ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

Proposed Extension of Hours
Farleigh Masonry, Warminster Business Park

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FARLEIGH MASONRY LIMITED

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

Farleigh Masonry appointed Acoustic Consultants Limited to undertake a noise impact assessment for a proposed extension of hours for their facility at unit 2C, Newopaul Way, Warminster Business Park, Warminster, Wiltshire, BA12 8RY.

This report provides the results of a noise survey of site noise levels and background sound levels and assesses the noise impact during the proposed extended hours.

The noise impact assessment has been undertaken in accordance with the guidance in British Standard 4142:2014 (BS4142).

The author of this report is a Member of the Institute of Acoustics with over 17 years' experience in the field of noise and is considered suitably qualified to undertake this noise impact assessment.

2. The Site & Development

The site is located to the South East of the Warminster Business Park situated to the North of Warminster.

The site is bordered by industrial buildings of Warminster Business Park to the North, South and West. To the East is woodland. The nearest noise sensitive locations are the residential properties on Chalfield Close, approximately 70 metres to the East.

Planning permission has been granted for the site. This imposes operational time limits which restricts use to daytime on weekdays only. The proposal is for the site to operate from 06:00 to 22:00 hours Monday to Friday and from 06:00 to 13:00 hours on Saturday.

The building contains a number of stone saws, CNC machines and a separate masonry workshop where manual stonework takes place. There are also offices and staff facilities. All plant is installed within the building.

The yard contains a number of storage racks and car park.

The main source of noise is generated by the cutting of stone with the large circular saws.

3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in July 2021. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 174 states:

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

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"

Paragraph 185 states:

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

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

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

The document does not prescribe any assessment methodology or criteria to assess the adverse effect of noise.

3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.
The NPSE sets out the long-term vision of Government noise policy. This long-term vision is supported by three noise policy aims which are as follows:

"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; and
where possible, contribute to the improvement of health and quality of life."

The NPSE introduces the concept of "Significant adverse" and "Adverse" impacts of noise which relate to the noise policy aims. These are applied as follows:

NOEL – No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur. With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

"The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its own merits. The NPSE does, however, emphasise that in dealing with noise, Local Planning Authorities are required to take a balanced approach in considering the benefits of development against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors."

3.3. National Planning Practice Guidance, Noise

The National Planning Practice Guidance (NPPG) on noise, referred to here, is based on the current version (July 2019) as provided on the Planning Guidance Website. It states that *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

The document provides generic guidance on how to determine the impact of noise and what factors could be a concern. It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation. Paragraph 5 of the NPPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated on the following page.

Table 1: NPPG Noise – Perception of Effect Levels

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

The table does not provide any objective assessment which equates to the noted effect levels. The NPPG identifies that where noise is audible it is not necessarily intrusive. The effect and impact on people is based primarily on the level of noise.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning were reduced to a minimum when taken into account against all other planning considerations.

Section 4 of this report identifies guidance which is considered to provide noise criteria equivalent to effect levels below the Lowest Observed Adverse Effect Level. This is where the perception of noise is "not noticeable" or "noticeable but not intrusive" as indicated in Table 1 above.

4. Assessment Methodology

4.1. BS4142:2014+A1:2019

For industrial and commercial noise, the most relevant guidance is provided within British Standard 4142:2014+A1:2019. The methods described in the British Standard use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes.

The initial estimate principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'. The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours). Clause 9 entitled 'Rating Level' 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."

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location. In Clause 11 of the Standard, entitled 'Assessment of the Impacts', it states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9), and consider the following.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

Based on the initial assessment outcomes of BS4142, and depending on context, it is our opinion that the NOEL, LOAEL and SOAEL levels stated in the Noise Policy Statement for England would generally fall within the following categories when considered in conjunction with the effect levels of the NPPG Noise.

Table 2: BS4142 Difference in Relation to Effect Levels

BS4142 Assessment Difference	Corresponding Effect Level*	Action*
≤-10 dB	No Observed Effect	No specific measures required
-9.9 dB to 0 dB	No Observed Adverse Effect	No specific measures required
	Lowest Observed Adverse Effect Level	
0.1 dB to 5 dB	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level	
5.1 dB to 10 dB	Significant Observed Adverse Effect	Avoid
≥10.1 dB	Unacceptable Adverse Effect	Prevent

* BS4142 states that "where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration". Therefore the assessment levels and effect levels above are not definitive and can be modified due to context.

