrosive internal environment.

Appendix F – Full Calculations

F.1 – Noise Breakout Calculations

The table below outlines the 1/1 octave frequency band internal sound pressure level expected at the façades and roof of the industrial unit. Whilst it is understood from conversations with the applicant that the unit will primarily be used for B8 storage, the planning application is intended to be for B2/B8 usage, which means there is the possibility that general industrial work may be undertaken in the future.

As such, the internal noise profile has been taken from measurements conducted by NOVA Acoustics for a B2 / B8 development. The measurements were conducted in the centre of a CNC machine workshop (NOVA report ref: 6850PC). The noise profile has been adjusted until the A-weighted sum of the 1/1 L_{eq} sound pressure levels resulted in an overall value of 85 dBA, which is in line with the Upper Exposure Action Value in accordance with the HSE 'Control of Noise at Work Regulations 2005' ('CoNAWR:2005') whereby hearing protection would be enforced. This is deemed to present a 'robust' scenario as it assumes that the internal noise level is a steady state 85 dBA incident upon the fabric of the building.

Description	1/1 Octave Frequency Band (Hz, L_P, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Industrial Unit Composite Façade Sections	82	80	83	81	78	77	77	73	85

Table 8 – Internal Sound Pressure Level

The table below outlines the predicted sound external noise level at 1m from each building fabric element. Manufacturers datasheets have been used where possible; however, elements have been modelled in INSUL 9.0 where data sheets were not available. The following assumptions have been made within the calculations:

- The internal sound pressure levels stated in Table 8 above,
- The predicted sound reduction (SRI) of each building element,
- A -3 dB correction to account for the change in reverberant internal conditions to external non-reverberant conditions in accordance with ISO 12354.

Noise Breakout Calculations									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Internal Noise Level	82	80	83	81	78	77	77	73	85
KS1000RW Panels (Walls, Roofing & Roller Shutter Doors)	20	18	20	24	20	29	39	47	25
External Noise Level at 1m	59	59	60	54	55	45	35	23	58

Table 9 – Noise Breakout Calculations

F.2 – HGV Delivery Noise Calculations

The following table outlines the HGV delivery calculations. The calculations are based on measurements conducted by NOVA Acoustics for a food manufacturing and distribution site, where electric forklifts loading pallets onto an HGV were measured at 9m from the loading bay and rear of the HGV (report ref: 8730PP). The following assumptions have been made within the calculations:

- The average SEL of 3 forklift loading events,
- 20 pallets are loaded into an HGV during a single delivery,
- Point source propagation behaviour with a directivity factor (Q) of 4.

HGV Delivery Noise Calculations									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Average SEL of Pallet Loading (9m)	89	88	88	82	79	76	71	62	85
Daytime HGV Loading (L_W)	90	89	89	84	81	78	72	64	87
Night-time HGV Loading (L_W)	96	95	95	90	87	84	78	70	93

Table 10 – HGV Delivery Noise Calculations

F.3 – HGV Movement Noise Calculations

To predict the noise emissions from HGVs entering / exiting the site, noise levels have been taken from a previous assessment compiled by NOVA Acoustics for storage and distribution facility (report ref: 6152FF).

Considering a 170m distance from the site entrance to the loading bays and 10mph speed limit, the time corrections applied to the measured results are shown in the table below.

Time Corrections				
Distance (m)	Speed (m/s)	Time (s)	Daytime Correction (1-hour, dB)	Night-time Correction (15-Minute, dB)
170	4.5	340*	-10	-4

