



Swansea Valley Business park, Ystalyfera

Noise Assessment for Planning Application

15th September 2020

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1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned to assess the impact of noise from a proposed speculative B1/B2/B8 commercial development at Swansea Valley Business Park, Ystalyfera.

The following technical noise assessment has been produced to provide supporting information to accompany a planning application to Neath Port Talbot County Borough Council and is based upon environmental noise measurements undertaken at the site and a subsequent predictive exercise.

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 and Objectives

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

- A sound monitoring survey was undertaken at a discrete location representative of the closest noise-sensitive receptors to the Site;
- An assessment of potential noise impacts with respect to the prevailing acoustic conditions at existing off-site receptors; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements BS4142:2014+A1:2019¹.

¹ British Standard 4142: 2014+A1:2019 *Method for rating and assessing commercial sound*. BSI

2. ASSESSMENT CRITERIA

2.1.1. BS4142:2014+A1:2019

BS4142:2014² 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 $L_{A,r,Tr}$ '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 low impact, depending on the context."*

During the daytime, the assessment is carried out over a reference time period of 1-hour, with a reference period of 15-minutes used for the night-time assessment. The periods associated with day or night, for the purposes of the Standard, are considered to be 07.00 to 23.00 and 23.00 to 07.00, respectively.

² British Standard 4142: 2014 +A1:2019 Method for rating and assessing commercial sound. BSI

2.1.2. Relative Change in Ambient Noise Level

In circumstances where a noise environment may be altered by addition or removal of a noise source, considered to be largely anonymous or within the prevailing acoustic character of an area, for example, changes to traffic quantum or patterns, it is normal to consider the relative change in ambient noise level. The assessment, therefore, focuses primarily on this phenomenon.

The impact scale adopted in this assessment is shown in Table 1 below, which relates to established human responses to noise.

TABLE 1: IMPACT SCALE FOR COMPARISON OF FUTURE NOISE AGAINST EXISTING NOISE

Noise Level Change dB(A)	Subjective Response	Significance
0	No change	No impact
0.1 – 0.9	Imperceptible change	Negligible impact
1.0 – 2.9	Barely perceptible	Minor impact
3.0 – 5.9	Noticeable	Moderate impact
6.0 – 9.9	Up to a doubling or halving of loudness	Substantial impact
10.0 or more	More than a doubling or halving of loudness	Major impact

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in Table 1 provide a good indication as to the likely significance of changes in noise levels in this case and have been used to assess the impact of noise from the proposed development.

3. SITE DESCRIPTION

3.1. Site and Surrounding Area

The site is located on a parcel of land located between the A4067 Swansea Valley route and the existing business park development at Godrergraig; to the south of the Ystalyfera Asda superstore.

The Proposed Development area, location of the proposed noise source and nearest noise sensitive receptors; being the dwellings immediately to the north of the site, are shown in Figure 1, below.

The prevailing ambient sound environment within the Site was noted to be dominated by road traffic noise arising from vehicles using the A4067, forklift and vehicle movements within the existing business park and activities associated with the Asda superstore.

FIGURE 1: SITE FOR PROPOSED NOISE SOURCE AND SURROUNDING AREA



3.2. Proposed Development Overview

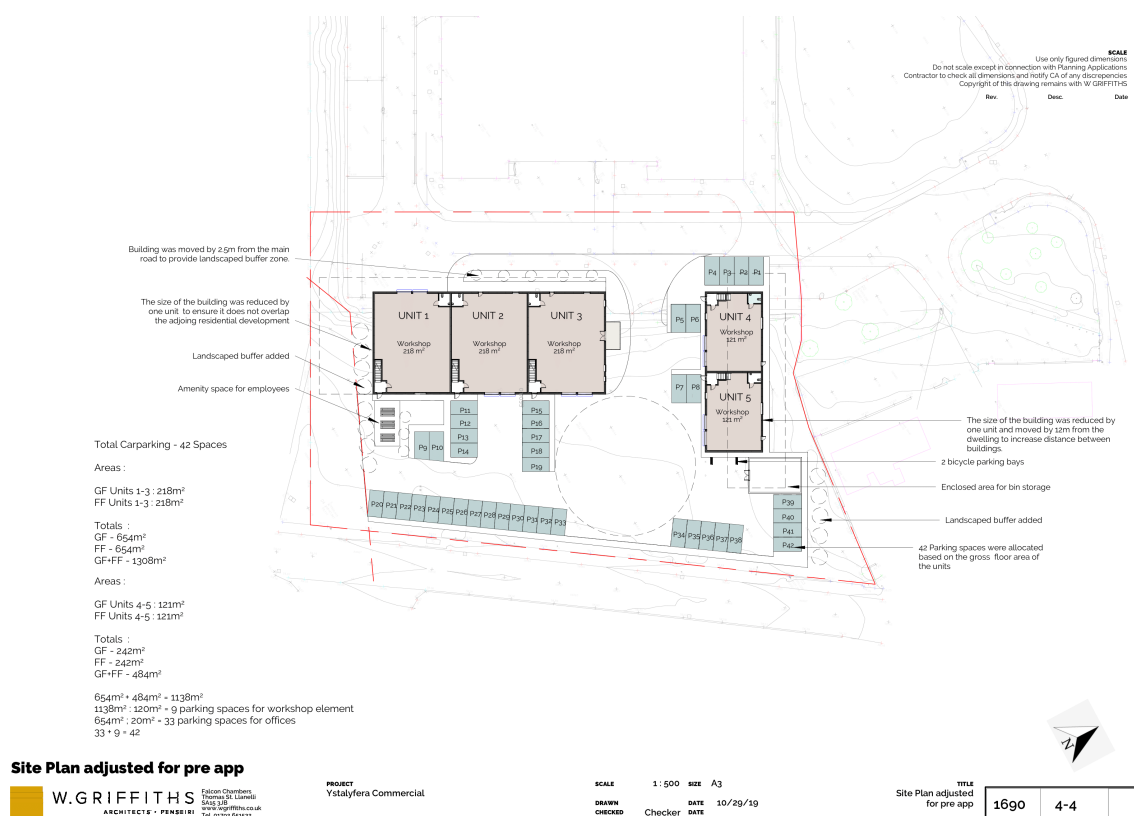
The proposals comprise the redevelopment of the site for speculative B1, B2, B8 uses, across 5 No. 2-storey units, with workshop spaces at ground floor level and general/clerical space at first floor level.

