



Noise Impact Assessment

Site Address: Land Off Norman Road, Rochadale, OL11 4HP

Client Name: Zakaria Islam

Project Reference No: NP-009277



Authorisation and Version Control

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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 the erection of 7 No. industrial units ('the Proposed Development') on land off Norman Road, Rochdale, OL11 4 HP ('the Site').

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

A noise survey has been undertaken to establish the prevailing background sound levels at the closest Noise Sensitive Receptors ('NSRs'). This 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:

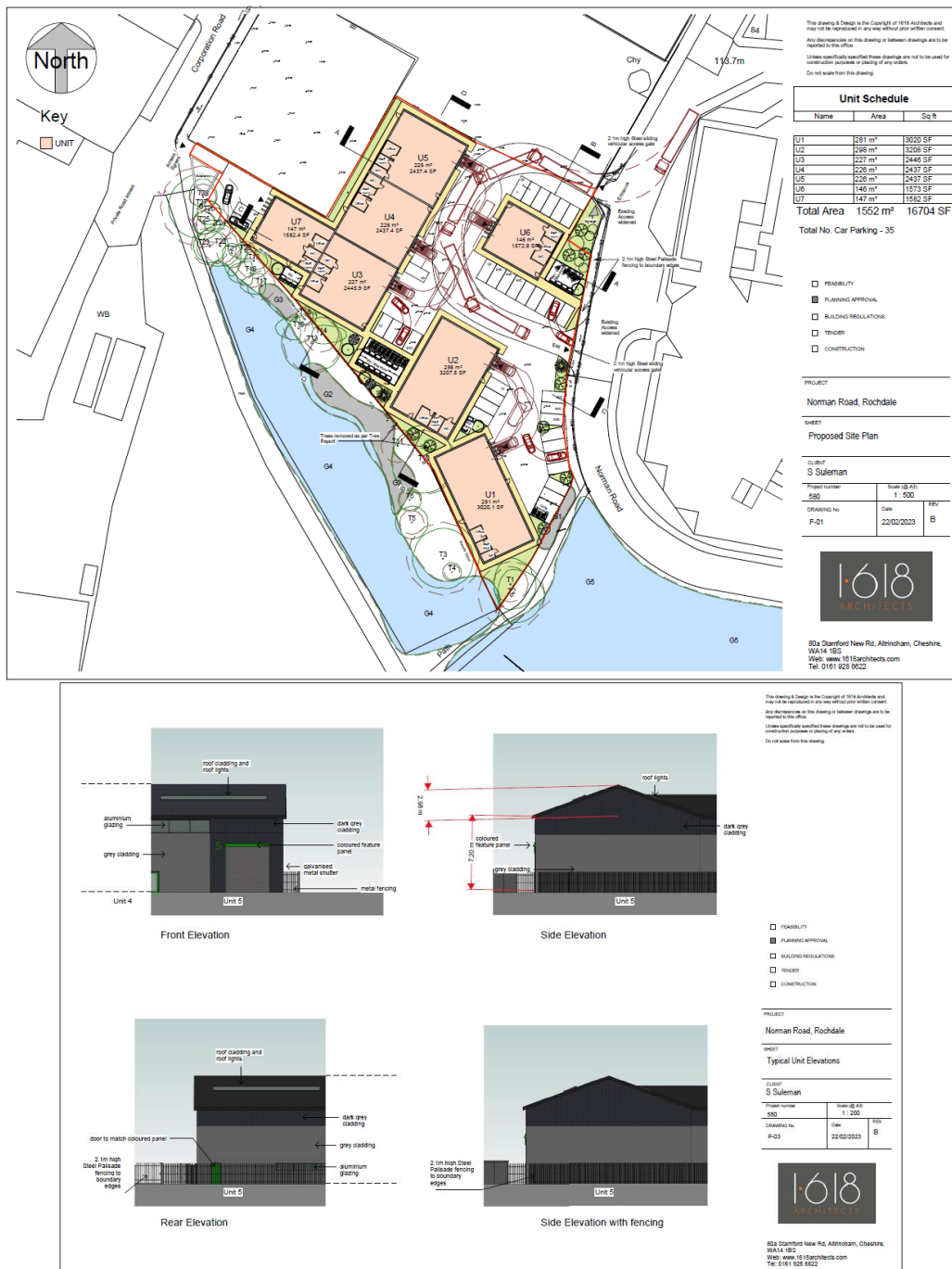
- The Local Planning Authorities (LPA) local draft plan and guidance, specifically; the 'Rochdale Adopted Core Strategy (October 2016)', including Policies SO4 (G9), DM1 and DM2.
- National Planning Policy Framework (2021)
- Noise Policy Statement for England (2010)
- British Standard BS4142:2014+A1:2019 – '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 7 No. industrial units on land off Norman Road. The end usage and occupiers are not known at this stage; however, all of the units will be Use Class B2 or B8. Operational times are also currently undecided; consequently, it is assumed that the site may operate 24/7 due to the B8 Use Class. There is also no known external fixed plant specification at this stage, and as such, a cumulative limit level per unit has been calculated to ensure all noise emissions from the Site fall significantly below the background sound level at the closest NSRs.

The figure below shows the Proposed Development.



Drawing Ref No. A102 from RJ Design Architectural Services

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	14/04/23 – 17/04/23	Equipment mounted on a lamppost along Spart Bottom Rd approximately 3.5m above the ground at least 3.5m from any other large reflective surface. A 130mm diameter windshield was fitted.
MP2		Equipment mounted on a lamppost along Holborn St approximately 3.5m above the ground at least 3.5m from any other large reflective surface. A 130mm diameter windshield was fitted.

Table 1 – Measurement Methodology

The figure below outlines the site surroundings and measurement locations:



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 Site is located within existing industrial area. The table below outlines the closest residential Noise Sensitive Receptors ('NSRs') relative to the closest noise source associated with the Proposed Development.

