



Gibbons Coaches

Taff Bargoed Centre, Trelewis, CF46 6RD

Noise Impact Assessment

19th May 2022

First Issue



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Revision History

Version	Comments	Author	Date
First Issue	First issued version of the report	Chris Parker-Jones Director and Acoustic Consultant BSc (Hons) MSc MIOA	19th May 2022

ParkerJones Acoustics Limited

Bristol

11 Bankside Road
Brislington
Bristol
BS4 4LB

London

29 Lincoln's Inn Fields
Holborn
London
WC2A 3EE

Glasgow

126 West Regent Street
Glasgow
G2 2RQ

+44 (0)800 830 3338

+44 (0)117 914 6558

info@parkerjonesacoustics.com

www.parkerjonesacoustics.com

Registered in England and Wales

Company No. 12235614

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1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed to undertake a noise monitoring exercise and subsequent Noise Impact Assessment at the existing facility operated by Gibbons Coaches, part of the Taff Bargoed Centre, Trelewis, CF46 6RD. The site is subject to a planning application (ref: P/22/0095) for the *"change of use to coach parking facility with associated hardstanding area"*.

This document has been written to assess the level of impact from noise 'pollution' generated by the existing business on the residential property nearest to the site. This has been achieved by conducting noise monitoring over several days at two discrete positions (one at the site boundary and one at the resident's boundary), with additional 3D noise map modelling to help validate the results.

Whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in **Appendix A**.

2.0 Site Description/History

The site in question is part of the Taff Bargoed Centre, a facility (known as the east unit) operated by Gibbons Coaches, a company which provides coach travel/holidays in the UK and has been a tenant at the centre since 2012.

As shown in **Figure 2.1**, the facility sits at the bottom of a valley, with the Rock UK Climbing Centre to the west, and a further building just south for vehicle storage (which also has planning permission to be used as an MOT centre ¹). At the top of the valley to the east are a railway line and the B4255 running north to south.

The nearest 'noise-sensitive' property, a residential dwelling, lies up the hill to the southeast, approximately 140m from the centre of the site, with a wooded area between, breaking the line of sight between the two. There is another lightweight metal structure close to the residents which may previously have been used as a classic car garage but appears to be unused now.

The site includes a lightweight metal clad structure with a roller shutter door for conducting maintenance on vehicles, an area of hardstanding for parking, manoeuvring, and washing vehicles, and an access ramp from the wider site. The site plan is shown in **Figure 2.2**.

The facility operates mainly during the daytime with coaches being moved or idling on the hardstanding (typically around 6 – 10 per day), to then be washed and vacuumed. Other maintenance work is generally conducted inside the building with the doors closed to contain noise breakout.

Occasionally coaches return to the site in the early hours of the morning after a long trip and are parked at the bottom of the access ramp and moved up to the main parking area the following day.

The facility has been occupied by Gibbons Coaches since 2012. However, it is understood that complaints regarding noise against the site have been lodged with the Council by the nearest residents in recent months/years. The applicant is not aware of any change/intensification in use that would have caused the noise emissions from site to have increased. From discussions with the applicant, PJA believes a member of the Local Planning Authority has previously undertaken noise measurements at the residential property and determined a low/acceptable level of impact.

Similar complaints are believed to have been brought against the Climbing Centre, which were subsequently dismissed. As alluded to above, another building on the site (which is closer to the residents) gained planning permission in 2015 to operate as an MOT Centre (a use which would likely have similar or potentially greater noise emissions to the site in question) without requiring a noise assessment or having any noise related planning conditions.

1 - Application P/15/0370 - On reviewing the application, there does not appear to be a Noise Assessment included in the submittal, and no noise-related concerns were raised by the Local Planning Authority.

Figure 2.1 – Site and surrounding area and locations of the noise monitoring positions