The buildings are proposed to be of a portal frame construction with block masonry walls to the ground floor and cladding of a Kingspan 1000 (or similar) type to the first floor. The ground floor "workshop" areas will also be served by roller shutter doors.

The proposals also include 42 parking bays and, as yet, no operational profiles are known, so it is assumed that the potential for unrestricted operation may exist, subject to the outcome of the noise impact assessment.

The proposed development layout is shown in Figure 2.

FIGURE 2: PROPOSED DEVELOPMENT LAYOUT



4. MEASUREMENT METHODOLOGY

4.1. General

The prevailing noise conditions in the area have been determined by an environmental noise survey conducted during both daytime and night-time periods between Friday 28th and Sunday 30th August 2020.

4.2. Measurement Details

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445³.

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672⁴. A full inventory of this equipment is shown in Table 2 below.

TABLE 2: INVENTORY OF SOUND MEASUREMENT EQUIPMENT

Unit	Make, Model & Description	Serial Number
MP1	Rion NL-32 Sound Level Meter	121396
	Rion NH-21 Preamplifier	36327
	Rion UC-53A Microphone	316715
	Cirrus CR:515 Acoustic Calibrator	72886

The sound measurement equipment used during the survey was field calibrated at the start and end of the measurement period. A calibration laboratory has calibrated the field calibrator used within the twelve months preceding the measurements. A drift of less than 0.1 dB in the field calibration was found to have occurred on the sound level meter.

The weather conditions during the survey were suitable for environmental noise measurement; being dry with low wind speeds, below 5ms⁻¹.

The microphone was fitted with a protective windshield for the measurement, which are described in Table 3, with an aerial photograph indicating their locations shown in Figure 3.

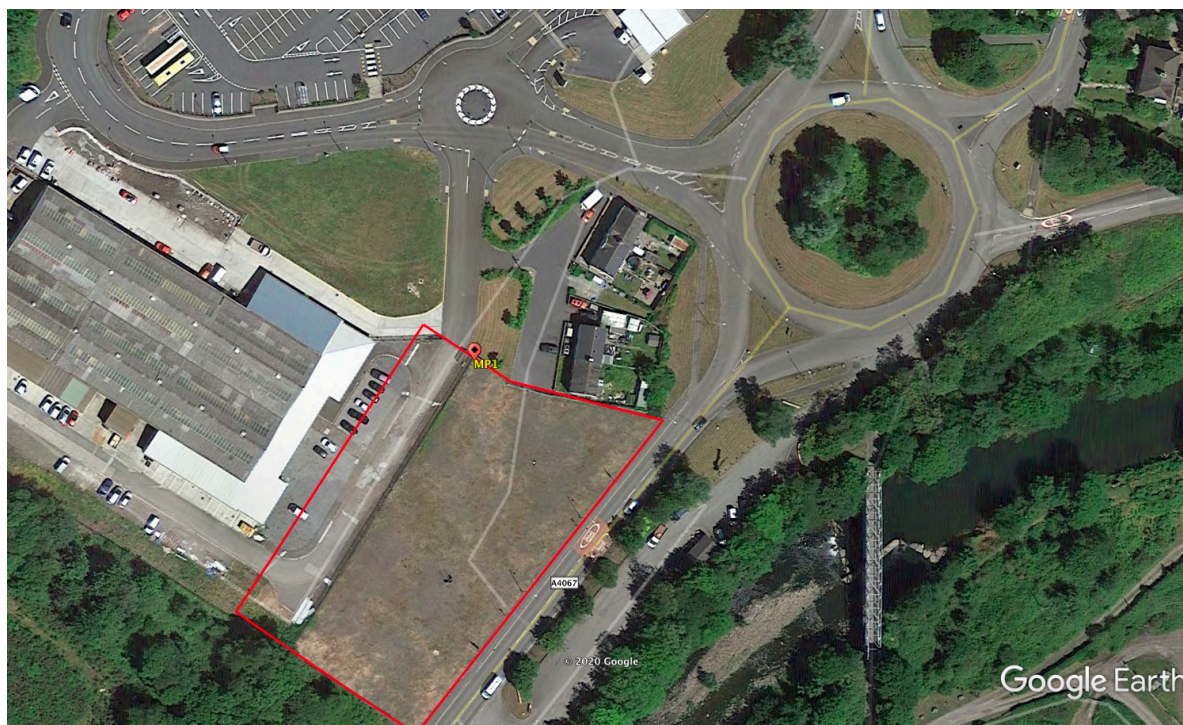
TABLE 3: MEASUREMENT POSITION DESCRIPTION