It should be noted that the numerical outcome only represents the initial estimate of impact, as stated in the first paragraph of Clause 11, and that contextual matters should be considered before determining what the potential impact is. This paragraph 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 effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.*
>
> *Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9).*
>
> *NOTE 1 More than one assessment might be appropriate.*

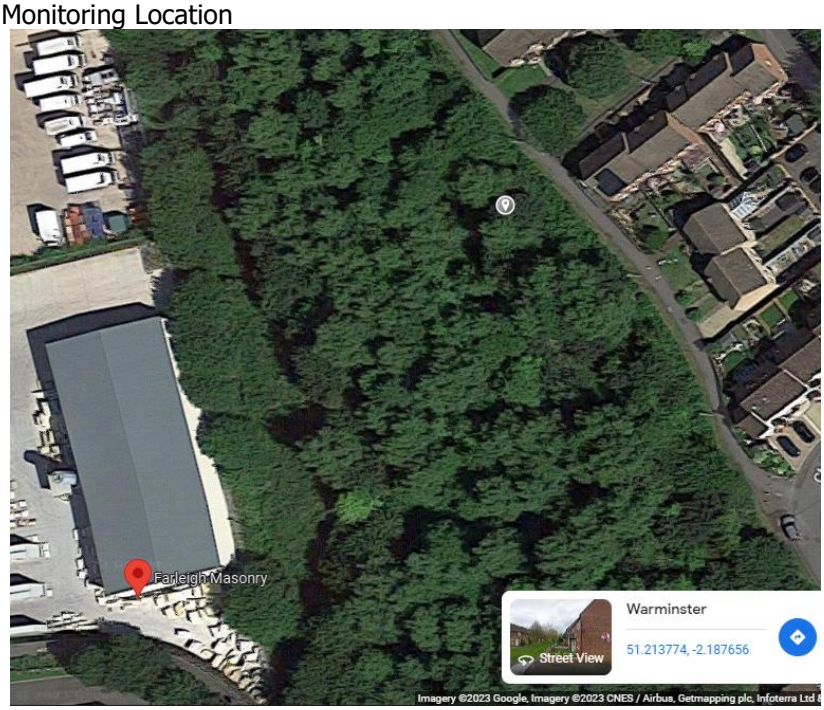
The second part of Clause 11 sets out three contextual matters that should be taken into account once the initial numerical estimate has been determined. It is important to note that the three listed is not exhaustive and all pertinent factors should be considered.

5. Baseline Noise Monitoring

A partially attended noise monitoring exercise was undertaken on the 3rd to 5th April 2023 to determine the existing noise climate at a location representative of the nearby residential dwellings.

A partially attended noise monitoring exercise was undertaken at Location A as shown in the figure below. The main source of noise was from plant associated with premises at the Business Park other than Farleigh Masonry. Principally this was from refrigeration plant from a food store to the North.

Figure 1: Noise Monitoring Location



5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Svantek 959 sound level analyser with half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 entitled "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

Table 3: Monitoring Equipment

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, Svantek, 959	14784	07/04/2022	1502194-1
Pre-Amplifier, Svantek, SV12L	18685	07/04/2022	1502194-1
Microphone, GRAS, 40AE	183810	07/04/2022	1502194-1
Calibrator, Larson Davis CAL200	18293	26/10/2022	42246

The SLM is calibrated every 2 years, the calibrators annually. This follows good practice. The measuring systems were checked for calibration before and after the tests. No significant drift was detected during the measures detailed in this report.