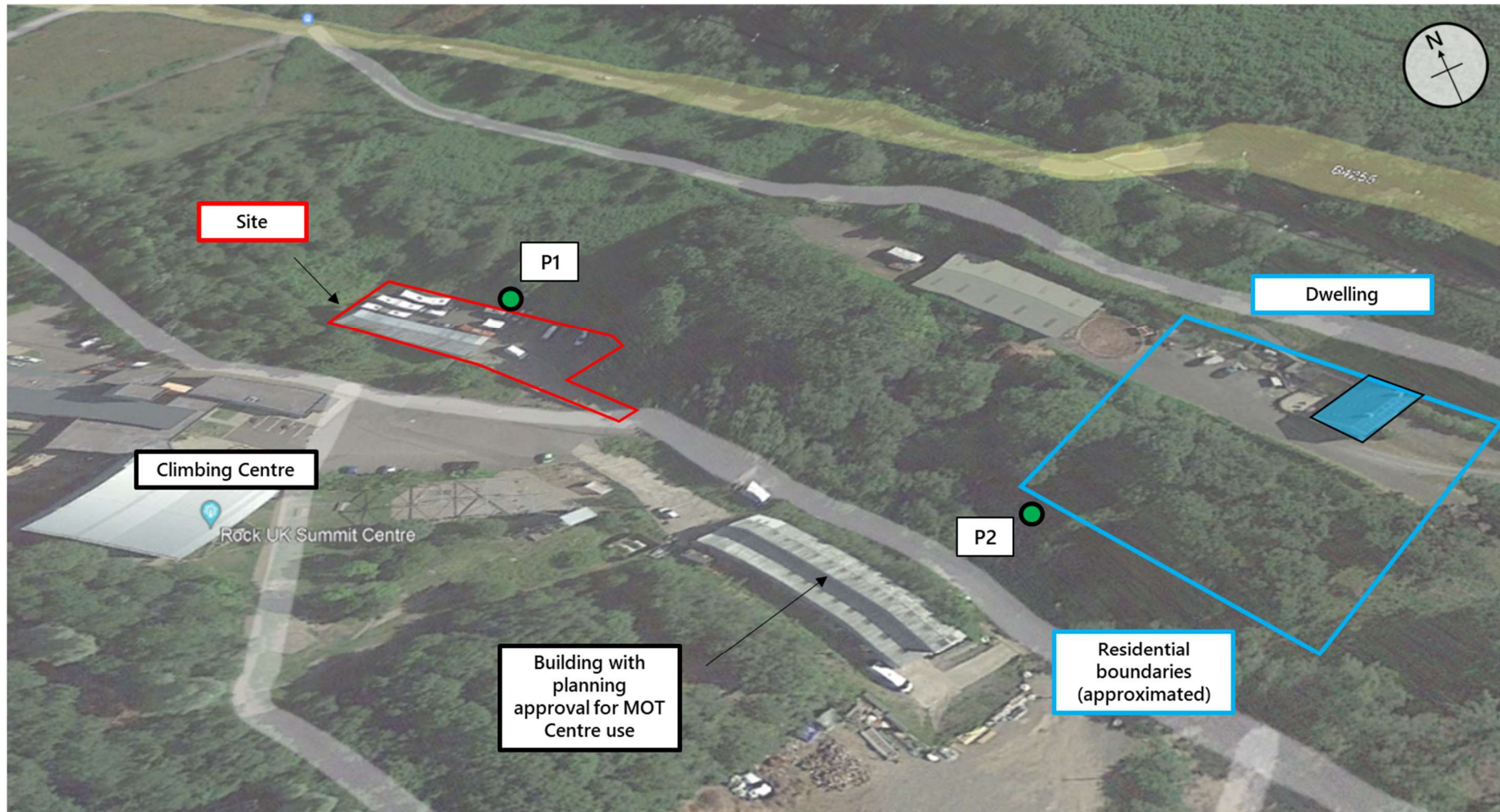
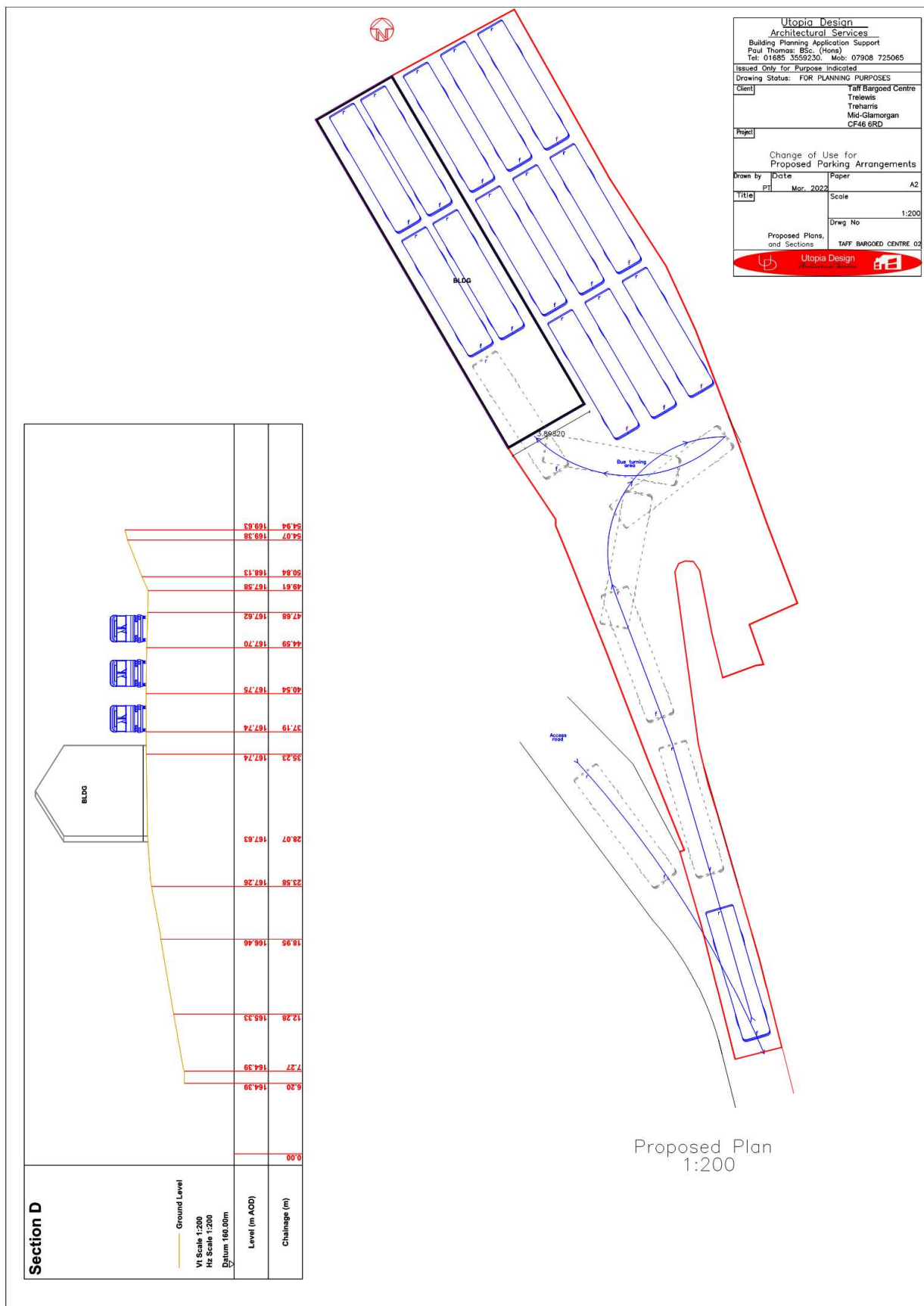