Measurement Position	Description
MP1	A largely unattended free-field measurement of sound representative of the nearest noise sensitive receptor. The measurement was undertaken at a height of 2.5 metres above local ground level and 1.5 metres above the ground level of the site and closest receptor. The sound environment was dominated by noise arising from road traffic using the A4067 road, with occasional contributions from on-site activities and the use of the Asda superstore

³ British Standard 7445: 2003: Description and measurement of environmental noise. BSI

⁴ British Standard 61672: 2003: Electroacoustics. Sound level meters. Part 1 Specifications. BSI.

FIGURE 3: MEASUREMENT POSITION



4.3. Summary Results

The summarised results of the environmental noise measurements are presented in Table 3, with the time history and statistical analyses presented under Appendix B.

TABLE 3: SUMMARY OF NOISE MEASUREMENT RESULTS

Measurement Position	Period	Noise Level, dB			
		L _{Aeq,T}	L _{A90}	L _{A10}	L _{AFMax}
MP1	Day 23:00 – 07:00	53	47	54	77
	Core Day 07:00 – 19:00	54	49	55	77
	Night 23:00 – 07:00	45	39	47	66

5. NOISE ASSESSMENT

5.1. Noise Modelling

5.1.1. General

As precise details of the Proposed Development, *vis-à-vis* end users and operational details have not yet been finalised, beyond the scope of the B1, B2 and B8 use categories for the site, the following assessment considers a hypothetical operational scenario, taking account of the type and scale of the development and reasonable, worst-case assumptions on noise generation.

5.1.2. Operational Assumptions

The following input data has been considered within the assessment:

- Internal sound levels within the workshop areas equivalent to the first exposure action of the Noise at Work Regulations 2005;
- Internal sound levels within the 1st floor areas equivalent at a moderate, but lower level than the workshop;
- 15 of the parking bays being utilised within a 1-hour period;
- One LGV arriving and another departing the site during a 1-hour period; and
- Roller shutter doors to the workshop areas maintained in a closed position during noisy operations.

5.1.3. Source Data

The A-weighted sound power levels associated with the Proposed Development, based on archive data, can be seen below in Table 4.

TABLE 4: SOUND SOURCE DATA

Source	Distance / Description	Noise Level - dB	
		L _{Aeq,T}	SEL
LGV arriving	10 metres	-	68.0
LGV Starting and Departing	10 metres	-	73.0
Car Passby	10 metres	-	71.0
Car Reversing	10 metres	-	71.0
Internal Level - Ground Floor	Internal Reverberant	80.0	-
Internal Level - First Floor	Internal Reverberant	70.0	

5.1.4. Building Envelope

In terms of the acoustic performance of the building envelope, the sound reduction statistics set out in Table 5 have been adopted.

TABLE 5: SOUND REDUCTION INDEX OF BUILDING COMPONENTS

Component	Type / Material	SRI - dB(A)
1 st Floor	Profiled Steel / KS1000 or similar	25
Ground Floor	Block/Masonry	52
Main Doors	Steel Roller Shutter - Closed	15

It has been assumed that any proposed ventilation louvres or access doors will be of a design and fit that does not compromise the overall sound insulation performance of the building envelope.

5.1.5. Calculation Process

Calculations were carried out using Cadna/A, which undertakes its calculations in accordance with guidance given in ISO9613-1:1993 and ISO9613-2:1996.

5.1.6. Sound Data Assumptions

Given that the land between Proposed Development and nearest receptors will be mixed, the ground factor has been set to 0.0 in the calculation software.

It has been assumed that all processes may occur simultaneously, representing a worst-case scenario.

5.1.7. Specific Sound Level Map

A sound map of the predicted specific sound level arising from cumulative typical operations at the closest receptors to the Site can be seen in Figure 4.

5.1.8. Specific Sound Level Summary

The predicted specific sound level arising from operations at the closest receptors to the Site, as shown on Figure 4 can be seen below in Table 6.