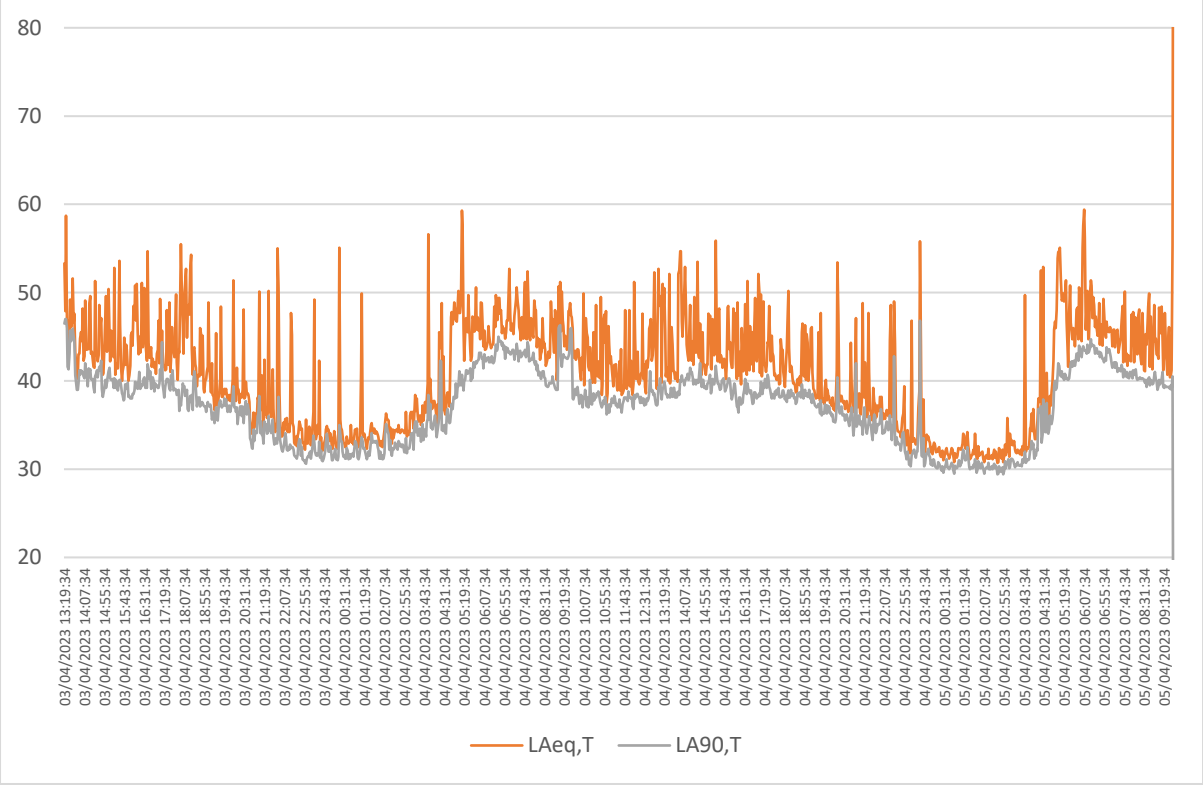
5.2. Weather Conditions

During the monitoring, conditions were clear. Wind speeds were low for the survey and did not normally exceed 3 m/s. The daytime air temperature was 13-15 degrees centigrade during the survey.

5.3. Measured Noise Levels

Chart 1 shows the measured noise levels over the duration of the monitoring exercise. From the data gathered a typical background sound level of 56dB $L_{A90,1\ hour}$ has been determined as representative for the proposed hours of operation.

Chart 1: Measured Noise Levels



From the measured noise levels, a background sound level of 43dB $L_{A90,15\ minutes}$ has been determined as typical for the area during the proposed extended morning hours of use.

From the measured noise levels, a background sound level of 32dB $L_{A90,1\ hour}$ has been determined as typical for the area during the proposed extended evening hours of use.

6. Source Noise Levels

An attended noise monitoring exercise was undertaken on the 3rd April 2023 at locations in and around the application site.

Observations were made at the noise sensitive properties and to the east of the application site. At both of these locations noise from the masonry yard was not distinguishable over other dominant noise sources, principally plant associated with surrounding premises on the business park.

To determine noise from masonry works noise levels were measured within the building whilst continuous cutting activities were taking place. The location is shown on the photograph below and was determined on site as being representative of the noise level within the space.