Figure 2.2 – Site plan



3.0 Relevant Guidelines

3.1 Technical Advice Note 11 (TAN 11)

'Technical Advice Notes (Wales) 11, Noise – October 1997' gives guidance on the control of noise to sensitive developments which may be affected by noise and vice versa. With regards to noise generation from industrial sites, it states:

"B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise.

The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24-hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233:1987."

3.2 BS 4142:2014

BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' is intended to be used to assess the potential adverse impact of sound of an industrial and/or commercial nature, at nearby noise-sensitive receptor (NSR) locations (i.e., residential windows) within the context of the existing sound environment.

The method is based upon assessing the predicted noise emissions from plant/equipment against the existing background sound levels at NSRs, the latter of which is determined by a noise survey conducted at the site.

The predicted noise emissions are termed as a 'rating level', which is the 'specific sound level' from plant (the actual measurable noise level), plus 'penalties' which account for whether the noise has distinguishing characteristics such as tonality, intermittency, impulsivity, or is generally distinguishable from the ambient noise environment. Such features may attract attention and be considered annoying, hence sounds with these qualities should be penalised over sounds at the same specific noise level which is less intrusive.

The general aim is for the 'rating level' (plant noise emissions) to not exceed the existing background sound levels outside of residential windows. BS 4142:2014 states that *"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."*

Appendix B explains the methodology in further detail.