FIGURE 4: SPECIFIC SOUND LEVEL MAP OF CUMULATIVE OPERATIONS

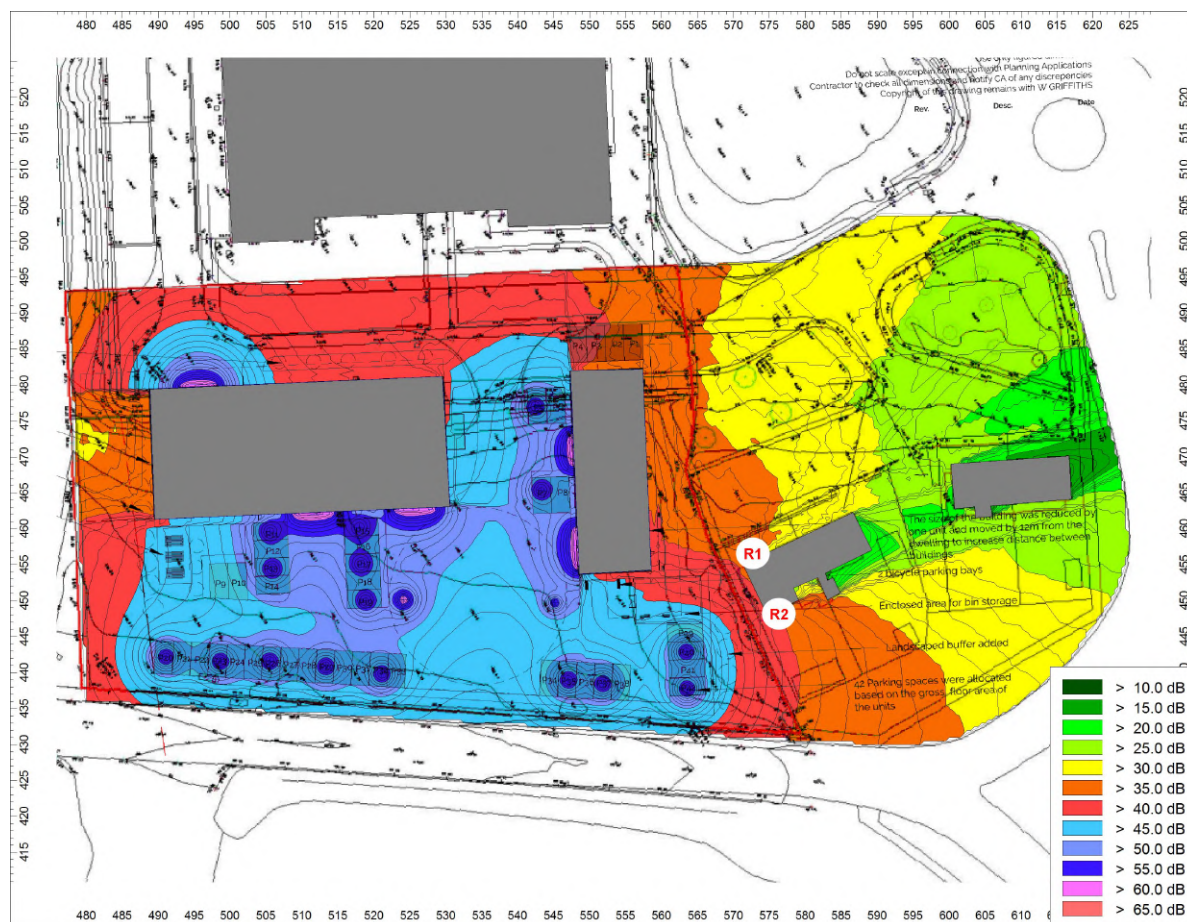


TABLE 6: PREDICTED SPECIFIC SOUND LEVEL SUMMARY

Position	Specific Sound Level at Façade dB(A)		
	Noise Breakout	Vehicle Movements	Cumulative
R1 - Ground Floor	29.5	36.0	36.9
R1 - First Floor	29.6	35.9	36.8
R2 - Ground Floor	28.6	40.2	40.5
R2 - First Floor	28.6	40.0	40.3

5.2. Assessment

5.2.1. Rating Penalty Principle

Section 9 of BS4142:2014+A1:2019 describes how the rating sound level should be derived from the specific sound level, by determining a rating penalty.

BS4142:2014+A1:2019 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.”*

Given that the extraction system was operational, 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+A1:2019, 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+A1:2019 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

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”*.

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”*.

Other Sound Characteristics

BS4142:2014+A1:2019 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.”*

5.2.2. Rating Penalty Assessment

Considering the content of Section 5.2.1, an assessment of the noise source associated with the Proposed Development, in terms of whether any rating penalties are applicable, and has been detailed in Table 7.

TABLE 7: RATING PENALTY ASSESSMENT

Source	Tonality	Impulsivity	Intermittency	Other Sound Characteristics	Discussion
Noise Breakout	0 dB	0 dB	0 dB	0 dB	On the basis of the predicted results, which make robust allowances for internally generated noise, it is considered that such activities would be at a level typically regarded as inaudible, relative to the background/residual sound environment. Therefore, although operational details are not yet known, it is considered that no acoustic feature corrections would be required for this source.
Vehicular Activities	0 dB	0 dB	0 dB	0 dB	On the basis of the predicted results, which make robust allowances for vehicular activity noise, it is considered that such activities would be at a level typically regarded as anonymous relative to the background/residual sound environment, which is already heavily characterised by on and off-site vehicle movements. Therefore, although operational details are not yet known, it is considered that no acoustic feature corrections would be required for this source.

In summary, no rating penalty has been included in the assessment.

