NOVA ACOUSTICS

3201802 36P

Noise Impact Assessment of a Proposed Class B1 Commercial/Industrial Estate

Client:	Mr James Alpe – James Alpe Ltd
Address:	Land South of Glendale, Lincoln Way, Salthill Industrial Estate, Clitheroe, BB7 1PL
Date:	16/04/2018

Version	1	2	3
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Date	17/06/15	16/04/2018	--
Project Number	326JA – V1	326JA – V2	--

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Executive summary

An environmental noise survey and noise impact assessment has been undertaken to assess the potential increase in noise levels from development of Land South of Glendale, Lincoln Way, Salthill Industrial Estate, Clitheroe, BB7 1PL in to a B1 industrial/commercial estate, on the surrounding noise sensitive receptors. The measured background sound levels have allowed a BS4142:2014 noise assessment to be carried out.

The BS4142 assessment in section 5.1.4, shows that there is a low likelihood of adverse impact provided all external plant areas and plant limit levels are adhered to. When considering the context of the assessment i.e. a worst-case scenario, the frequency of usage and time of day the units will be in operation, any impact is expected to be reduced. Further mitigation has been recommended, in section 5.3, to minimise uncertainty in the predictions presented and ensure the amenity of the NSR's is protected.

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

1. Introduction

1.1 Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for a B1 Industrial Estate ('the Proposed Development') at Land South of Glendale, Lincoln Way, Salthill Industrial Estate, Clitheroe, BB7 1PL ('the Site').

The Applicant is preparing a planning application to be submitted ('the Application') to Ribble Valley District Council

Accordingly, the following technical noise assessment has been produced to accompany the Application to the Local Authority.

This report details the existing background sound climate at the nearest receptors, as well as the sound emissions associated with the Proposed Development.

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

1.2 Scope & Objectives

The scope of the noise assessment can be summarized as follows:

- Baseline sound monitoring survey to evaluate the prevailing sound levels at the nearest sensitive receptor ('NSR') to Site;
- Detailed sound modelling, acoustic calculation and analysis in accordance with ISO9613 – 1 prediction methodology to predict sound levels at the NSR.;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the National Planning Practice Guidance in England and Wales, BS4142:2014 and other relevant standards.

2. Legislation, Policy and Guidance

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

2.1 National Planning Policy Framework (2012)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2012. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 11, Conserving and enhancing the natural environment, paragraph 109, it states:

The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;

Paragraph 123 states and Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impact on health and quality of life arising from noise from new development, including using conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.*

2.2 Noise Policy Statement for England

Paragraph 123 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.

2.3 IEMA Guidelines on Noise Impact Assessments

The IEMA Guidelines for Environmental Noise Assessment address the key principles of noise impact assessment and are applicable to all development proposals where noise effects may occur. The guidelines set out key principles for noise impact assessment relevant to all types of project regardless of size. The guidance provides advice with regards to the collection of baseline noise data, prediction of noise levels and how noise should be assessed. The guidance recognizes that the effect associated with a noise impact will be dependent on a number of factors including but not limited to the sensitivity of the receptor, frequency and duration of the noise source and time of day. The Guidelines accept that a simple change in noise levels using a single noise indicator may fail to adequately reveal the actual noise impact of the proposal. The character of the noise must be considered and the Guidelines suggest comparing several noise indicators such as the LAeq, LAmax and LA90 as a more rigorous approach.

Absolute levels such as those set out in WHO Guidelines are also considered and the Guidelines suggest that a change in noise levels in an area where the existing levels are above WHO Guidelines should be considered as having more of an adverse effect than a change in noise levels in an area where existing levels are well below.

The Guidelines stop short of providing specific assessment criteria which developments should achieve but instead suggests that the methodology adopted should be selected on a site by site basis regarding relevant national and local standards.

The Guidelines contain effect descriptors for changes in noise levels and for noise effect levels. These are summarized below:

Effect Descriptors	
Very substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise sensitive receptor, or a 5 to 9.9 dB LAeq change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB L_{Aeq} change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5dB LAeq change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity
None/Not Significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals

Table 1.0 – IEMA Guidelines effect descriptors

Noise Effect Level		
Time	**Lowest Observed Adverse Effect Level**	**Significant Observed Adverse Effect Level**
07:00 - 23:00	50 dB $L_{Aeq,16\ hour}$	60 dB $L_{Aeq,16\ hour}$
23:00 - 07:00	40 dB $L_{Aeq,8\ hour}$	55 dB $L_{Aeq,8\ hour}$
	60 dB L_{AFMax} (at the facade)	80 dB L_{AFMax} (at the facade)

Table 2.0 – IEMA Guidelines noise effect level

The Guidelines are not prescriptive as to how a noise impact assessment should be carried out, and allow assessors to consider factors such as frequency spectra, days and times of operation, frequency of operation and any other factor which allows the noise to be assessed in context.

2.4 BS 4142:2014

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.

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 a 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.

2.5 *ISO 9613-2 Attenuation of sound during propagation outdoors*

The ISO 1996 series of standards specifies methods for the description of noise outdoors in community environments. Part 2 of ISO 9613 is intended to enable noise levels in the community to be predicted from sources of known sound emission. The method is general in the sense that it may be applied to a wide variety of noise sources, and cover most of the major mechanisms of attenuation.

This standard provides guidance on the outdoor propagation of sound. It is widely used to establish the different attenuations that occur during the transmission of the sound from the sources to the receivers. The total attenuation is the sum of the following: geometrical divergence, atmospheric absorption, ground effect, barriers, and miscellaneous other effects.