NSR	Distance (m) from Proposed Development Site
1	Sparth Bottoms Road, approximately 57m to the north-east.
2	Holborn Street, approximately 220m to the south.
3	Oaknrod Hill, approximately 235m to the north-west.
4	Castle Avenue, approximately 290m to the east.

Table 2 – NSR Identification

The noise profile at NSR1 (MP1) is dominated by industrial noise emissions from 'Mayo Civil Engineering' and 'United Springs' to the south of the NSR1. The industrial noise emissions include clearly audible, continuous low frequency hums and high-pitched tones. It is understood that 'Mayo Civil Engineering' operates during typical business hours, however, the operational times for 'United Springs' are unknown, but it is thought they operate 24/7.

The noise profile at NSR2 (MP2) is dominated by distant road traffic noise emissions from the surrounding road networks, particularly Manchester Road, and during infrequent lulls in the traffic flow, the industrial noise emissions from the neighbouring industrial estates are faintly audible.

The noise profile at NSR3 is deemed very similar to that of NSR2 (MP2). The noise profile at NSR4 is equally dominated by road traffic noise emissions from Manchester Road and industrial noise emissions from 'Mayo Civil Engineering' and 'United Springs'.

2.3 Environmental Noise Survey Results

Background Sound Level Analysis

The following section outlines the measured background sound levels that have been used as the baseline for the subsequent BS4142 noise assessment. The figure below shows a histogram graph of the background sound levels measured during the proposed operational hours (24/7) throughout the entire measurement period.

In accordance with BS4142:2014, a period of heavy rainfall from 13:00 to 17:00 hours on 14/04/23 of the measurement period have been removed from the data set. The complete time history results can be found in Appendix D.

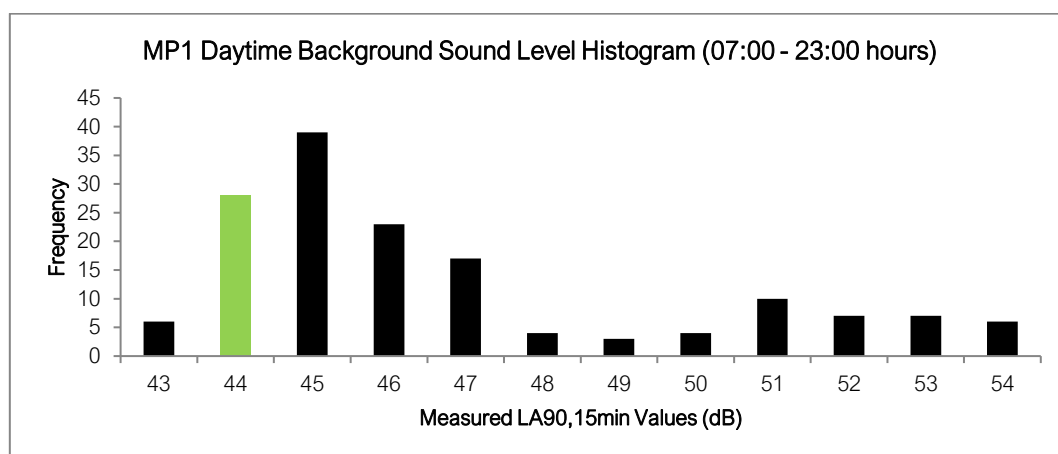


Figure 3 – MP1 Operational Hours Background Sound Level Analysis – Daytime

As can be seen in the figure above, the modal $L_{A90,15min}$ value measured during the proposed daytime operational hours at MP1 is 45 dB, however, the measured $L_{A90,15min}$ value of 44 dB is deemed to be the 'lowest typical' background sound level and has been used as the baseline in the following assessment.

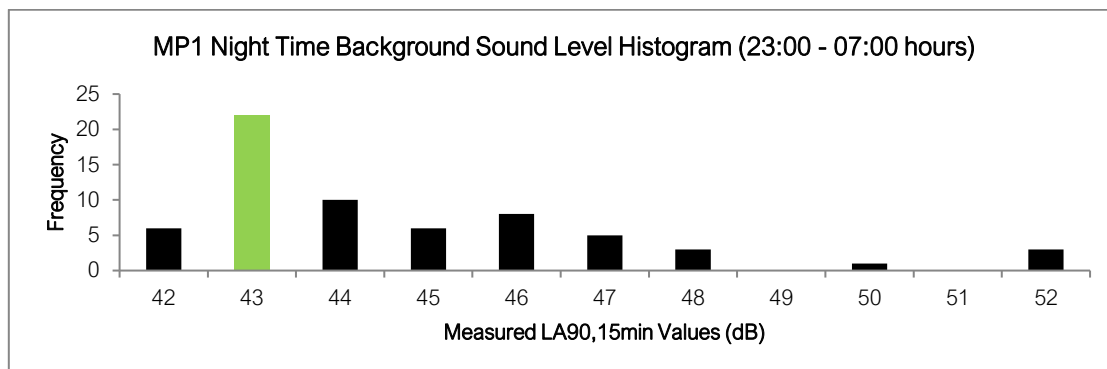


Figure 4 – MP1 Operational Hours Background Sound Level Analysis – night-time

The modal background sound level during night-time operational hours at MP1 is 43 $L_{A90,15min}$ dB, and given the distribution of the values, it is deemed to be the 'lowest typical' background sound level and presents a 'robust' assessment.