3.3 BS 8233:2014

BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' suggests appropriate criteria and limits for different situations. This includes internal noise criteria for residential developments. The limits with BS 8233:2014 are similar to those in the WHO's 'Guidelines for Community Noise and Night Noise Guidelines for Europe' document.

Table 4 of BS 8233:2014 provides internal ambient noise level (IANL) limits for dwellings from "steady external noise sources". These are summarised in **Table 3.1** below.

Table 3.1 – BS 8233:2014 internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

Annex G.1 of BS 8233:2014 suggests that "if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB". Therefore, a noise limit directly outside of the nearest residential windows could be set based upon the values above plus 15 dB.

Therefore, to meet internal noise targets in nearby residential dwellings, noise from the proposed plant should not exceed 50 dB L_{Aeq} during the daytime and 45 dB L_{Aeq} during the night-time when measured/calculated directly outside of a residential bedroom or living room window.

3.4 World Health Organisation (WHO) Environmental Noise Guidelines

The WHO document *Guidelines for Community Noise 1999* has recently been superseded by the *Environmental Noise Guidelines for the European Region*. However, the updated guidance states that 'all WHO guidelines for community noise (CNG) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid'.

The document sets out guidance as to noise levels at which there will be an unacceptable impact on the local community. WHO guidelines state:

- To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.
- To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq} .

4.0 Survey/Monitoring

4.1 Methodology

PJA has attended the site to conduct noise monitoring between Thursday the 12th and Tuesday the 17th of May 2022.

Measurements were conducted at two main positions as identified in **Figure 2.1** (and in photographs in **Appendix C**), one at the boundary of the site in question, and the second outside of the south boundary of the nearest residents. The latter position was chosen as the residents' property could not be accessed to place a monitor directly outside of the house. As alluded to later in the report, the chosen position is a worst-case position and noise levels at the dwelling itself would be lower than those measured on the boundary.

The sound level meters were set to log noise levels over continuous 5-minute averaging periods, synchronised to one another so that the results between the two in each period could be compared directly.

The following noise indices were recorded (amongst others):

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period T. This parameter is typically considered as a good representation of the average ambient sound level;
- $L_{AFmax,T}$: The maximum A-weighted noise level during the measurement period T; and
- $L_{A90,T}$: The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level' and is therefore used in determining the 'representative background sound level' as defined by BS 4142:2014;

Appendix C contains further information on the methodology of the survey including photographs taken from site; the equipment used; and the weather conditions at the time of the survey.

4.2 Results

4.2.1 P1 – Site Boundary

Figure 4.1 overleaf presents the time history of noise levels measured at position P1, the monitoring position installed on the east site boundary. Table 4.1 provides a summary of the results across the daytime (07:00 – 19:00), evening (19:00 – 23:00) and night-time (23:00 – 07:00) periods.