2.6 *BS EN 12354-4 Building Acoustics*

Estimation of acoustic performance of buildings from the performance of elements – Transmission of indoor sound to the outside

This European Standard describes a calculation model for the sound power level radiated by the envelope of a building due to airborne sound inside that building, primarily by means of measured sound pressure levels inside the building and measured data which characterize the sound transmission by the relevant elements and openings in the building envelope. These sound power levels, together with those of other sound sources in or in front of the building envelope, form the basis for the calculation of the sound pressure level at a chosen distance from a building as a measure for the acoustic performance of buildings.

2.7 *Local Policy Guidance & Discussions with the Local Authority*

An initial noise survey and impact assessment was undertaken for the same site by NOVA Acoustics Ltd in 2015. Originally the site was to be a mixture of class B1 business/commercial and B2 general industrial. Upon consulting with the local environmental health officer, James Russel, it was agreed that all noise emissions from the site should fall a minimum 5dB below the prevailing background sound level at the closest NSR to ensure low impact. This criterion was agreed upon in 2015 and it is assumed to still be applicable.

3. Site Description & Background Information

3.1 Site & Surroundings

The site is located at Land South of Glendale, Lincoln Way, Salthill Industrial Estate, Clitheroe, BB7 1PL. The surrounding area is comprised of a mixture of residential dwellings, commercial/industrial and farm land. To the east of the proposed site there is large areas of farmland. To the north and west of the site there are multiple commercial / industrial units some of which are as follows: There is 'James Alpe Ltd' which operates between 07:00 – 18:00. 'Absolute Fitness Clitheroe' which operates between 07:00 -22:00. The 'Copper Dragon' which operates between 08:45 and 17:00. 'T & J Haulage' with assumed operating hours of 07:00 – 18:00 and finally 'Farm House Fare' Which operated 09:00 – 17:00. Directly adjacent to the site there is an existing industrial and haulage facility however no operating hours for this unit could be found it is assumed to operate between 07:00 -18:00. To the south of the proposed development there are multiple residential dwellings the closest of which is approximately 20m from the southern perimeter of the proposed site. Due to their close proximity to the development these dwellings will be considered the closest Noise Sensitive Receptor (NSR) in the subsequent assessment.

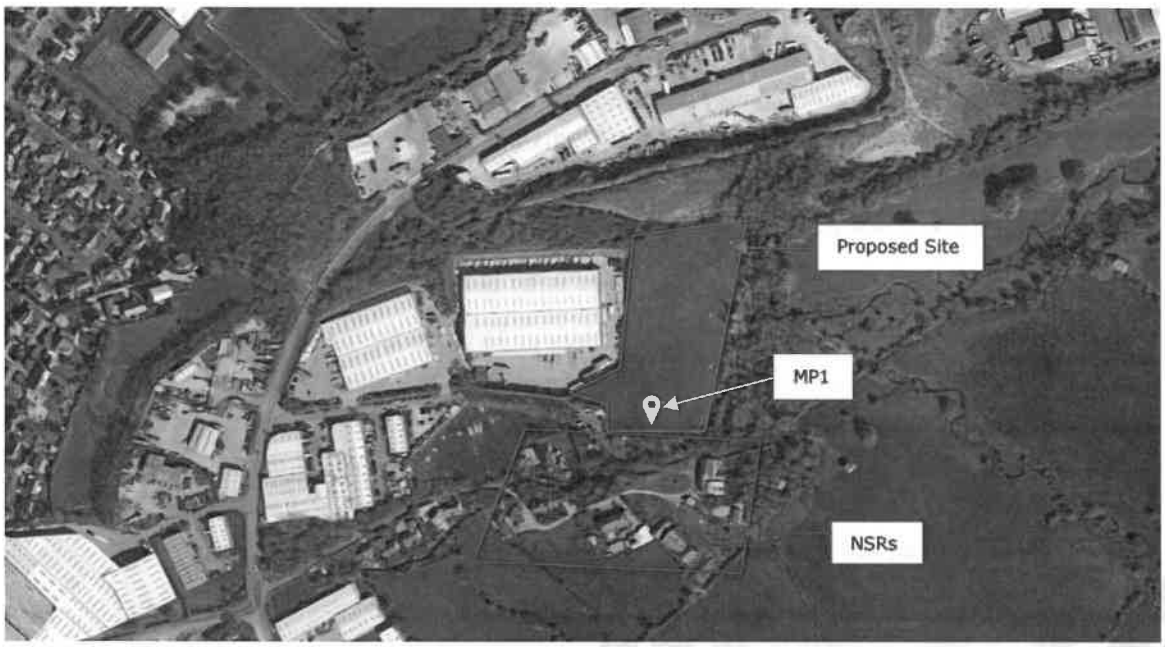


Figure 1.0 - Site and Surroundings

3.2 Background

An initial noise survey and impact assessment was undertaken in 2015 accounting for two main buildings with a total 21 No. industrial/business units. Planning permission was conditionally granted by the local authority. However, the layout and classification of some of the units on site has been subsequently changed from class B2 to B1. Instead of two main buildings there will now be 7 No. main buildings. Consequently, the noise impact of the proposed site has been re- assessed and the results are presented below. It was noted on the site plans that building 1 and building 2 have already been constructed as part of the previous planning application and consequently only the remainder of the site, building 3 - 7 will be assessed. Full site plans can be found in appendix C.