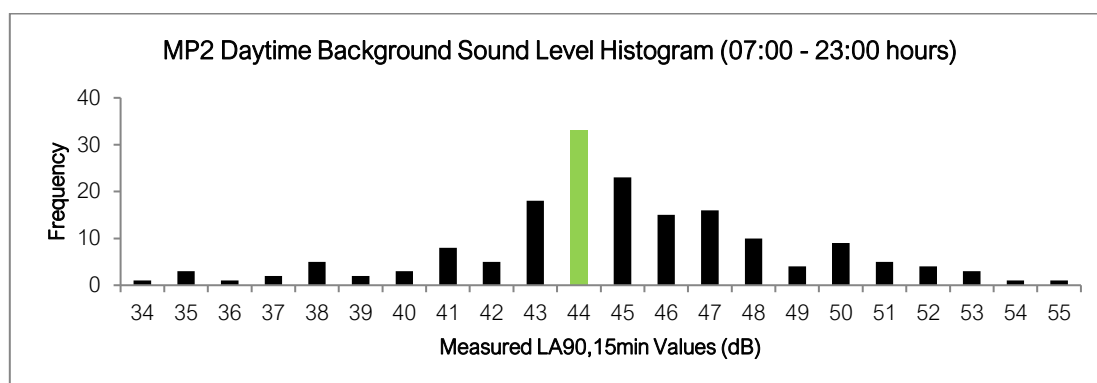


Figure 5 – MP2 Operational Hours Background Sound Level Analysis – Daytime

The modal background sound level during daytime operational hours at MP2 is 44 $L_{A90,15min}$ dB, and given the distribution of the values, it is deemed to be the 'lowest typical' background sound level and presents a 'robust' assessment.

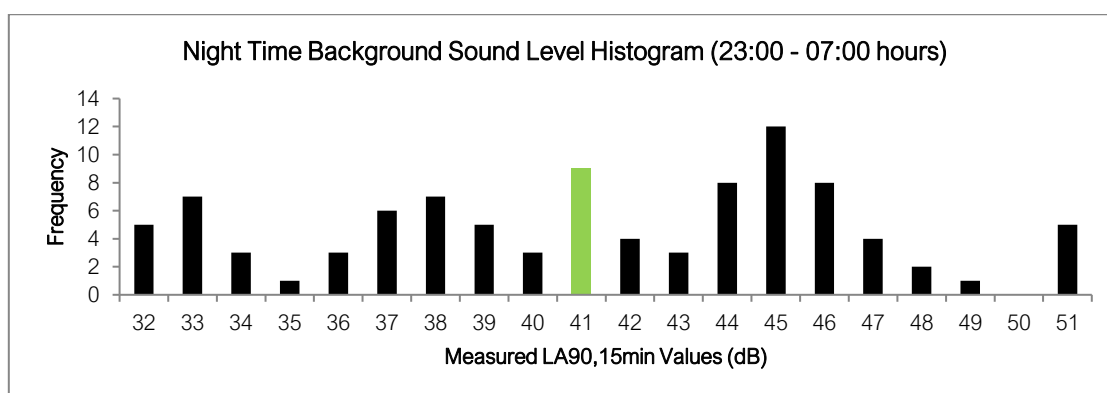


Figure 6 – MP2 Operational Hours Background Sound Level Analysis – night-time

The modal background sound level during night-time operational hours at MP2 is 45 $L_{A90,15min}$ dB, however, given the distribution of the measured values the 'lowest typical' value is deemed to be 41 dB.

3. BS4142 Noise Limit Levels

The proposed uses of the industrial units, number of deliveries and plant specifications are not yet finalised. Therefore, it is considered appropriate to define a noise limit level for each individual unit to ensure the noise emissions do not exceed the background sound levels at the closest NSRs. The limit levels are inclusive of any BS4142 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 in the table below have been calculated for the daytime and night-time periods.

BS4142 Daytime Noise Limit Levels		
Description	NSR1 & NSR4 (dBA)	NSR2 & NSR3 (dBA)
Background Sound Level	44	44
Cumulative Noise Limit Level at NSR (per unit)	36	36
BS4142 Night Time Noise Limit Levels		
Description	NSR1 & NSR4 (dBA)	NSR2 & NSR3 (dBA)
Background Sound Level	43	41
Cumulative Noise Limit Level at NSR (per unit)	35	33

Table 3 – BS4142 Noise Limit Levels at NSRs

The above noise limits are derived so that the cumulative noise emissions from the entire development do not exceed the 'lowest typical' background sound levels at the closest NSRs. When assessed in accordance with BS4142 this indicates 'Low Impact', and when assessed with the NPPF and NPSE this is classed as 'No Observed Effect Level' ('NOEL').

The future occupiers of each unit should undertake further noise impact assessments to ensure that the above limits are not exceeded due to their specific operations.

4. Indicative BS4142 Noise Impact Assessment

To provide an indication on the feasibility of the Proposed Development, an indicative assessment of site noise emissions from two of the most impactful units is provided in the following section.

4.1 Internal Ambient Noise Levels

Given that the end user is not yet known, the following table outlines the predicted internal ambient noise levels of an industrial unit. The noise levels were measured within a Use Class B2 industrial unit by NOVA Acoustics (ref: NP-008984) and included 'typical' equipment and activities such as continuously operating fixed plant, forklift movements and sirens and impacting and grinding of metals and other materials. The measured noise level is also at the 'Upper Exposure Action Value' ('UEAV') of 85 dB as prescribed by the HSE 'Control of Noise at Work Regulations:2005' ('CoNAWR:2005') where hearing protection must be enforced. This is deemed to present a 'robust' scenario as it assumes that the internal noise level of the industrial units is a steady state 85 dBA incident upon the fabric of the building.

Predicted Internal Ambient Noise Level of Industrial Units									
Description	1/1 Octave Frequency Band (Hz, L _{eq} dB)								dBA
	63	125	250	500	1k	2k	4k	8k	
Internal Ambient Noise Level	81	79	84	80	79	78	75	66	85

Table 4 – Predicted Internal Ambient Noise Level of Industrial Units

4.2 Proposed Constructions, Minimum Requirements & Control Measures

To achieve the BS4142 limit levels presented in Section 3 of this report, the following mitigation and noise control measures should be adhered to:

- The proposed units will be steel-frame structures comprising of composite cladding on each façade and the roofs. Due to the distance to the closest NSRs, any composite panels used for unit 6 will need to provide an enhanced acoustic performance of 38 dB R_w or greater. Any panels used for all other units will require an enhanced acoustic performance of 35 dB R_w or greater.
- For the purpose of this indicative assessment, enhanced Kingspan and 200mm EuroPanel F5 panels have been assumed and the manufacturers' datasheets can be found in Appendix E.
- A 2.4m tall acoustic screen should be erected around the northern and eastern perimeter of the Proposed Development Site. The fence should contain no holes or gaps and have a minimum surface mass of 15 kg/m². The proposed location can be seen in Appendix C.
- Night-time HGV movements and deliveries were modelled in an initial screening assessment; however, they were found to cause 'Adverse Impact' (in accordance with BS4142). Due to the topography of the intervening ground and the height of the closest NSR (NSR1), no suitable mitigation could be specified. Consequently, HGV deliveries should take place during daytime hours of 07:00 to 23:00 exclusively.