5.2.3. Uncertainty

BS4142:2014+A1:2019 requires that the level of uncertainty in the measured data and associated calculations is considered in the assessment. The Standard recommends that steps should be taken to reduce the level of uncertainty.

Measurement Uncertainty

BS4142:2014+A1:2019 states that measurement uncertainty depends on a number of factors, including the following, which are applicable to the Proposed Development:

“

...

b) the complexity and level of variability of the residual acoustic environment;

- ...
- d) *the location(s) selected for taking the measurements;*
- ...
- g) *the measurement time intervals;*
- h) *the range of times when the measurements have been taken;*
- i) *the range of suitable weather conditions during which measurements have been taken;*
- ...
- k) *the level of rounding of each measurement recorded; and*
- l) *the instrumentation used."*

Each of the measurement uncertainty factors outlined above have been considered and discussed in Table 8.

TABLE 8: MEASUREMENT UNCERTAINTY FACTORS

Measurement Uncertainty Factor Reference	Level of Uncertainty	Discussion
b)	0 dB	Residual acoustic environment is relatively constant, hence no correction for a complex residual acoustic environment.
d)	0 dB	The measurements were undertaken at a location considered to be robustly representative of the closest noise-sensitive receptors to the site.
g)	0 dB	Measurement time intervals were set in accordance with BS4142:2014+A1:2019, hence no further correction needs to be made.
h)	0 dB	Background measurements were undertaken over continuous partially attended daytime and night-time periods.
i)	0 dB	The partially attended nature of the measurement enabled detailed observations of the weather conditions and no periods of significant wind or precipitation were noted.
k)	0 dB	Measured values were rounded to 0.1 dB, therefore rounding would not have had a significant impact on the overall typical background sound levels.
l)	0 dB	The acoustic measurement equipment accorded with Type 1 specification of British Standard 61672, and were deployed with appropriate wind shields.

In summary, a correction of 0 dB has been included in the assessment, to account for measurement uncertainty.

Calculation Uncertainty

BS4142:2014 states that calculation uncertainty depends on a number of factors, including the following, which are applicable to the Proposed Development:

- "
- ...
- b) *uncertainty in the operation or sound emission characteristics of the specific sound source and any assumed sound power levels;*
- c) *uncertainty in the calculation method;*
- d) *simplifying the real situation to "fit" the model (user influence on modelling); and*
- e) *error in the calculation process."*

Each of the calculation uncertainty factors outlined above have been considered and discussed in Table 9 below.

TABLE 9: CALCULATION UNCERTAINTY FACTORS

Calculation Uncertainty Factor Reference	Level of Uncertainty	Discussion
b)	0 dB	Sound levels for all sources/activities have been based on robust archive data and reasonable worst-case assumptions.
c)	0 dB	Calculations were undertaken in accordance with ISO 9613-2, which is considered a “ <i>validated method</i> ” by BS4142:2014+A1:2019.
d)	0 dB	The real situation has not been simplified for the purposes of this assessment.
e)	+1 dB	ISO 9613-2 indicates that there is a ± 3 dB accuracy to the prediction method, dependent upon input variables and propagation complexities.

In summary, a +1 dB has been included in the assessment, for calculation uncertainty.

5.2.4. BS4142:2014+A1:2019 Assessment

The rating sound level, as calculated from the predicted specific sound level, has been assessed in accordance with BS4142:2014+A1:2019.

The BS4142:2014+A1:2019 assessment at NSR1, can be seen in Table 10.

TABLE 10: BS4142:2014+A1:2019 ASSESSMENT OF COMMERCIAL NOISE – LOCATION R1

Results	Sound Level (dB)	Notes
Specific Sound Level	37	As shown in Table 6.
Rating Penalty	0	As discussed in Table 7.
Measurement Uncertainty	0	As discussed in Table 8.
Calculation Uncertainty	+1	As discussed in Table 9.
Rating Sound Level	38	-
Daytime Background Sound Level	47	As shown in Table 3.
Excess of Rating over Daytime (07:00-23:00) Background Sound Level	-9	Assessment indicates a “ Low Impact ”.

The BS4142:2014+A1:2019 assessment at NSR2, can be seen in Table 11.

TABLE 11: BS4142:2014+A1:2019 ASSESSMENT OF COMMERCIAL NOISE – LOCATION R2

Results	Sound Level (dB)	Notes
Specific Sound Level	41	As shown in Table 6.
Rating Penalty	0	As discussed in Table 7.
Measurement Uncertainty	0	As discussed in Table 8.
Calculation Uncertainty	+1	As discussed in Table 9.
Rating Sound Level	42	-
Daytime Background Sound Level	47	As shown in Table 3.
Excess of Rating over <u>Daytime</u> (07:00-23:00) Background Sound Level	-5	Assessment indicates a “ Low Impact ”.

5.2.5. Night-time Operations

It is not yet known whether the intention is to operate the development at night; however, it should be noted that the predicted levels are low and that the most significant potential source of noise, is that associated with vehicle movements on-site, which are acoustically anonymous within the existing acoustic environment of the site.

On that basis and considering that the night-time background noise level is reasonably sustained at 39 dB L_{A90} , it is considered that the site could be operated without any time-limiting restrictions.