4. Environmental Noise Survey

In order to characterise the sound profile of the area of the proposed development, a long term 72-hour environmental sound survey was carried out from the 5th of June 2015 to the 8th of June 2015.

4.1 Measurement Methodology

For the long-term sound monitoring, the sound level meter was placed at ground floor level. The microphone was positioned approximately 1.5m away from the ground with no other reflective surface within 3.5m. The monitoring position was chosen in order to collect representative sound levels of the area during the week and weekend day time and night time periods. This position was also representative of the sound levels at the NSR. The measurement position can be found in figure 1.0.

4.2 Measurement Equipment

Piece of Equipment	Serial No	Calibration Deviation
SVAN 977 Class 1 Sound Level Meter	34826	
SVAN Class 1 Calibrator SV31	32569	≤0.5

Table 3.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with negligible deviation of ≤0.5 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 wind shield for the entire measurements period. Calibration certificates can be provided upon request.

4.3 Weather Summary

As the environmental noise survey was carried out over a long un-manned 72-hour period no records of weather conditions were taken. However, during the set up and collection of the monitoring equipment the weather was calm with wind speeds of less than 5m/s and no precipitation. All measurements have been compared with met office weather data of the area and periods of elevated weather conditions have been excluded from the subsequent calculations. The weather conditions were suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise.

4.4 Results

4.4.1 Summary Results

The following table shows a summary of the sound survey results; L_{Aeq}, L_{Amax}, L_{A90} and the L_{A10} for the measurement period.

Measurement Position MP1		
Measurement Time Period ('t')	**$L_{Aeq,t}$**	**$L_{A90,t}$**
Day 1 – 05/06/15 – 13:00 – 23:00	51.6	43.1

Night 1 – 05/06/15 – 23:00 - 07:00	43.7	35.9
Day 2 – 06/06/15 – 07:00 – 23:00	63.6	44.9
Night 1 – 06/06/15 – 23:00 - 07:00	41.4	36.2
Day 3 – 07/06/15 – 07:00 – 23:00	42.7	40.0
Night 3 – 07/06/15 – 23:00 - 07:00	42.8	35.8
Day 4 – 08/06/15 – 07:00 – 14:00	45.8	41.5

Table 4.0 – Sound Survey Summary Results

The following table shows a summary of the sound survey results; L_{Aeq}, L_{Amax}, L_{A90} and the L_{A10} for the proposed operational hours of the units 07:00 – 19:00.

Measurement Position MP1		
Operational Hours ('t')	**$L_{Aeq,t}$**	**$L_{A90,t}$**
Day 1 – 05/06/15 – 13:00 – 19:00	52.7	44.7
Day 2 – 06/06/15 – 07:00 – 19:00	64.2	49.0
Day 3 – 07/06/15 – 07:00 – 19:00	42.5	40.1
Day 4 – 08/06/15 – 07:00 – 14:00	**45.8**	**41.5**

Table 5.0 – Sound Survey Operational Hours Results

4.5 Subjective impression & Context

Whilst on site it was found that the surrounding acoustic environment was moderate to low typical of that semi-rural / commercial area. This is further corroborated by the results shown above.

4.6 Assumptions

It is assumed that as the NSRs are already in close proximity to an industrial estate and part of the proposed site has already been developed, building 1 and building 2, in to B1 business/light industrial spaces and that the further development of the site in to B1 units will have minimal impact on the NSR. The existing Building 1 and building 2 will not be assessed.

Planning classification B1 is for the use of *'Offices (other than those that fall within A2), research and development of products and processes, light industry appropriate in a residential area.'*

Consequently, it is assumed that there is a possibility of these units being used for light industry and/or business therefore there is likely to be some external plant associated with the development such as AC units. Consequently, a plant limit level will be defined and used to calculate the specific noise levels at the NSR.

There is also a possibility that noise from said light industry may break out of the proposed units in to the external environment. However, it is assumed that internal noise levels will be relatively low

and not exceed a level 79 dB which is just below the lower action value stated in the noise at work regulations 2005.

It is assumed that assessing both the impact of possible external plant and noise break out from the proposed B1 business and light industrial units using an internal noise level of 79 dBA will provide a robust and conservative assessment given the proposed use classification. It is likely that the majority of the proposed units will have significantly lower internal levels then stated above.

4.7 Uncertainty

BS4142:2014 section 10.0 states that uncertainty in the calculation of sound levels during the assessment process can arise from both the measured values and calculation methods.

To ensure the accuracy of the assessment consideration has been taken for the level of uncertainty in the measured data and associated calculations in the proposed methodology used to undertake the assessment. Where the level of uncertainty could affect the conclusion, reasonably practicable steps have been taken to minimise the level of uncertainty. Where the level of uncertainty is excessive, additional measurements and site visits have been conducted to increase the confidence in the results. In all instances the following steps have been taken to address the uncertainty;

1) Measured Values; A detailed understanding of the source of noise under investigation has been conducted including consideration for the complexity, variability over time and location, the character and effect of the residual sound level in comparison with the source, the measurement location, quantity of measurements and distance/intervening ground conditions, measurement time interval and the range of times measurement were taken, the suitability of weather conditions, the level of rounding and the classification of the instrumentation used to conduct the assessment.
2) Calculation Methods; Consideration has been taken for the accuracy of the measured sound levels, the character of the sound emissions in question, the calculation method and the simplification of the real situation to "fit" the modelled situation. Recognised standards and validated methods and processes have been used to establish accurate values during the calculation process.