Sound Reduction of Façades and Roofing									
Description	1/1 Octave Frequency Band (Hz, SRI dB)								R _w (dB)
	63	125	250	500	1k	2k	4k	8k	
Unit 6 Façades (AWP/60 + W15)	14	17	31	40	48	46	56	56	40
Unit 6 Roofing (KS1000RW/40 + I + L)	8	17	32	43	48	54	60	60	41
Façades & Roofing – All Other Units (EuroPanel 200mm S5)	23	27	32	36	29	41	61	61	36

Table 5 – Sound Reduction of Industrial Unit Building Fabric

4.3 Specific Sound Levels & Noise Modelling Assumptions

Two of the most impactful industrial units have been modelled within SoundPlan 9.0 and the following assumptions have been made within the noise modelling software:

- To accurately model the land surrounding the Proposed Development, the topographical data has been obtained from the EA's 'National LIDAR Programme' on the DEFRA Data Services Platform.
- For the purpose of the assessment, the ground between the source and receivers is considered to be a mixture of acoustically 'soft' and 'hard' surfaces and have been modelled according to a visual inspection.
- Where source data was provided with octave band data, it was used to facilitate noise modelling in accordance with ISO 9613-2. 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 drawing No. 580 P01 by '1.618 Architects'.
- To form a 'robust' scenario, no on-time corrections have been applied to the noise emissions generated by internal operations as they are considered to be continuous over reference time periods of 1-hour and 15-minutes during the day and night-time periods, respectively.
- It is assumed that 1 No. HGV delivery to or from the industrials units occur within a worst-case 1-hour as per the daytime reference period of BS4142. Furthermore, as per the required noise control measures outlined in Section 3.1, no HGV deliveries occur during night-time period (23:00 to 07:00 hours).
- Time corrected HGV movements to and from the delivery bays where deliveries are occurring have been modelled.
- SoundPlan 9.0 calculates the level of noise breakout in accordance with BS 12354 considering:
 - o The internal noise levels seen in Table 4,
 - o The sound reduction values seen in Table 5,
 - o A Cd correction of -3 dB (scenario 4).

- Full calculation and all the sound power levels used within the noise model can be found in Appendix F.

The sound maps showing the specific sound levels emission from the Proposed Development can be seen in the figures below.