5.2.6. Potential External Plant

The development, as proposed, does not include any provision for external plant items, such as air handling units; however, such units typically generate sound of 65 dB $L_{Aeq,T}$ at a metre from the source and are acoustically broadband in character.

Such plant could easily be accommodated within the site, assuming they are sympathetically located, to maximise the screening effects of the built form of the Proposed Development i.e. not at/on the north-west, north-east or south-east facades of Units 4 and 5.

5.2.7. Effect on the Ambient Sound Environment – Residential Receptors

The differential between the predicted specific noise levels at each residential receptor, when compared to the measured ambient $L_{Aeq,T}$ levels in the area would ensure that no significant increase in the prevailing ambient sound level would occur during the day or night.

5.2.8. Discussion and Operational Recommendations

The assessment identifies that probable noise emissions from activities associated with the Site would likely give rise to low levels of audibility at the closest residential properties to the site and

that the currently proposed building construction would be effective in containing the probable levels of internally generated noise within the units.

The assessment does consider the effects of the presumed, most potentially acoustically significant operations within the Proposed Development, on a reasonable and robust basis, given the lack of currently available information relating to the actual end uses of the buildings within the Site. These assumptions are considered sufficient to demonstrate the potential levels of noise impact arising from the Proposed Development and offer sufficient comfort to the Local Planning Authority, that noise arising from the Site can be controlled via the design of the Site.

The application of noise-limiting planning conditions would add a level of operational control and ensure that no restrictions on operating hours would need to be applied, in lieu of noise.

The following noise-limiting planning condition is therefore suggested to cover cumulative activity:

Noise arising from the Development shall not exceed the typical background sound level during the day or night at the closest residential receptors to the site, existing at the time of the approval of this planning permission, when assessed in accordance with the methodology and principles set out in BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

6. CONCLUSION

inacoustic has been commissioned to assess the impact of noise from a proposed speculative B1/B2/B8 commercial development at Swansea Valley Business Park, Ystalyfera.

This technical noise assessment has been produced to provide supporting information to accompany a planning application to Neath Port Talbot County Borough Council and is based upon environmental noise measurements undertaken at the site and a subsequent predictive exercise.

The assessment considers the potential noise emissions arising from robust activity levels at the Proposed Development.

The assessment has identified that noise levels arising as a result of probable operations are predicted to be at a level considered to represent a Low Impact at the closest off-site noise-sensitive receptors, in BS4142:2014+A1:2019 terms.

In light of the above, it is considered that the potential noise impacts associated with the Proposed Development can be adequately controlled by the proposed design and the application of a suitably worded planning condition and that noise should not be considered a material constraint to the granting of planning permission for the proposals in their current form.

7. APPENDICES

7.1. Appendix A – Definition of Terms

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of $20\mu\text{Pa}$ (20×10^{-6} Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1 / s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	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. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
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.

TABLE 12: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

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, BS 4142 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1\text{hour}}$ dB and $L_{A90,15\text{mins}}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