For the avoidance of doubt, the level of uncertainty will not be quantified. If appropriate consideration is taken for points 1 and 2 during the collection of data and analysis thereof, then the influence of uncertainty in the final result is at its lowest practical value.

5. Noise Assessment

5.1 BS4142:2014 Noise Assessment

The proposed site is not yet operational, and the clients do not know the business type that will be using each unit once the site has been completed. Therefore, a worst-case scenario has been assessed assuming light industrial inside each building at a sound level of 79 dBA. The breakout from building 3 has not been assessed as it is shown on the site plans as office space. An external plant limit level will also be defined and used in the subsequent assessment.

5.1.1 Specific Noise Levels

External Plant Area Limit Levels

The development is comprised of no. 4 building numbered 3 -7. An external plant area has been defined for each building and can be seen in the site plan in appendix C. A Plant Limit Level has been defined for each external plant area to ensure all external plant unit noise emissions fall a minimum of 5dB below the prevailing background sound level.

Plant Area	Cumulative Plant Noise Limit
Building 3	62 dB @ 1m
Building 4, 5A	65 dB @ 1m
Building 5B	62 dB @ 1m
Building 6	62 dB @ 1m
Building 7	62 dB @ 1m

Table 6.0 – Specific External Plant Area Limit Levels

Specific Noise Break Out Levels

To assess a worst-case scenario, it has been assumed that the internal noise level in each unit is 79 dBA. The break out of each building has been assessed assuming the weakest element of the facade and roof construction which is assumed to be composite sheet. An 80mm composite sheet provides a minimum 25 dB attenuation when modelled in INSUL Sound Insulation Prediction Software. Full break out calculations can be found in appendix E. Noise breakout from building 3 will not be assessed as the site plan shows this building will be office space.

Specific Road Traffic Noise

The expected increase in noise level due to the use of the access road has been calculated using the method in CRTN:1988. The full calculations can be found in appendix E. The assumptions used in the calculation of road traffic noise along the access road can be found below.

- A speed limit of 20kph
- 15 vehicle movements per hour
- 10% of those movements are HGVs

- The road will be constructed from an impervious bituminous surface

The cumulative specific sound level at the NSR has been calculated using SoundPlan Essential 4.1, which undertakes its calculation in accordance with the guidance given in IS09613 – 1:1993 and ISO9613 – 2:1996.

The following assumptions have been made within the calculation software:

- To accurately model the land surrounding the development the topographical data has been taken from Google Maps, it is assumed this has an accuracy within the last 3 years.
- The ground between the source and receiver is mixed, 'soft' and 'hard', for the purpose of the assessment the ground has been considered as 'hard'.
- The calculated plant area limit levels stated above have been used to calibrate the sound map.
- The location of all external plant areas as shown in appendix C.
- The calculated noise breakout of each building assuming the conservative internal level and sound insulation stated above. Full calculations in appendix E.
- The calculated access road level according to CRTN. Full Calculation in appendix E.
- All building heights 8m.
- A 2m earth bund with 1.5m acoustic fence situated along the southern perimeter of site as stated in the original acoustic report 326JA – V1. The location of acoustic barrier can be found in appendix C.

The sound map showing the specific sound level emissions from the Proposed Development can be seen below in Figure 3.0. and 3.0