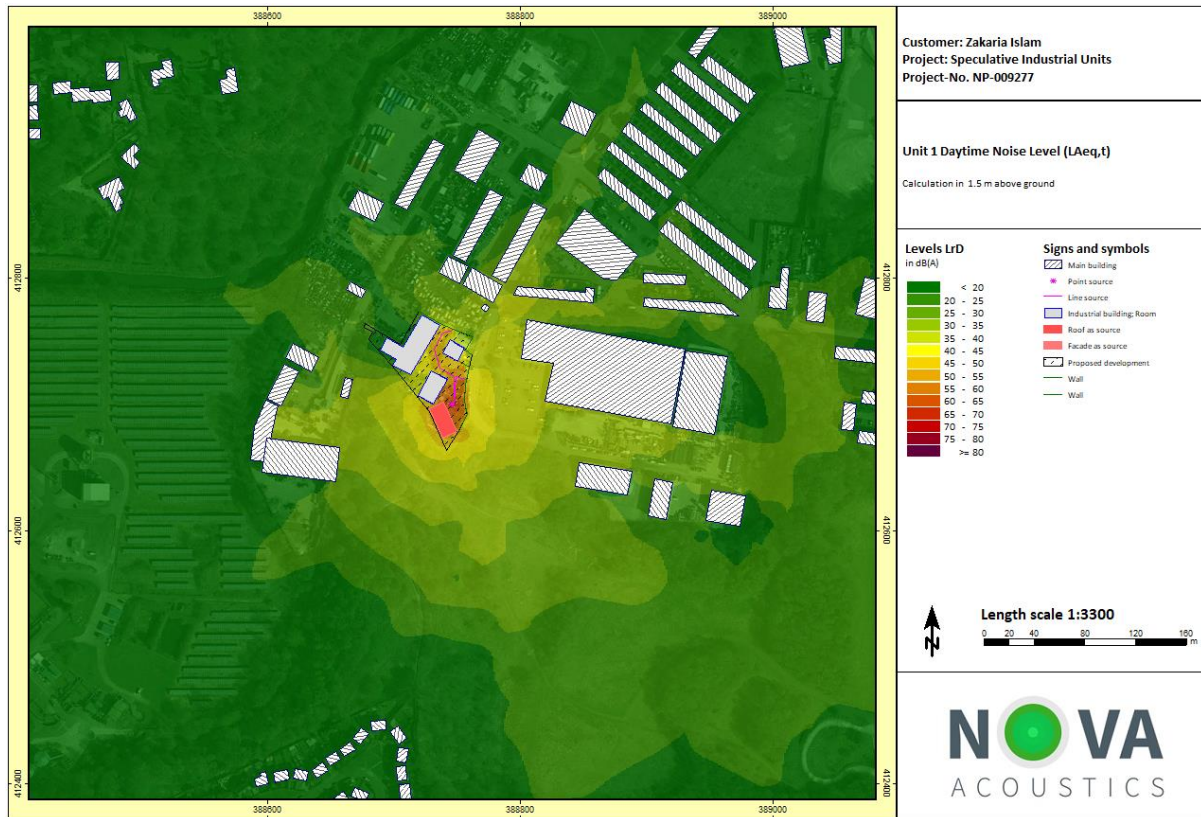


Figure 7 – Unit 1 Daytime Specific Sound Level Map – 1.5m Grid Map Height



Figure 8 – Unit 1 Night-time Specific Sound Level Map – 1.5m Grid Map Height



Figure 9 – Unit 6 Daytime Specific Sound Level Map – 1.5m Grid Map Height

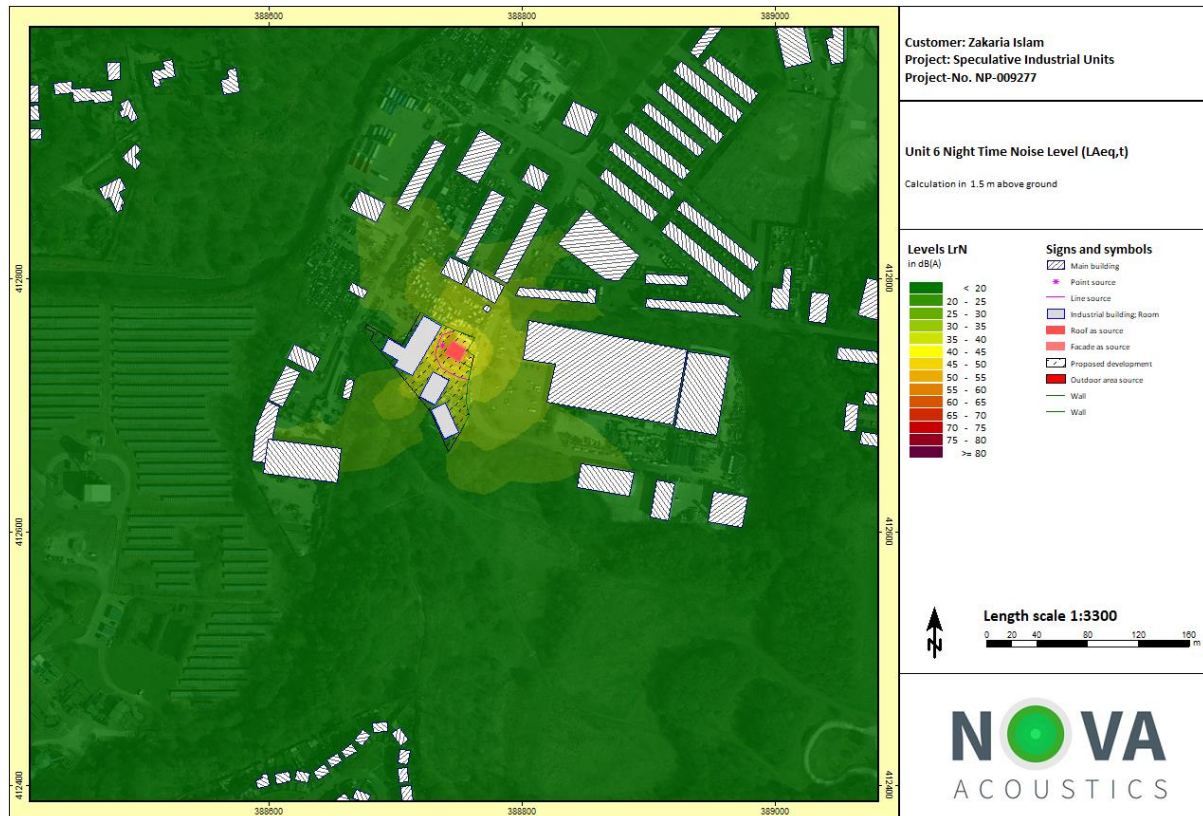


Figure 10 – Unit 6 Night-time Specific Sound Level Map – 1.5m Grid Map Height

4.4 Indicative BS4142 Noise Impact Assessment

The indicative BS4142 noise impact assessments at the most affected NSRs are presented in the tables below.

Indicative BS4142 Noise Impact Assessment of Unit 1 – Daytime									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at NSR1	38	36	35	29	31	26	19	0	34
Acoustic Feature Correction	Just Perceptible Tonality & Intermittency of Operations								+5
Rating Sound Level ($L_{A,T}$)									39
Plant Limit Level Criteria (Table 3)									36
Exceedance									+3
BS4142:2014 Assessment Outcome	The assessment indicates low likelihood of 'Adverse Impact, dependent on context' in accordance with BS4142 at the most affected NSR (NSR1).								
NPPF & NPSE Outcome	The assessment indicates 'Lowest Observed Adverse Effect Level ('LOAEL') in accordance with the NPPF and NPSE.								

Indicative BS4142 Noise Impact Assessment of Unit 1 – 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	32	26	27	20	28	14	-11	-30	29
Acoustic Feature Correction	Just Perceptible Tonality & Intermittency of Operations								+5
Rating Sound Level ($L_{A,T}$)									34
Plant Limit Level Criteria (Table 3)									35
Exceedance									-1
BS4142:2014 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.								

Table 6 – Indicative BS4142 Noise Impact Assessment of Unit 1

Indicative BS4142 Noise Impact Assessment of Unit 6 – Daytime									
Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at NSR1	48	41	36	30	28	25	18	1	34
Acoustic Feature Correction	Just Perceptible Tonality & Intermittency of Operations								+5
Rating Sound Level (L _{Ar,T})									39
Plant Limit Level Criteria (Table 3)									36
Exceedance									+3
BS4142:2014 Assessment Outcome	The assessment indicates low likelihood of ‘Adverse Impact, dependent on context’ in accordance with BS4142 at the most affected NSR (NSR1).								
NPPF & NPSE Outcome	The assessment indicates ‘Lowest Observed Adverse Effect Level (‘LOAEL’) in accordance with the NPPF and NPSE.								
Indicative BS4142 Noise Impact Assessment of Unit 6 – 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	39	31	18	10	10	-5	-19	28
Acoustic Feature Correction	Just Perceptible Tonality & Intermittency of Operations								+5
Rating Sound Level (L _{Ar,T})									33
Plant Limit Level Criteria (Table 3)									35
Exceedance									-2
BS4142:2014 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.								