7.2. Appendix B – Measurement Results

FIGURE 5: MEASURED TIME HISTORY – MP1

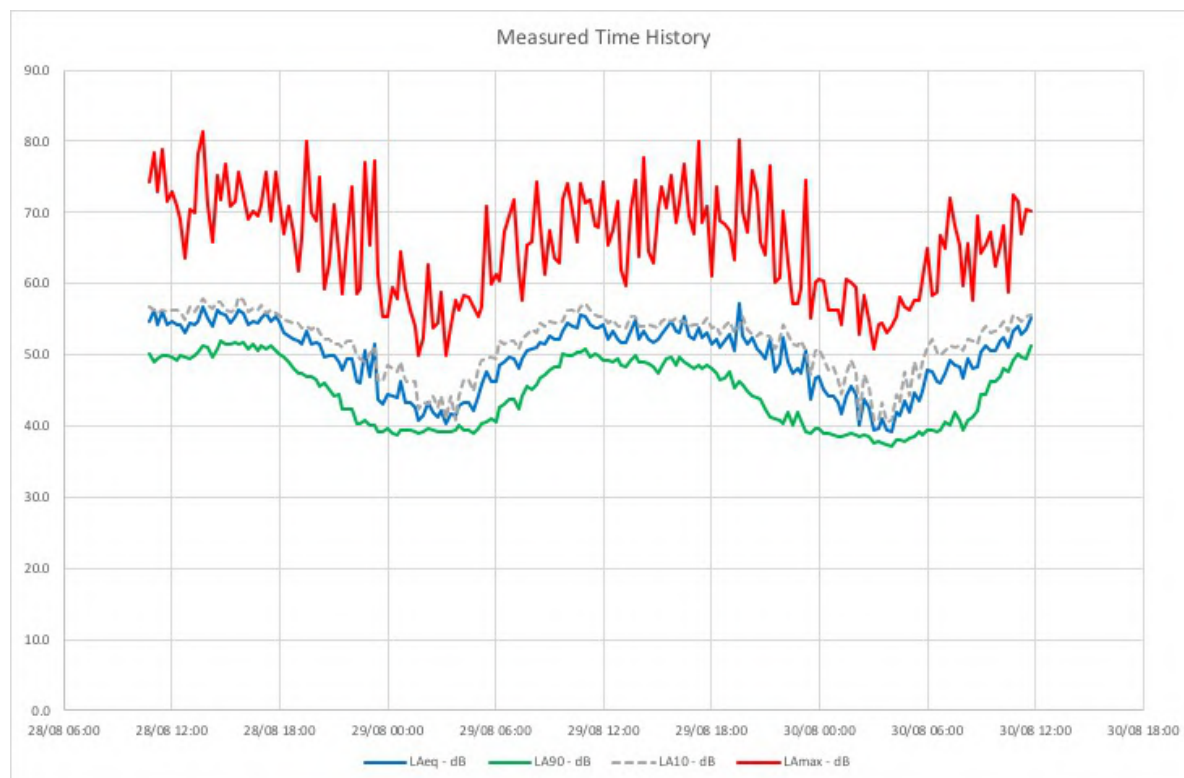


FIGURE 6: STATISTICAL ANALYSIS OF L_{A90} BACKGROUND – MP1 DAYTIME

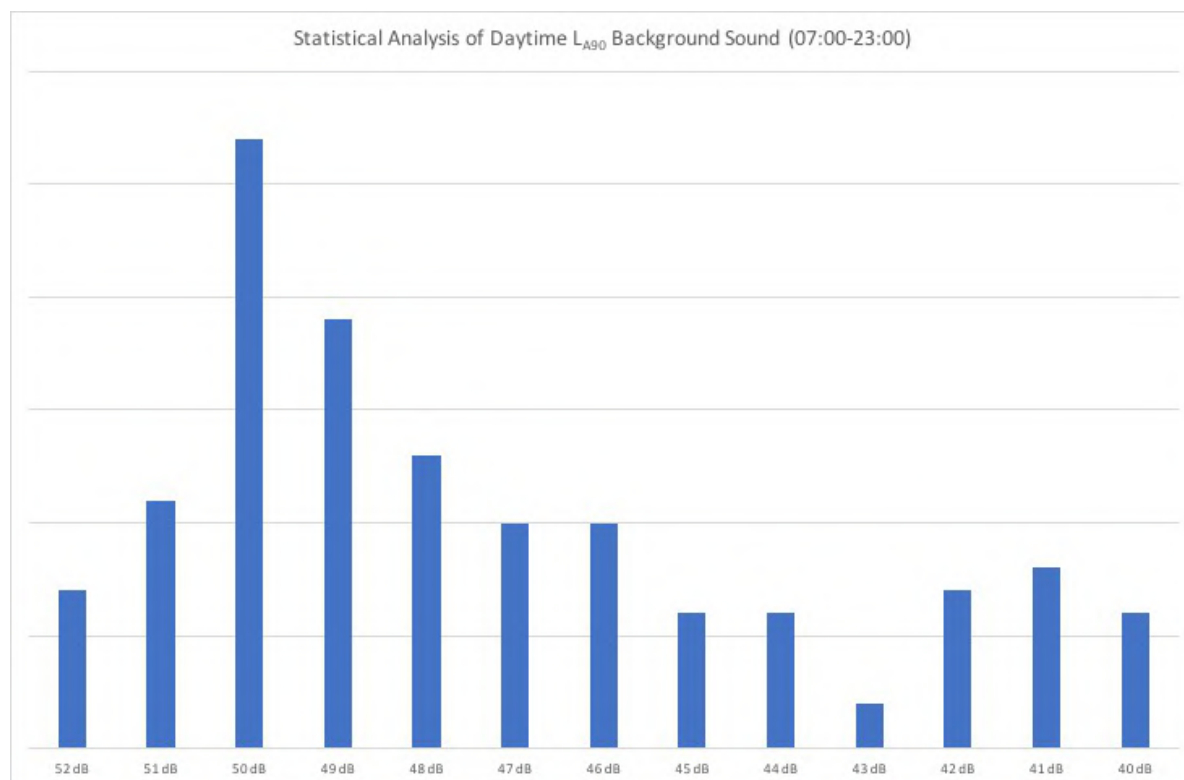