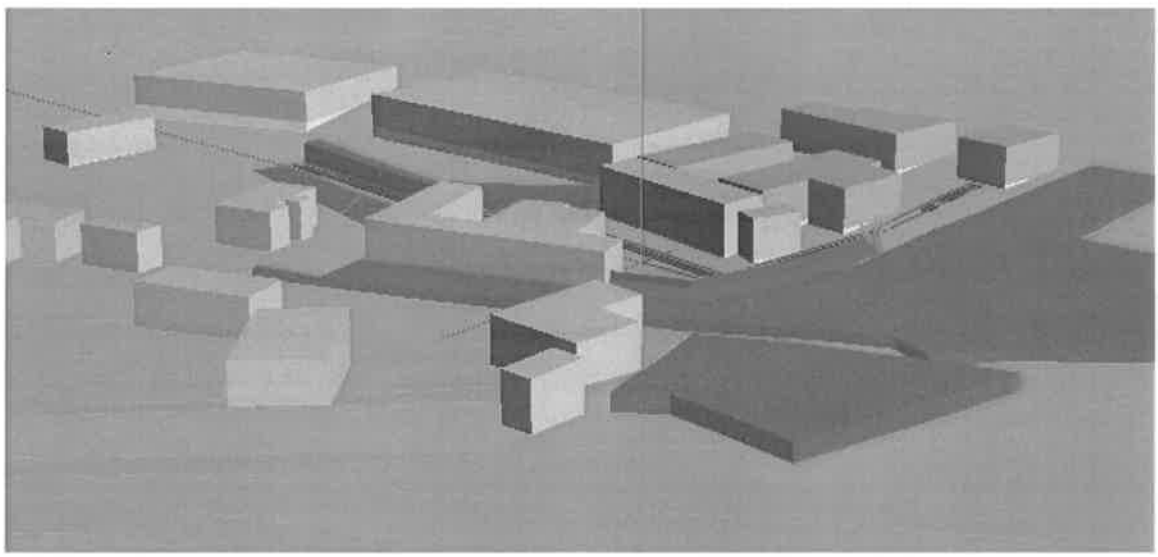


Figure 2.0 - 3D site Map

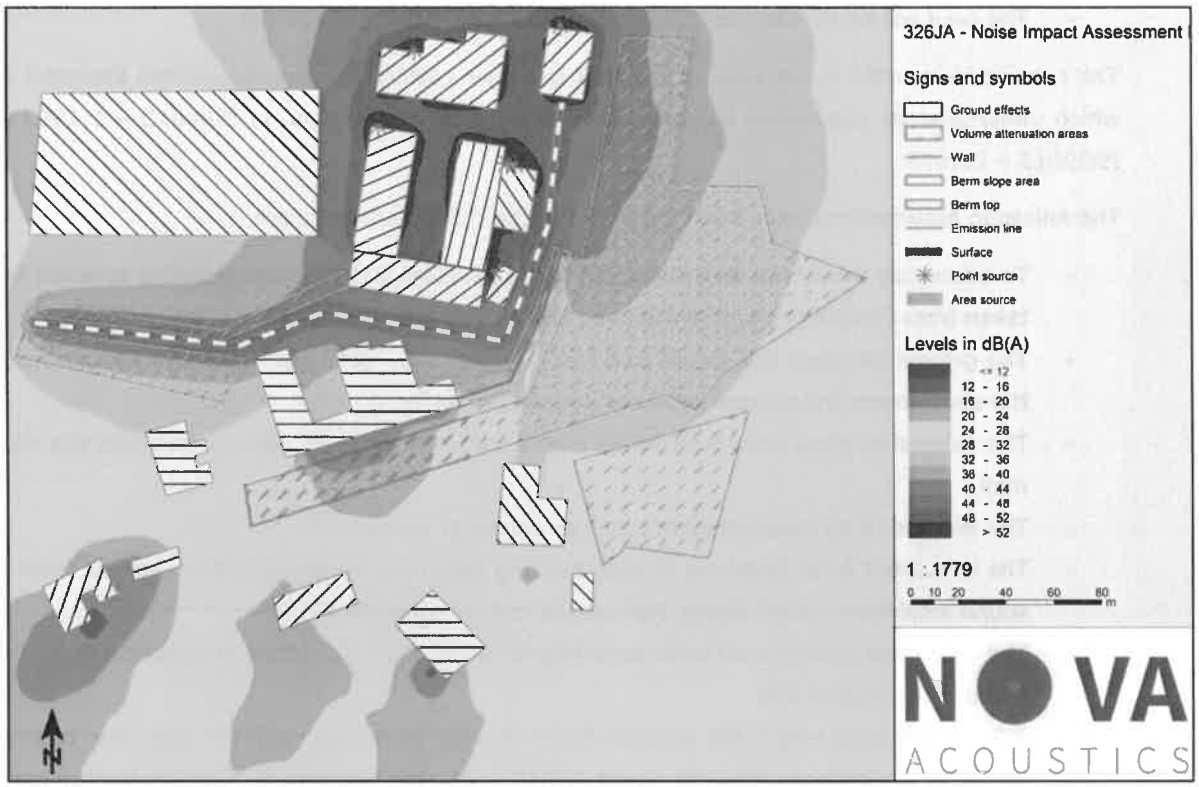


Figure 3.0 – Specific Sound Level Map

A summary of the specific sound levels at the NSRs, based on the sound map shown in Figure 2.0, can be seen below in Table 7.0.

NSR	Specific Sound Level (dBA)
1	33.0

Table 7.0 - Specific Sound Level at NSR Summary

5.1.2 Rating Level

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."

Rating Penalty Assessment

Considering the requirements of the rating penalty, an assessment of the various sound sources associated with the Proposed Development, in terms of whether any rating penalties are applicable, and has been detailed in Table 8.0 below.

Source	Tonality	Impulsivity	Intermittency	Other Sound Characteristics	Discussion
1	--	--	+3	--	Intermittent operations in units and vehicle pass bys

Table 8.0 – Rating Penalty Assessment

Rating Level

Incorporating the rating penalties with the specific sound levels, the rating sound levels have been derived and have been detailed in Table 9.0.

NSR	Rating Sound Level (dB)
1	36.0

Table 9.0 – Summary of Rating Sound Levels

5.1.3 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. **Error! Reference source not found.**.0 outlines a summary of the background sound level for the operational period, as well as the statistically most repeated values for each period.

Measurement Position MP1	
Operational Hours ('t')	**$L_{A90,t}$**
Day 1 – 05/06/15 – 13:00 – 19:00	44.7
Day 2 – 06/06/15 – 07:00 – 19:00	49.0
Day 3 – 07/06/15 – 07:00 – 19:00	40.1
Day 4 – 08/06/15 – 07:00 – 14:00	**41.5**

Table 10.0 – Background Sound Level Summery

Discussion:

It can be seen that the ambient noise levels are variable and that, of the period considered, they reach a maximum level during Saturday. The difference between the day when they are highest,

Saturday, and the day when they are lowest, Sunday, is more than 20dBA. As the proposed operational times for the industrial units is Monday to Saturday from 7am to 7pm, the noise levels from Monday will be used in the assessment because they are the lowest levels of the representative days.

5.1.4 BS4142 Assessment

The rating sound level has been assessed in accordance with BS4142:2014 at all NSR's. The BS4142:2014 assessment at the NSR, during day and night time periods can be seen below in Table 11.0.

Results	Sound Level (dB)	Notes
Rating Sound Level	36.0	As shown in Table 9.0
Operational Period Background Sound Level	41.5	As shown in Table 10.0
Excess of Rating over Background Sound Level	-5.5	Assessment Indicates a 'Low Impact'.