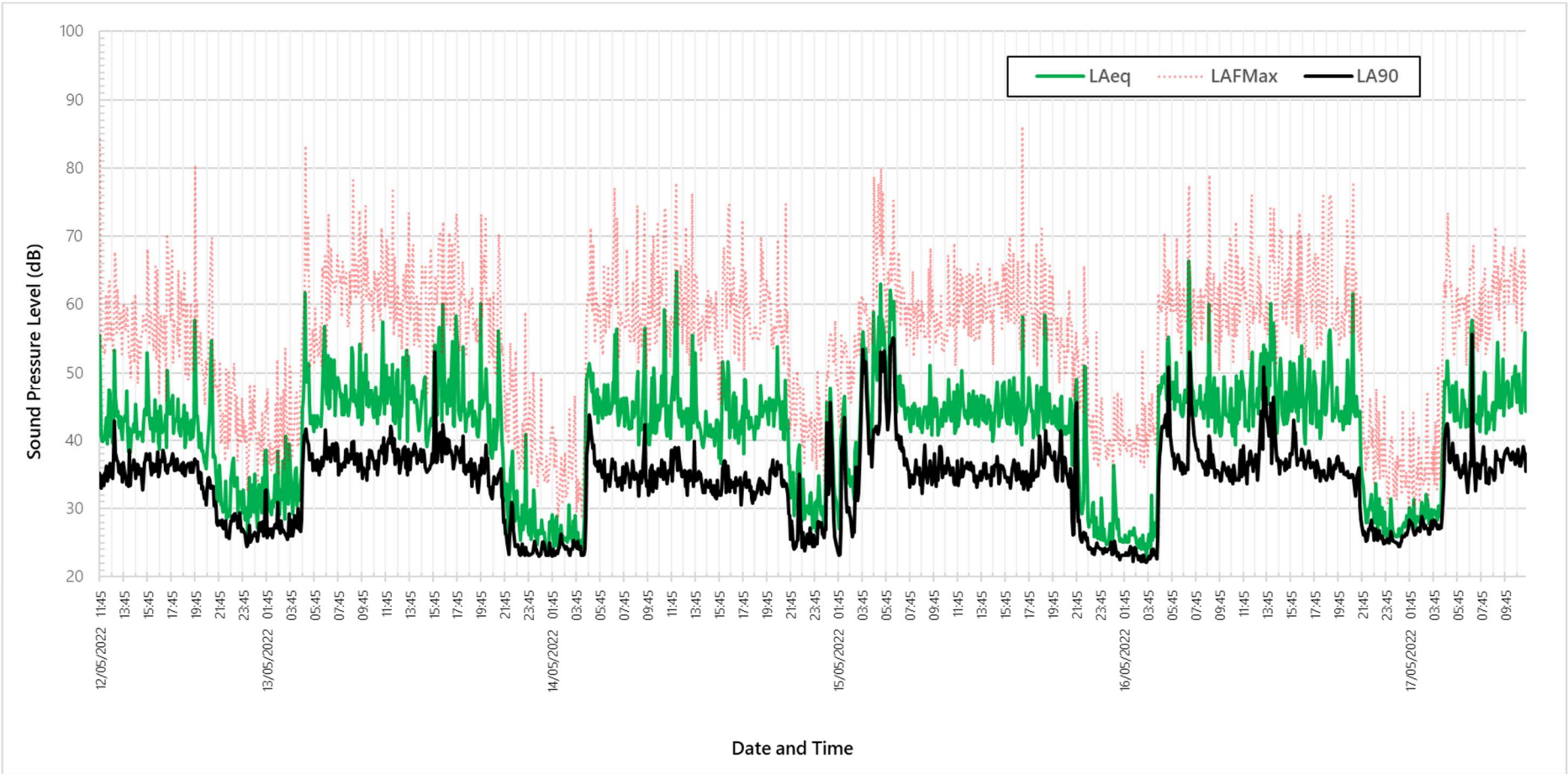
The surveyor noted that the noise emissions from the site arise from coaches maneuvering around the hardstanding and then idling briefly, and the vehicles being washed and vacuumed. A low powered jet washer is used but with significant noticeable compressor noise that would usually be expected.

Generally, the surveyor noted that the site is not particularly busy/noisy. The noise climate is more consistently dominated by road traffic along the B4255, birdsong, the rustling of vegetation, and less frequently the railway (infrequent but significant when a train passes by)). Both the graph and table of results do *not* suggest significant and clear periods of high noise levels that always occur during the unit's operating hours – there appears to be little correlation. The diurnal pattern of noise levels is regularly seen on sites that are mainly affected by road traffic noise.

Table 4.1 – Summary of measured noise levels – position P1 (site boundary)

Period	Parameter	Maximum	Minimum	Logarithmic Average	Mean Average	Modal Average	Median Average
Daytime (07:00 – 19:00)	L _{Aeq,5min} (dB)	66	37	49	45	43	45
	L _{AFMax,5min} (dB)	86	45	N/A	61	57	60
	L _{A10,5min} (dB)	72	40	N/A	48	48	47
	L _{A90,5min} (dB)	56	31	N/A	36	37	36
Evening (19:00 – 23:00)	L _{Aeq,5min} (dB)	62	26	46	40	44	42
	L _{AFMax,5min} (dB)	80	34	N/A	54	56	54
	L _{A10,5min} (dB)	68	28	N/A	43	46	44
	L _{A90,5min} (dB)	46	23	N/A	32	35	34
Night-time (23:00 – 07:00)	L _{Aeq,5min} (dB)	63	23	47	35	26	31
	L _{AFMax,5min} (dB)	83	29	N/A	47	40	44
	L _{A10,5min} (dB)	66	23	N/A	38	31	34
	L _{A90,5min} (dB)	55	22	N/A	30	24	27

Figure 4.1 – Graph of measured noise levels – position P1 (site boundary)



4.2.2 P2 – Receptor Boundary

Figure 4.2 overleaf presents the time history of noise levels measured at position P2, the monitoring position installed on the nearest residential properties boundary. **Table 4.2** provides a summary of the results across the daytime (07:00 – 19:00), evening (19:00 – 23:00) and night-time (23:00 – 07:00) periods.