Table 7 – Indicative BS4142 Noise Impact Assessment of Unit 6

Discussion

The exceedance of the daytime BS4142 limit level needs to be placed into context and following should be considered:

- The exceedances are due to the HGV movements and deliveries exclusively and would only occur when HGVs enter the site and could be controlled via appropriate scheduling.
- The closest NSR (1) is surrounded by an existing industrial site and is already subject to industrial noise emissions that include HGV movements during the daytime.

- The noise emissions from each individual unit are predicted to be at least 5 dB below the prescribed noise limit levels at all other NSRs.

Given the residual acoustic environment and the fact that HGV movements would only occur during social daytime hours and controlled via appropriate scheduling, it is thought that the receptor sensitivity of NSR1 would be reduced and that 'Low Impact' in accordance with BS4142 would be present, thus making the Site suitable for industrial development.

Due to the proximity of existing residential receptors to the Site, the construction of the building fabric will need to be considered depending on the use and noise levels associated with the future tenants.

5. Conclusion and Action Plan

The proposed development has been assessed against the requirements of BS4142 and the LPA's Local Draft Plan, 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 future occupiers of each unit should undertake further noise impact assessments to ensure that the prescribed BS4142 limit levels are not exceeded due to their operations.
2. The precise construction of the building fabric will need to be considered depending on the use and noise levels associated with the future tenants.
3. HGV deliveries to and from the Proposed Development Site should occur between the hours of 07:00 to 23:00, exclusively.

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 p_0 is the reference sound pressure (20 μ Pa)
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 p_0 is the reference sound pressure (20 μ Pa)
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 – Location Plans