Figure 2: Noise Monitoring Location



6.1. **Monitoring Equipment**

Sound Pressure Levels were measured using a NTi XL2 sound level analyser with half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 entitled "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

Table 4: Monitoring Equipment

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-13617-E0	30/03/2022	40614
Pre-Amp, NTI, MA220	7727	30/03/2022	40614
Microphone, NTI, MC230A	A16151	30/03/2022	40613
Calibrator, Larson Davis, CAL200	12605	23/06/2022	44735

The SLM is calibrated every 2 years and the calibrators annually. This follows good practice. The measuring systems were checked for calibration before and after the tests. No significant drift was detected during the measures detailed in this report.

6.2. Measured Noise Levels

The following table provides the measured noise levels over the 1-hour of continuous stone cutting.

Table 5: Measured Noise Levels

Octave Band (Hz)	63	125	250	500	1000	2000	4000	8000	A
Sound Pressure Level $L_{Aeq,1\ hour}$ (dB)	77.0	69.8	71.6	74.5	75.7	69.7	68.1	63.3	78.7

7. Noise Emission Predictions

During the site survey noise from the masonry yard was not determinable above the residual noise climate at the residential properties. Whilst this demonstrates the current proposals do not have an adverse impact by way of noise it is not possible to use external noise measurements to determine the noise impact in accordance with BS4142. As such, to determine noise levels from masonry activities at noise sensitive premises noise modelling has been undertaken.

7.1. Building Fabric Constructions

Noise emission predictions have been undertaken based on following external fabric constructions which were proposed and constructed as part of the original application.

7.1.1. Wall Build Up

The standard wall build up is considered to be an insulated composite panel supported on steel sections.

The wall system is the Kingspan KS1000 RW panel. This construction achieves the following sound reduction indices:

Octave Bands (Hz)	63	125	250	500	1000	2000	4000
Sound Reduction Indices (dB)	15	16	19	23	26	22	39

The southern and eastern wall of the building have been enhanced by lining the metal sections with a layer of 10 millimetre thick dense particle board with a surface density of at least 11.7 kilograms per metre squared. According to the Kingspan data this achieves the following sound reduction indices:

Octave Bands (Hz)	63	125	250	500	1000	2000	4000
Sound Reduction Indices (dB)	12	19	32	42	50	52	60

7.1.2. Roof Build Up

The standard roof build up is considered to be an insulated composite panel supported on steel sections.

The proposed roof system is the Kingspan KS1000 RW panel. This has been enhanced with a layer of 10 millimetre thick dense particle board with a surface density of at least 11.7 kilograms per metre squared fixed under support spacers with 120 millimetre insulation in the cavity. According to the Kingspan data this achieves the following sound reduction indices:

Octave Bands (Hz)	63	125	250	500	1000	2000	4000
Sound Reduction Indices (dB)	17	27	39	44	49	57	67

7.1.3. Access doors

The roller shutter access doors are located on the western side of the building. The doors have been selected to achieve the following minimum sound reduction indices:

Octave Bands (Hz)	63	125	250	500	1000	2000	4000
Sound Reduction Indices (dB)	15	16	19	23	26	22	39

7.1.4. Windows and Roof Lights

The windows and roof lights on all elevations apart from the west have been specified to achieve the same sound insulation performance as the walls and roof, the required minimum sound insulation indices are as follows:

Octave Bands (Hz)	63	125	250	500	1000	2000	4000
Sound Reduction Indices (dB)	17	27	39	44	49	57	67

Windows to the west façade are specified to achieve the following minimum sound insulation indices:

Octave Bands (Hz)	63	125	250	500	1000	2000	4000
Sound Reduction Indices (dB)	15	16	19	23	26	22	39

7.2. Noise Modelling

The plant noise emission has been modelled in the noise modelling software Cadna:A by DataKustik. The modelling software calculates sound levels based on the inputted sound emission values, source and receiver locations, and primarily distance, barrier and ground attenuation. Calculations are undertaken using the General Method of Calculation from ISO 9613.