Subjectively, the surveyor noted a similar noise climate to position P1, most consistently dominated by road traffic along the B4255, and less frequently the railway (infrequent but significant when a train passes by). Birdsong appeared to be a more significant noise source during the early hours of the morning judging by **Figure 4.2**.

The surveyor was able to faintly hear coaches maneuvering or idling on the hardstanding, albeit this did not seem to have a significant effect on ambient L_{Aeq} levels when observing the sound level meter between 'on' and 'off' periods of coach activity, suggesting that the noise contributions from the facility were below the baseline noise levels generated by the wider environment.

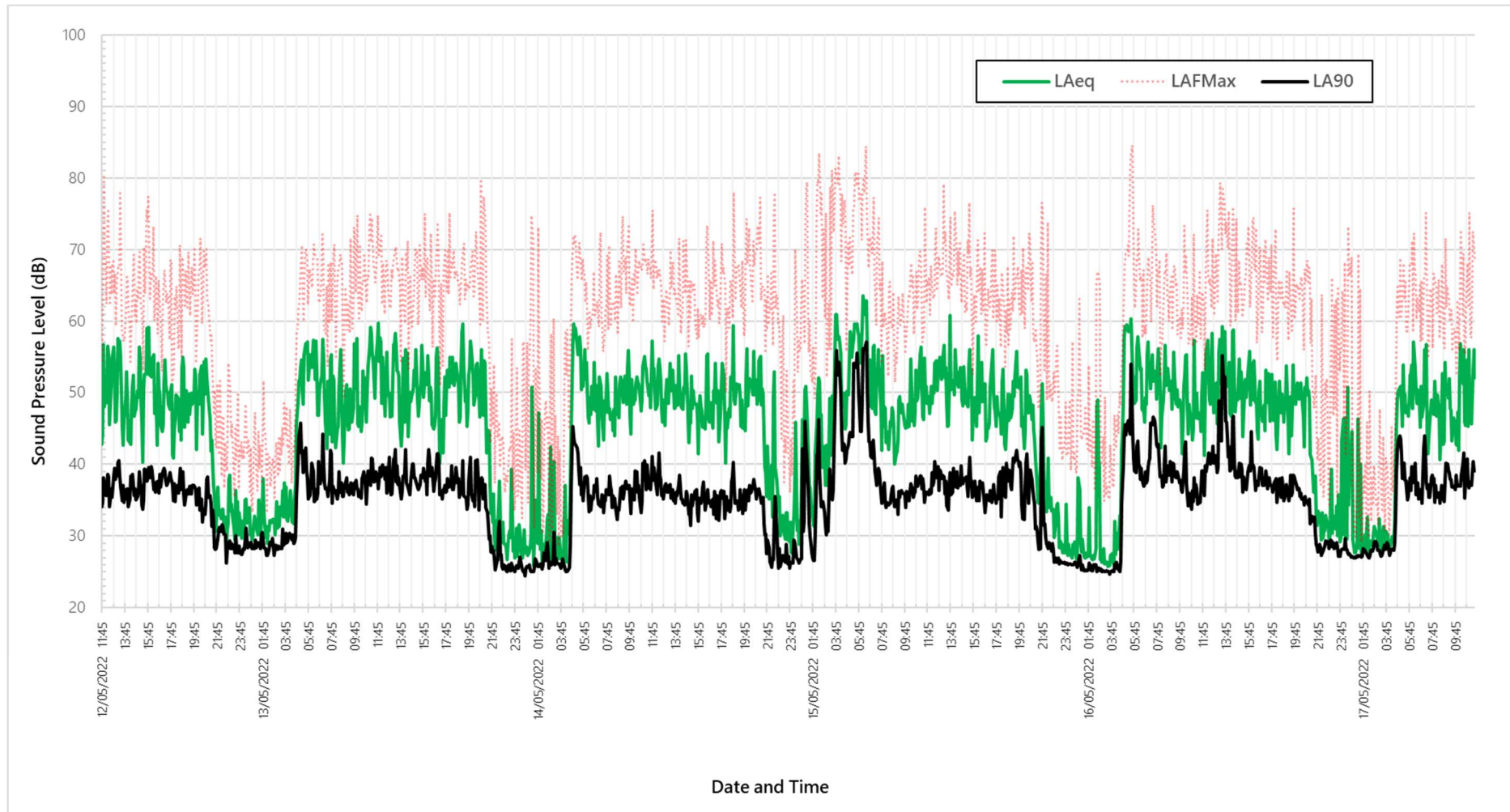
Jet washing and vacuuming were both occurring consistently during the two site visits but were both imperceptible to the surveyor at this position.