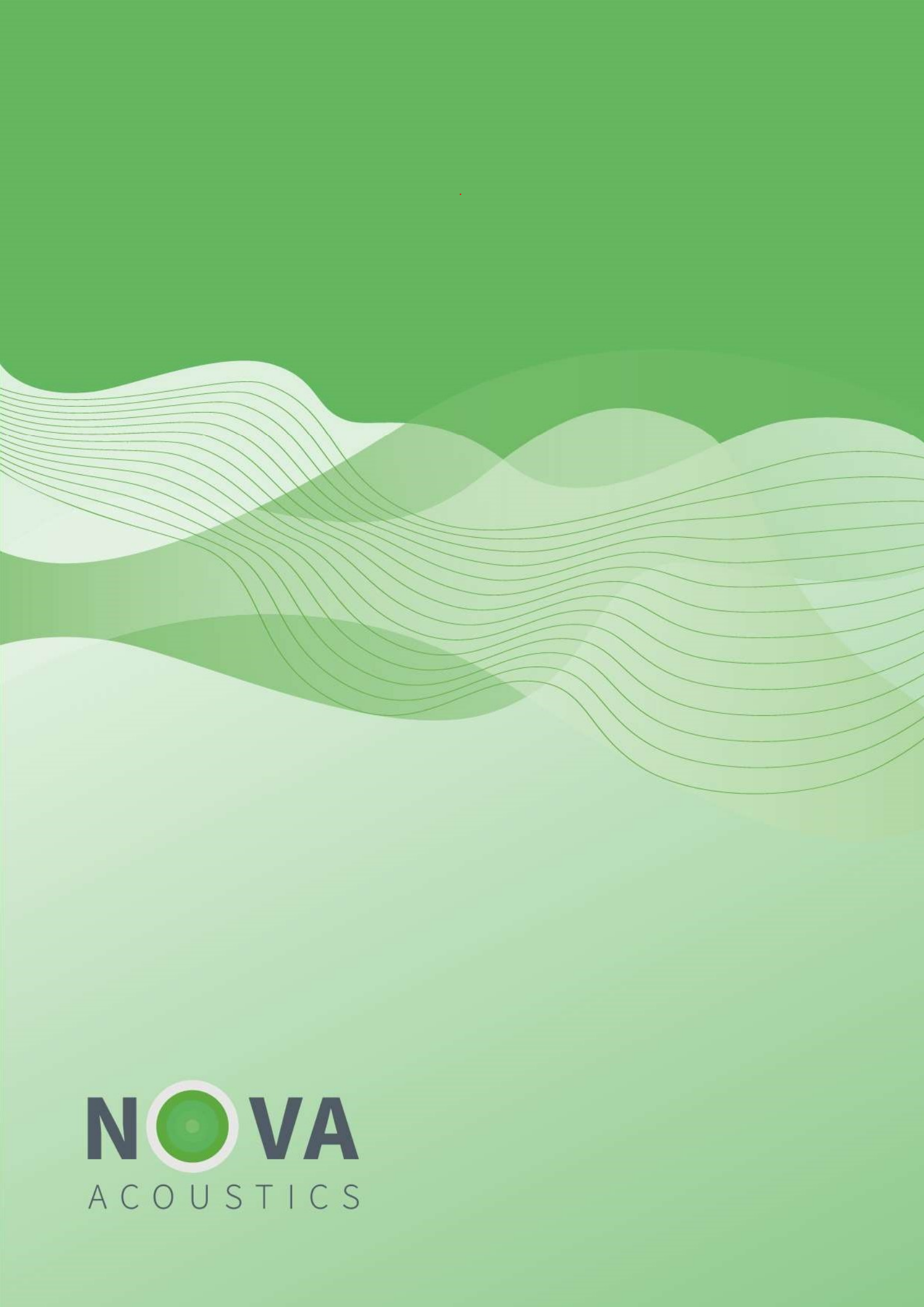
Table 11 – HGV Movement Time Corrections

**Total movement time for 9no. HGVs.*

The total time corrected noise emissions for 9no. HGV pass-bys are calculated in the table below.

HGV Movement Noise Calculations									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
HGV Pass-by at 3m (L_{eq})	84	77	75	73	72	71	65	59	77
Time Corrected Daytime (9no. Movements) (L_W)	91	84	82	80	79	78	72	66	85
Time Corrected Night-time (9no. Movements) (L_W)	97	90	88	86	85	84	78	72	91

Table 12 – HGV Movement Noise Calculations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