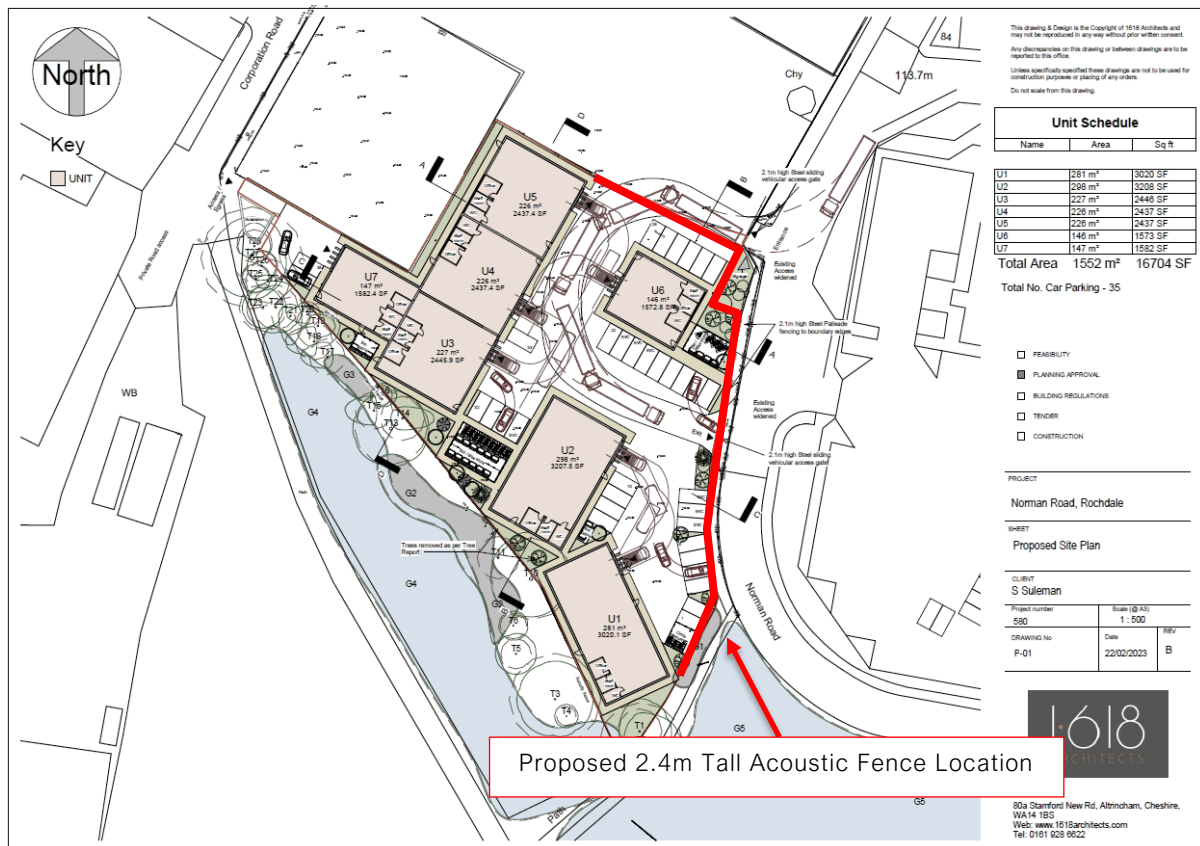


Figure 11 – Site Plans & Acoustic Fence Location

Appendix D – Environmental Survey

D.1 – Time History Noise Data

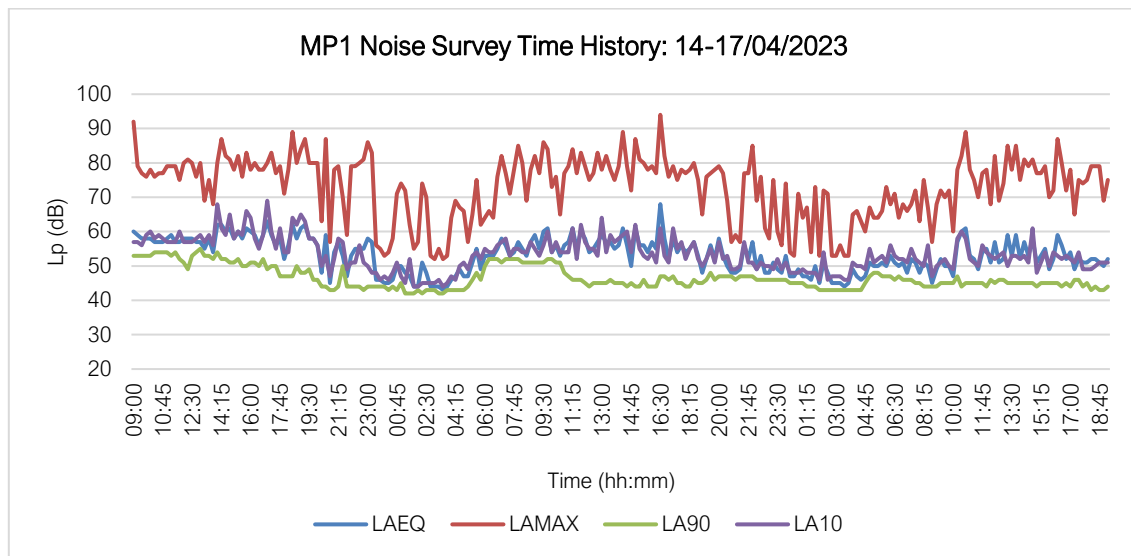


Figure 12 – MP1 Noise Survey Time History

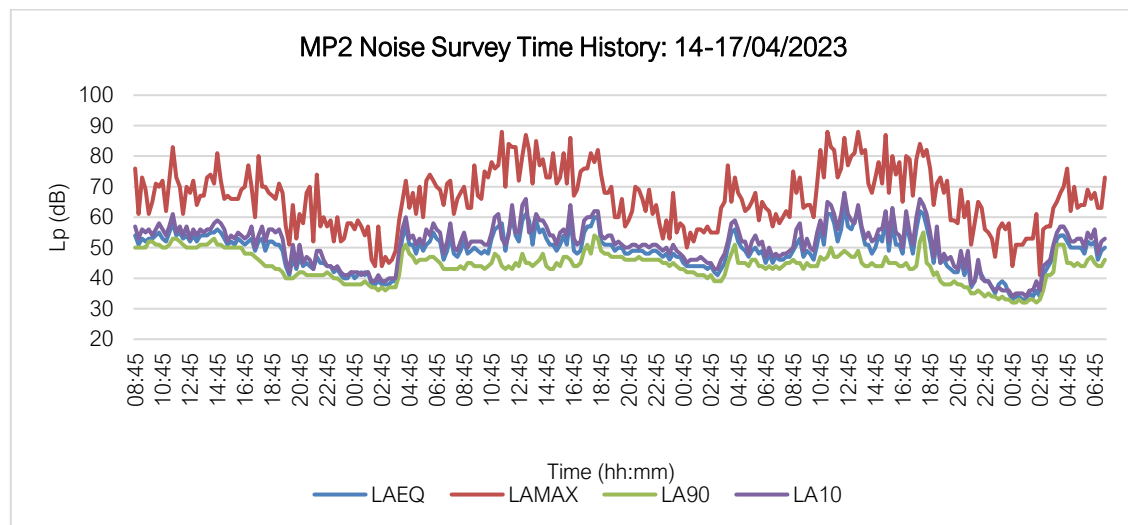


Figure 13 – MP2 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV307 Class 1 Sound Level Meter	87871	≤0.1
Svantek SV36 Class 1 Calibrator	106876	
Svantek SV307 Class 1 Sound Level Meter	84953	≤0.1
Svantek SV36 Class 1 Calibrator	106876	

Table 8 – 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 – Starring Way (Approx. 5.2km NE of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)*	Prevailing Wind Direction	Wind Speed (m/s)
14/04/23 – 00:00 – 23:59	0.2 – 6.8	0.0 – 1.4	SSW	0.0 – 1.9
15/04/23 – 00:00 – 23:59	1.1 – 14.6	0.0	S	0.0 – 1.8
16/04/23 – 00:00 – 23:59	9.5 – 10.8	0.0	SW	0.0 – 1.4
17/04/23 – 00:00 – 23:59	5.3 – 14.6	ESE	0.0	0/0 – 3.2

Table 9 – Weather Conditions

*Rainfall rate data obtained from closest station to record such data: Chadderton

Appendix E – Manufacturers' Data Sheets

Acoustic Test Results Appendix A - Wall/Facade Panel Construction

Octave Band Sound Reduction Index (R) and Weighted Sound Reduction Index (R_w)

Wall	Panel and Lining	Octave Band Sound Reduction Index R								R _w	C _w	Surface Weight Kg/m ²
		63	125	250	500	1k	2k	4k	8k			
1W	AWP/60 + no lining	15	16	19	23	26	22	39	–	25	-3	18
2W	AWP/60 + F	12	19	32	42	50	52	60	–	43	-10	30
3W	AWP/60 + W15	14	17	31	40	48	46	56	–	41	-10	28
4W	AWP/60 + W15 + F	17	24	37	45	52	54	64	–	47	-9	40
5W	AWP/60 + P + W12	16	22	37	45	51	50	63	–	46	-10	41
6W	AWP/60 + P + W12	18	23	35	44	49	50	61	–	45	-8	41
7W	AWP/60 + I + P + W	18	24	37	48	53	55	63	–	48	-10	4
8W	KS1000 RW/40 + I + L	13	14	29	38	40	45	55	–	38	-9	20
9W	KS1000 RW/40 + I + L	12	16	30	40	44	51	64	–	40	-9	20
10W	AWP/70 + no lining	20	15	17	23	18	25	40	46	24	-4	12.5

Key

AWP = Architectural Wall Panel with various profiles (Optimo, MR, EB, FL, MM, CX, WV, Longspan)

F = 10mm dense particle board (11.7kg/m²)

W15 = 15mm plasterboard (10kg/m²)

W12 = 12.5mm wallboard (7.9kg/m²)

P = 19mm dense plasterboard plank (15.2kg/m²)

I = Insulation (see construction description for details)