Table 11.0 – BS4142:2014 Assessment

Discussion

The assessment above shows that assuming a worst-case scenario the rating noise level at the NSR falls 5.5 dB below the prevailing background sound level, indicating a low likelihood of adverse impact on the NSR. When considering the context of the surrounding area as well as the time of day the units will be operating that impact is expected to be reduced further.

5.2 Increase in Ambient Noise Level Assessment

This section of the report assesses the likely impact due to the increase in ambient noise levels of the area due to the proposed development. The assessment is undertaken by logarithmically adding the specific sound levels predicated at the NSR to measured ambient sound levels of the area. The higher the increase in noise level the higher the expected impact.

Description	Sound Level (dB)
Ambient Sound Level	45.8
Specific Noise Level at NSR	33.0
Resulting Noise Level	46.0
Increase	+0.2
Expected Impact	Not Significant

Table 12.0 – Increase in Ambient Noise Level Assessment

Discussion:

The Increase in ambient noise level assessment shows an expected increase in noise levels at the NSR of +0.2 dB. indicating that the impact on the NSR due to operations at the development will not be significant.

5.3 Recommendations & Mitigation

The following section outlines the mitigation measures that are necessary to reduce the impact from Proposed Development.

- All future tenants will be carefully vetted to ensure that their operations are not excessively noisy.
- No Heavy/General industrial processes should occur on site.
- Any external plant associated with the proposed B1 units will be located in the designated plant area for each building.
- The cumulative noise levels in each plant area should not exceed a noise level of **62 dBA at 1m** or the noise limit level stated in table 6.0 of this report.
- If external plant is required to be located in an area away from specified plant areas, such as extraction system, the noise emissions should be assessed by a suitably qualified person to ensure noise emissions fall a minimum 10 dB below the prevailing background sound level.
- All units and buildings should be constructed with materials that provide a minimum sound reduction index of 25 dB Rw. This is inclusive of the roof, façade, roller shutters and glazing elements.
- The 3.5m acoustic barrier recommended in the first version of this report should still be implemented along the southern perimeter of the site. As shown in appendix C. It is recommended that this noise barrier take the form of a 2m high earth bund with a 1.5m closed board timber fence on top. However, any other 3.5m noise barrier will suffice.
- The access road should have a maximum speed limit of 20kph.
- The access road should be constructed with an impervious bituminous low noise surface.
- Traffic calming measures should be installed.

6. Conclusion

An environmental noise survey and noise impact assessment has been undertaken to assess the potential increase in noise levels from development of Land South of Glendale, Lincoln Way, Salthill Industrial Estate, Clitheroe, BB7 1PL in to a B1 industrial/commercial estate, on the surrounding noise sensitive receptors. The measured background sound levels have allowed a BS4142:2014 noise assessment to be carried out.

The BS4142 assessment shows that there is a low likelihood of adverse impact, when considering the context of the assessment, frequency of usage and time of day the units will be in operation, any impact is expected to be reduced. Further mitigation has been recommended to minimise uncertainty in the predictions presented and ensure the amenity of the NSR's is protected.

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

Appendix A – Acoustic Terminology

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 20μPa (20x10-6 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 s1 and s2 is given by 20 log10 (s1 / s2). 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 20μPa.
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.
$L_{eq,T}$	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. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 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. L10 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 3.5m
Facade	At a distance of 1m 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 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided. The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
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 factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source. A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

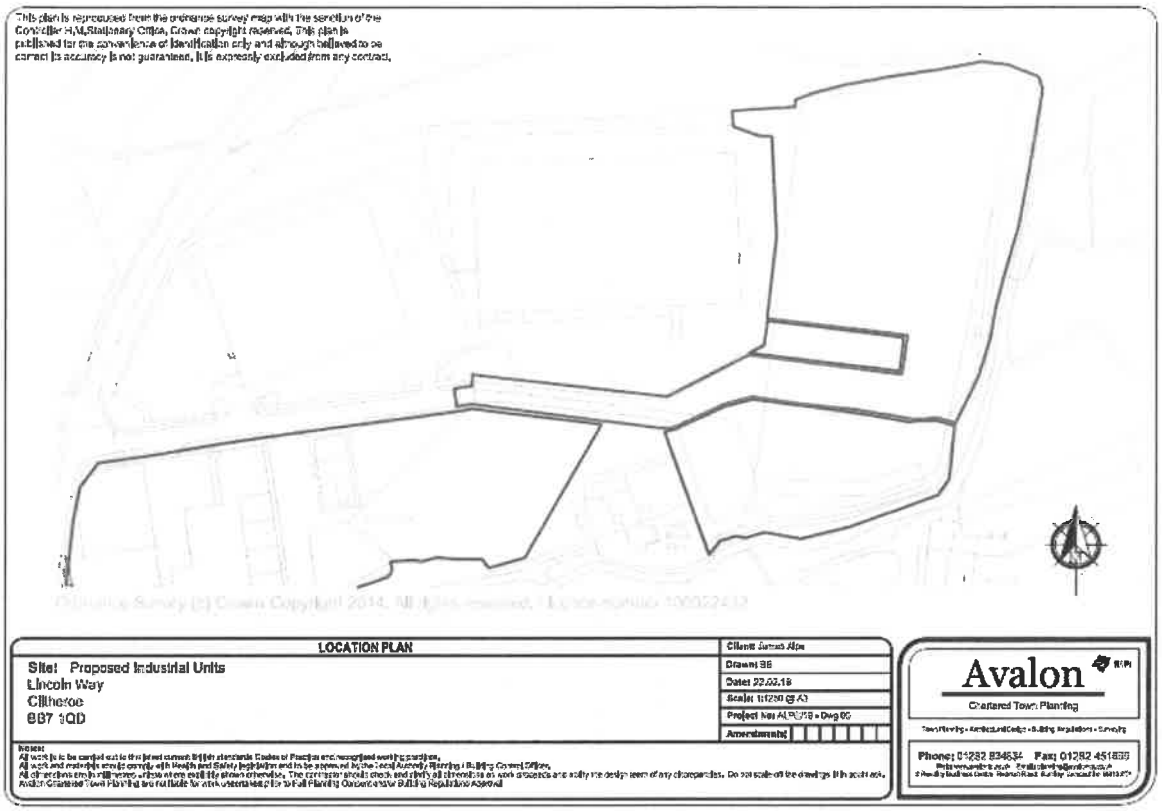
For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the