7.2.1. Noise modelling parameters

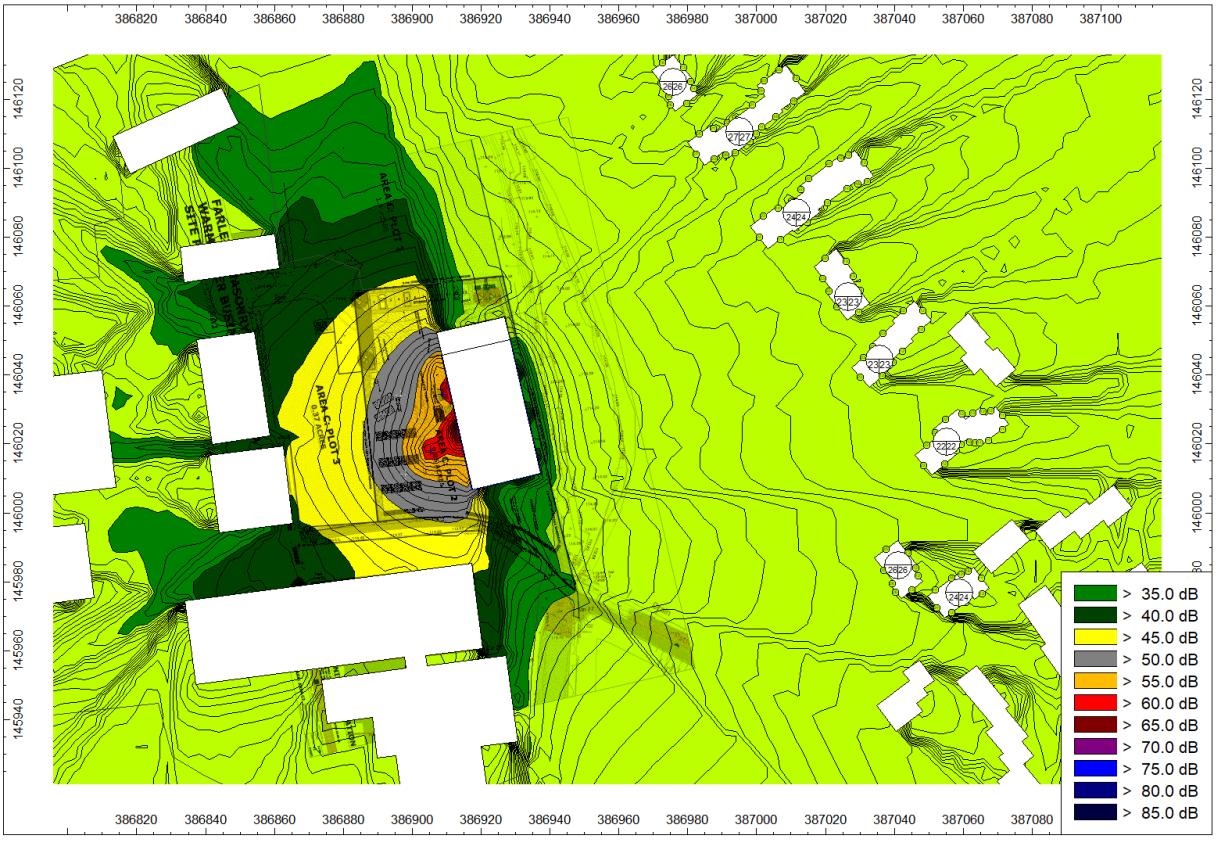
The noise model is based on the following parameters:

- The site layout is determined from the supplied plans with the surrounding area determined from Google maps imagery.
- The noise level within the building has been determined from the site measured data.
- The construction of the building is as stated in section 7.1.
- Noise levels are predicted at a height of 4.5 metres above the ground which is typical of a first floor bedroom as the hours of operation fall within the night time period.
- The ground between the site and nearby houses is considered to be "soft".
- Third order reflections have been considered.
- For the extension of hours, it is assumed that the doors to the building will at times be open and this is modelled for a worst case assessment.
- During the extension of hours, it is assumed that all activities will take place within the building.

7.3. **Predicted Noise Level**

A noise map of the plant specific sound levels is provided for the proposed operation.

Figure 3: Predicted Specific Sound Level of Plant $L_{Aeq(T)}$



The predicted noise level at the worst-case residential property is 26dB $L_{Aeq,T}$.