FIGURE 7: STATISTICAL ANALYSIS OF L_{A90} BACKGROUND – MP1 CORE MIDWEEK DAYTIME

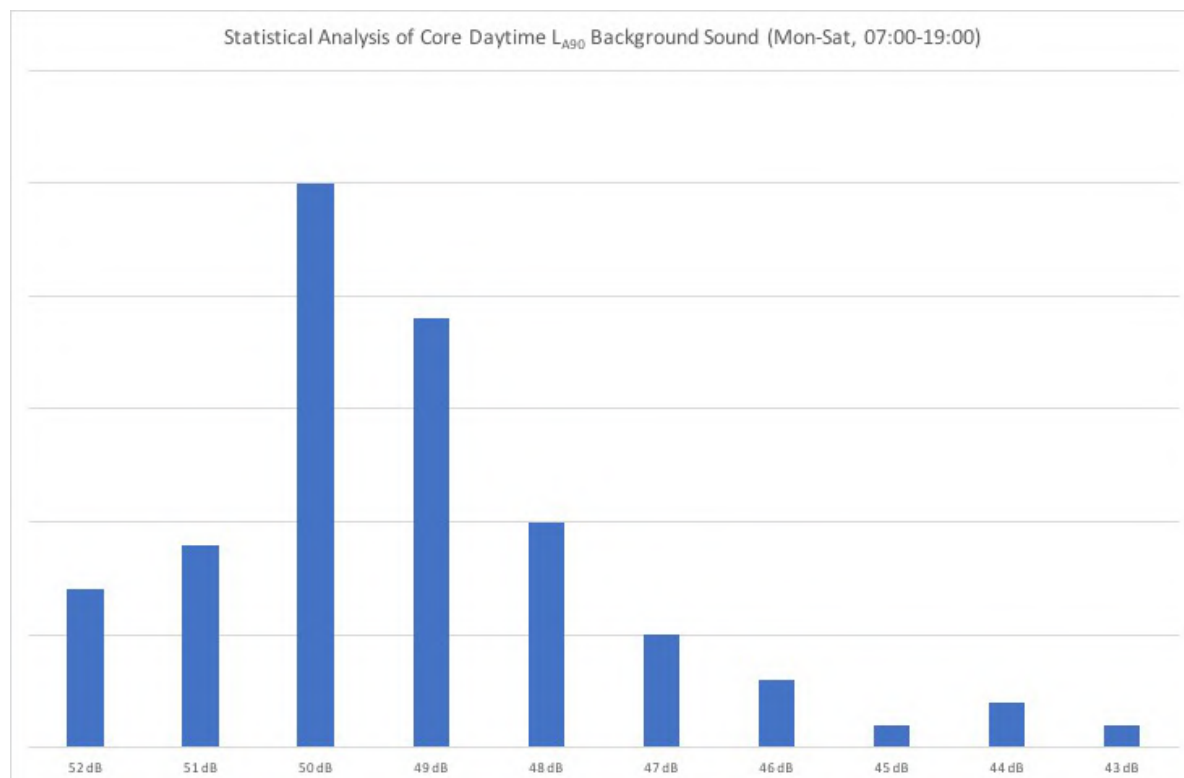
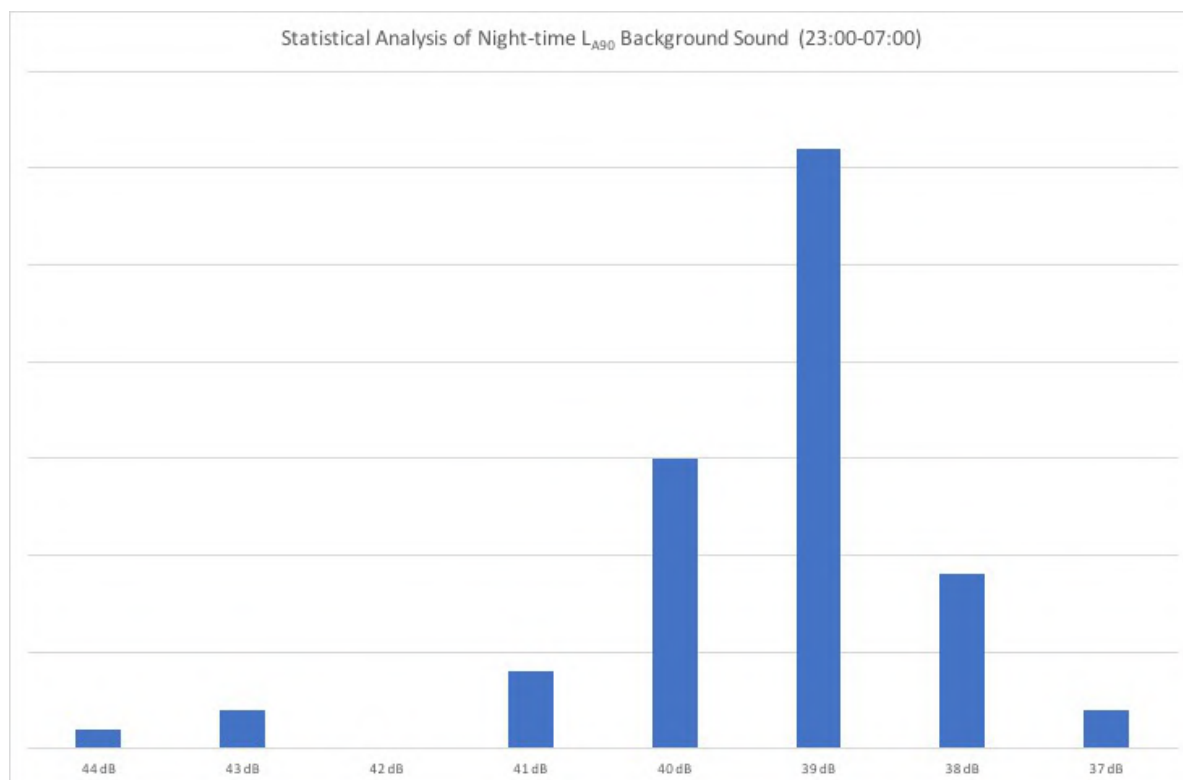


FIGURE 8: STATISTICAL ANALYSIS OF L_{A90} BACKGROUND – MP1 NIGHT-TIME



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