time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

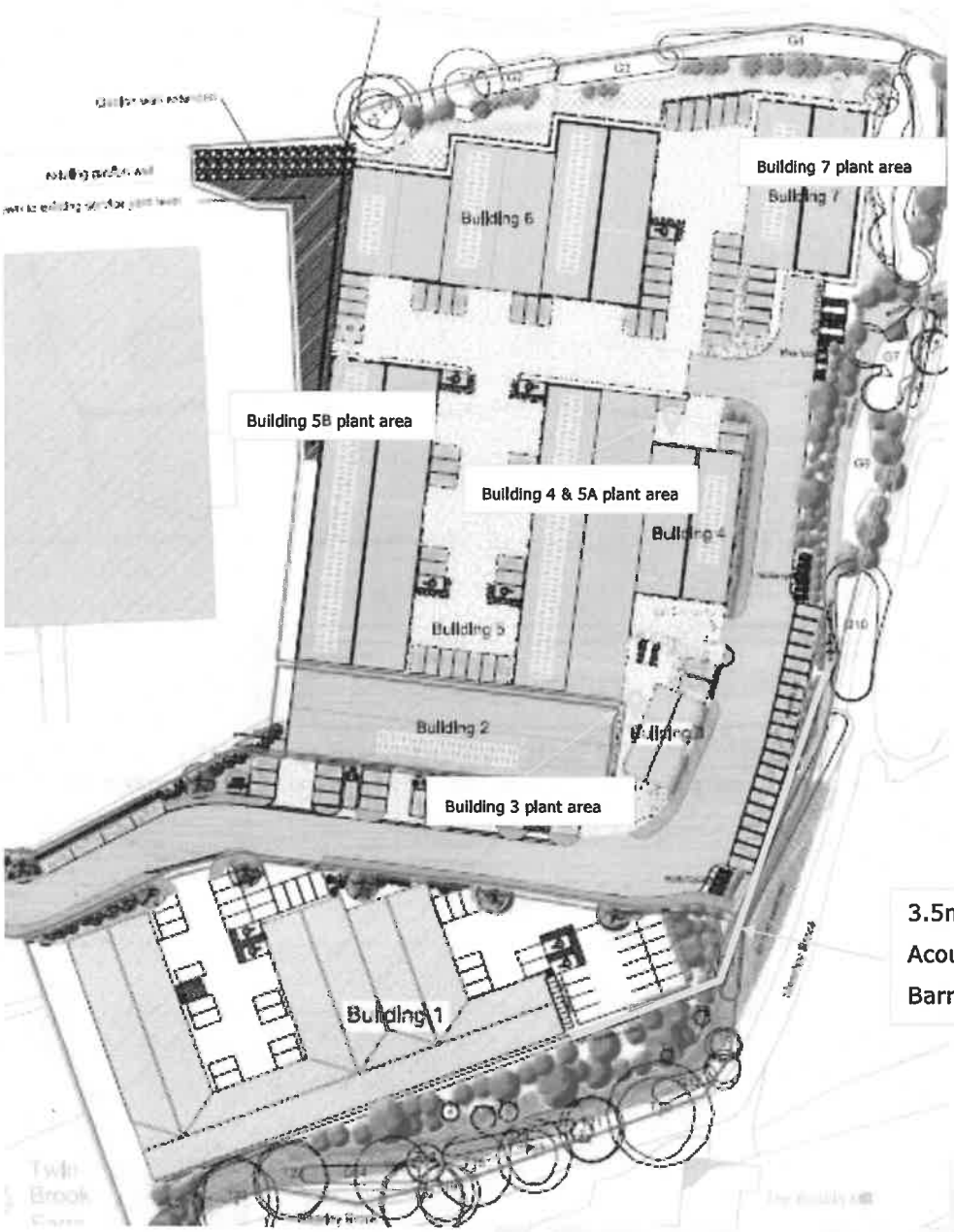
This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound. To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS4142:2014 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms.