8. Noise Impact Assessment

8.1. Initial Estimate of Impact

A British Standard 4142:2014 assessment has been undertaken at the sensitive receivers on the site.

Background Sound Level

From the measured noise levels, a background sound level of 43dB $L_{A90,15\ minutes}$ has been determined as typical for the area during the proposed extended morning hours of use.

From the measured noise levels, a background sound level of 32dB $L_{A90,1\ hour}$ has been determined as typical for the area during the proposed extended evening hours of use.

Predicted Specific Sound Level

The cumulative specific sound level at the worst-case receiver is 26 dB $L_{Aeq(15minutes)}$ (free-field level). This is the level determined at the noise sensitive receivers without any character corrections applied.

Character Corrections

Character corrections should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. Based on observations made on site it did not appear that the site noise emission has any noticeable impulsive or tonal characteristics. No correction has been applied for these features.

The most significant noise is that from the stone saws, these have a clear on/off condition when the saw is cutting and when it is spinning in air. As such a penalty of 3 dB has been applied due to the intermittency.

For other sound characteristics the British Standard states: *"Where the specific sound features characteristics that are neither tonal or impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."*

Therefore, the British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 6: British Standard 4142:2014 initial estimate for NSR

Parameter	Morning operation from 06:00 hours	Evening operation until 22:00 hours
Background Level, $L_{A90,\ (T)}$	43 dB	32 dB
Specific Sound Level, $L_{Aeq,\ (T)}$	26 dB	26 dB
Character Correction	+3 dB	+3 dB
Rating Level, $L_{Ar,\ 15min}$	29 dB	29 dB
Excess of rating over background level	-14 dB	-3 dB

This means that the rating noise level at the nearest noise sensitive receiver will result in a 'difference' of -14dB in the early morning and -3 dB in the evening at the most sensitive receiver. This indicates that there will be no adverse impact when assessed to British Standard 4142:2014.

We would consider the noise impact of the proposed extension of hours to have No Observed Adverse Effect and to fall below the Lowest Observed Adverse Effect Level (LOAEL) of the NPSE and NPPG and as such achieves the aims of National Planning Policy Framework (NPPF).

On this basis the proposals are considered acceptable in terms of noise impact.

9. Summary and Conclusions

Farleigh Masonry appointed Acoustic Consultants Limited to undertake a noise impact assessment for a proposed extension of hours for their facility at unit 2C, Newopaul Way, Warminster Business Park, Warminster, Wiltshire, BA12 8RY.

The site is located to the South East of the Warminster Business Park situated to the North of Warminster.

The site is bordered by industrial buildings of Warminster Business Park to the North, South and West. To the East is woodland. The nearest noise sensitive locations are the residential properties on Chalfield Close, approximately 70 metres to the East.

Planning permission has been granted for the site. This imposes operational time limits which restricts use to daytime on weekdays only. The proposal is for the site to operate from 06:00 to 22:00 hours Monday to Friday and from 06:00 to 13:00 hours on Saturday.

A partially attended noise monitoring exercise was undertaken on the 3rd to 5th April 2023 to determine noise from the site and background sound levels during the extended hours of operation.

During the site survey noise from the masonry yard was not determinable above the residual noise climate at the residential properties. Whilst this demonstrates the current proposals do not have an adverse impact by way of noise it is not possible to use external noise measurements to determine the noise impact in accordance with BS4142. As such, to determine noise levels from masonry activities at noise sensitive premises, noise modelling has been undertaken.

A British Standard 4142:2014 assessment has been undertaken at the sensitive receivers on the site. The rating noise level at the nearest noise sensitive receiver will result in a 'difference' of -14dB in the early morning and -3 dB in the evening at the most sensitive receiver. This indicates that there will be no adverse impact when assessed to British Standard 4142:2014.

We would consider the noise impact of the proposed extension of hours to have No Observed Adverse Effect and to fall below the Lowest Observed Adverse Effect Level (LOAEL) of the NPSE and NPPG and as such achieves the aims of National Planning Policy Framework (NPPF).

On this basis the proposals are considered acceptable in terms of noise impact.

10. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 µPa)

Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t1}^{t2}[p_A(t)^2/p_0^2]dt\right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 µPa); and
$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

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. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



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