L = 0.7mm profiled steel liner sheet

The figures after the forward slash refers to the panel thickness in mm (ie AWP/60 = panel thickness of 60mm)

Acoustic Test Results Appendix B - Roof Panel Construction

Octave Band Sound Reduction Index (R) and Weighted Sound Reduction Index (R_w)

Roof	Panel and Lining	Octave Band Sound Reduction Index R								R _w	C _w	Surface Weight Kg/m ²
		63	125	250	500	1k	2k	4k	8k			
1R	KS1000 LP/45 + I + 2 x SB	27	32	47	61	69	69	75	-	58	-11	-
2R	KS1000 RW/40 + I + L	8	17	32	43	48	54	60	-	43	-	2
3R	KS1000 RW/40 + I + L	11	19	36	48	54	61	73	-	46	-	19
4R	KS1000 RW/40 + I + Py	17	27	39	44	49	57	67	-	48	-	31
5R	KS1000 RW/30 + no lining	-	17	20	23	23	23	41	-	25	-3	-
6R	KS1000 RW/30 + I + L	-	18	35	50	55	59	60	-	44	-11	-
7R	KS1000 RW/50 + I + L	-	19	34	48	52	56	63	-	44	-10	-
8R	KS1000 RW/80 + I + L	-	20	36	48	50	66	70	-	46	-11	-
9R	KS1000 RW/80 + no lining	-	18	21	23	20	38	42	-	26	-4	-
10R	KS1000 RW/80 + no lining	20	18	20	24	20	29	39	47	25	-3	-
11R	KS1000 RW/80 + I + PL	18	19	22	29	31	40	58	49	32	-4	-
12R	KS1000 ZIP/90 + no lining	19	18	19	20	17	35	38	44	23	-4	-
13R	KS1000 LP/80 + no lining	19	19	19	22	19	35	39	46	24	-4	-
14R	KS1000 RT + no lining	20	19	21	22	22	32	38	44	25	-2	-
15R	KS1000 TS + no lining	20	16	15	23	29	39	45	53	27	-4	27

Key

I = Insulation (see construction description for details)

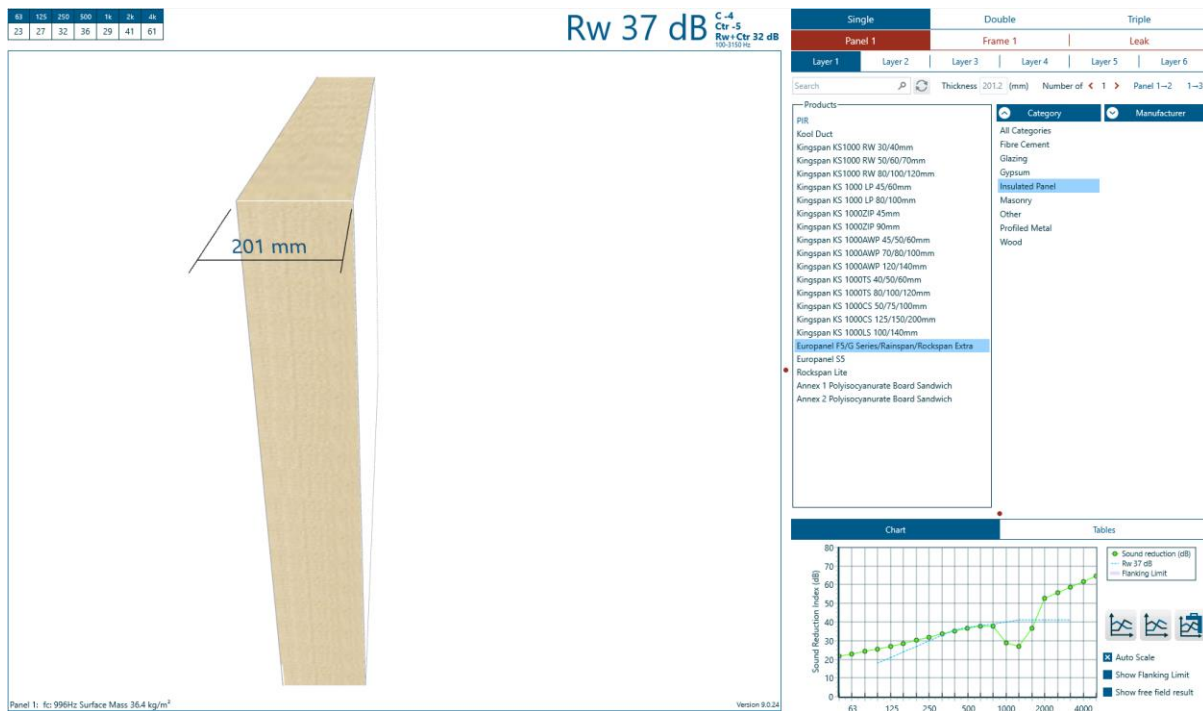
2 x SB = 2 x 12.5mm dense plasterboard (15.2kg/m²)

L = Profiled Steel Lining Sheet

Py = 10mm thick dense particle board (11.7kg/m²)

PL = Profiled Perforated Steel Lining Sheet

The figures after the forward slash refers to the panel thickness in mm (ie LP/45 = panel thickness of 45mm)



Appendix F – Full Calculations

F.1 – 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 a 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,
- 10 pallets are loaded into an HGV during a single delivery,
- Point source propagation behaviour with a directivity factor (Q) of 5.

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)	88	87	87	81	78	75	70	61	84

Table 10 – HGV Delivery Noise Calculations

F.2 – HGV Movement Noise Calculations

The following table presents the sound levels of an HGV pass-by measured for a previous assessment compiled by NOVA Acoustics for storage and distribution facility (report ref: 6152FF). Measurements were taken at 3m from a HGV passing by and are deemed to present a worst-case scenario. Based on the calculated SEL of the 20-second HGV pass-by and point source behaviour, the following table also presented the calculated sound power level.

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
Daytime HGV Movement (L_w)	102	95	93	91	90	89	83	77	95

Table 11 – HGV Movement Noise Calculations



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