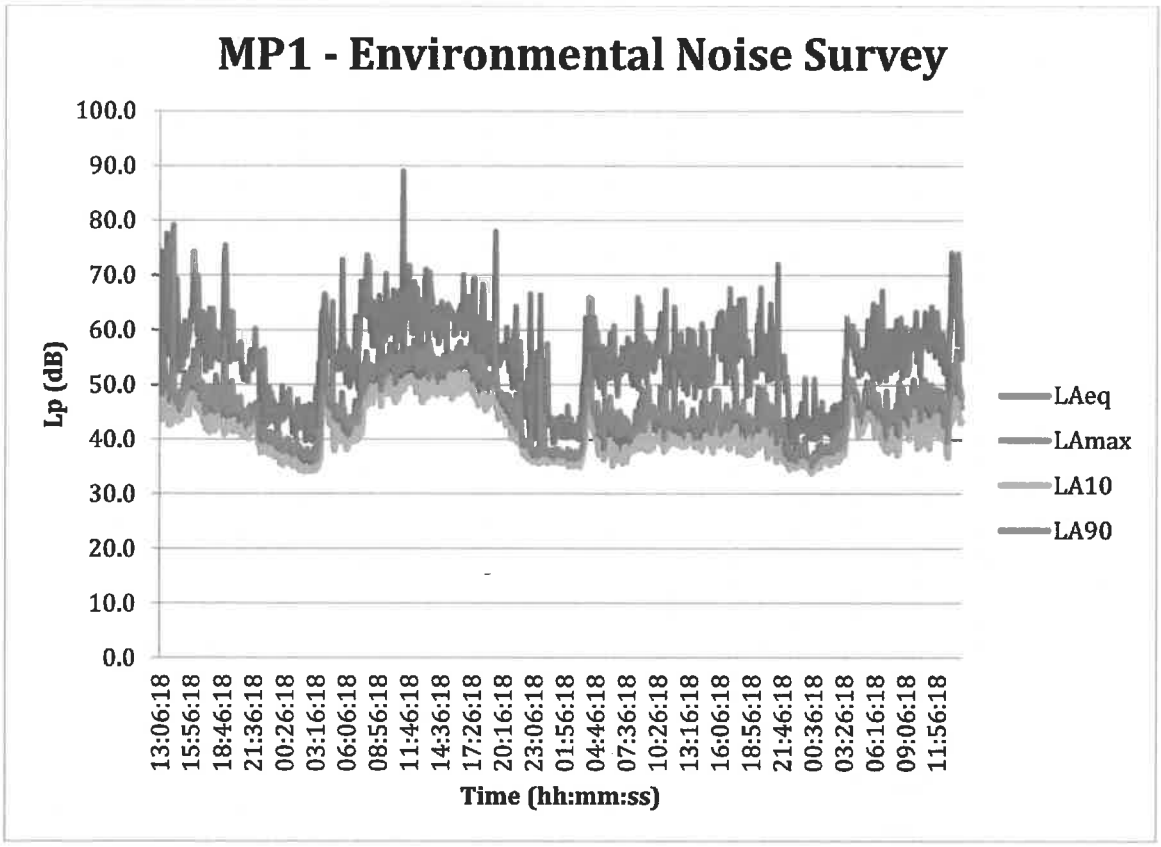
Appendix B – Location Plan



Appendix C – Site Plans



Appendix D – Environmental Sound Survey



Appendix E – Calculations

Noise Breakout Calculations

Building 4 Breakout					
Length	25				
Width	15				
Height	8				
	Area m²	**Internal Level (dB)**	**Sound Reduction (Rw)**	**External (dB)**	**Sound power (dB)**
Side 1 Composite sheet	200	79	25	48	71.0
Side 2 Composite sheet	120	79	25	48	68.8
Side 3 Composite sheet	200	79	25	48	71.0
Side 4 Composite Sheet	120	79	25	48	68.8
Roof Composite Sheet	375	79	25	48	73.7

Building 5 Wing A					
Length	50				
Width	20				
Height	8				
	Area m²	**Internal Level (dB)**	**Sound Reduction (Rw)**	**External (dB)**	**Sound power (dB)**
Side 1 Composite sheet	400	79	25	48	74.0
Side 2 Composite sheet	160	79	25	48	70.0
Side 3 Composite sheet	400	79	25	48	74.0
Side 4 Composite Sheet	160	79	25	48	70.0
Roof Composite Sheet	1000	79	25	48	78.0

Building 5 Wing B					
Length	50				
Width	20				
Height	8				
	Area m²	**Internal Level (dB)**	**Sound Reduction (Rw)**	**External (dB)**	**Sound power (dB)**
Side 1 Composite sheet	400	79	25	48	74.0
Side 2 Composite sheet	160	79	25	48	70.0
Side 3 Composite sheet	400	79	25	48	74.0

Side 4 Composite Sheet	160	79	25	48	70.0
Roof Composite Sheet	1000	79	25	48	78.0

Building 6

Length South Façade	50
Length East Façade	30
Length West Façade	20
Length North façade 1	15
Length North façade 2	15
Length North façade 3	15
Height	8

	Area m²	Internal Level (dB)	Sound Reduction (Rw)	External (dB)	Sound power (dB)
South Facade Composite sheet	400	79	25	48	74.0
East Façade Composite sheet	240	79	25	48	71.8
West Façade Composite Sheet	160	79	25	48	70.0
Each Northern Façade Composite sheet	120	79	25	48	68.8
Roof Composite Sheet	1150	79	25	48	78.6

Building 7

Length	30
Width	20
Height	8

	Area m²	Internal Level (dB)	Sound Reduction (Rw)	External (dB)	Sound power (dB)
Side 1 Composite sheet	240	79	25	48	71.8
Side 2 Composite sheet	160	79	25	48	70.0
Side 3 Composite sheet	240	79	25	48	71.8
Side 4 Composite Sheet	160	79	25	48	70.0
Roof Composite Sheet	600	79	25	48	75.8

CRTN Calculation	Noise Leve (dB)
L10 Basic Hourly Noise Level (Chart 2)	54.0
Correction for Speed and HGV percentage (Chart 4)	0.3
Impervious bituminous road surface	-1

Resulting L10	53.3
Resulting LAEQ - 1dB	52.3