Objectively, the results in **Table 4.2** and **Figure 4.2** are very similar to those at position P1, and in fact, exhibit slightly higher noise levels that recorded on the site boundary, which as alluded to above, appears to be due to greater levels of birdsong given the positioning in a wooded area away from buildings.

Table 4.2 – Summary of measured noise levels – position P2 (receptor boundary)

Period	Parameter	Maximum	Minimum	Logarithmic Average	Mean Average	Modal Average	Median Average
Daytime (07:00 – 19:00)	$L_{Aeq,5min}$ (dB)	61	40	52	50	48	49
	$L_{AFMax,5min}$ (dB)	80	49	N/A	65	67	65
	$L_{A10,5min}$ (dB)	66	43	N/A	53	53	53
	$L_{A90,5min}$ (dB)	55	32	N/A	37	37	37
Evening (19:00 – 23:00)	$L_{Aeq,5min}$ (dB)	60	28	49	44	50	47
	$L_{AFMax,5min}$ (dB)	80	34	N/A	60	67	63
	$L_{A10,5min}$ (dB)	65	29	N/A	46	54	49
	$L_{A90,5min}$ (dB)	45	25	N/A	33	35	34
Night-time (23:00 – 07:00)	$L_{Aeq,5min}$ (dB)	64	26	50	39	30	33
	$L_{AFMax,5min}$ (dB)	85	29	N/A	53	44	52
	$L_{A10,5min}$ (dB)	66	26	N/A	40	31	35
	$L_{A90,5min}$ (dB)	57	24	N/A	32	26	29

Figure 4.2 – Graph of measured noise levels – position P2 (receptor boundary)



5.0 Analysis and Conclusions

Comparing the survey results from the two monitoring positions, the graphs in particular, it can be said that there is a clear shared pattern in noise levels over time ², suggesting that the two are affected by the same noise sources.

This correlation in PJA's opinion is because the ambient noise environment is most consistently/significantly influenced by environmental noise in the wider area, i.e., road traffic, birdsong/wildlife, vegetation rustling in the wind, and the railway.

Average ambient noise levels were slightly higher at position P2 (the receptors boundary). For example, average levels over the daytime, evening, and night-time periods at position P2 were 52 dB $L_{Aeq,12hr}$, 49 dB $L_{Aeq,4hr}$, and 50 dB $L_{Aeq,8hr}$ respectively. This is 3 dB higher in each period than those measured at position P1, of 49 dB $L_{Aeq,12hr}$, 46 dB $L_{Aeq,4hr}$, and 47 dB $L_{Aeq,8hr}$.

Figure D.2 in Appendix D shows an indicative 3D noise model ³ which isolates the B4255 as a noise source. Whilst the absolute values themselves are arbitrary numbers, the model shows an estimated 3 dB difference between the two monitoring positions, which correlates well with the analysis above. This validates the point that the monitoring positions, including the one right next to the facility, are mostly affected by ambient noise from the wider area, with lesser contributions from the facility.

These findings correlate well with the surveyor's subjective opinion whilst on site, that the noise emissions from the site were relatively low. The two graphs (Figure 4.1 and Figure 4.2) show very little correlation during daytime periods where 'noisier' activities at the facility.

For example, on both days that the surveyor was on-site, coaches manoeuvring and idling, and jet washing/vacuuming (all occurring on the hardstanding) were observed on a regular basis. There is no correlation in noise levels between the positions during these periods, and levels are in fact higher at the receptor's boundary than the site boundary, because of the influence of other ambient noise sources.

As a further demonstration, Figure D.3 in Appendix D presents a noise map of a 'worst-case' 1-hour daytime period. The modelling includes:

- A coach travelling along the line of travel shown on the site plan, at a speed of 5 km/h, with a sound power level of 94 dB L_{WA} . A total of 4 movements are modelled in the hour (i.e., 4 coaches arriving, or 2 coaches arriving and then leaving again).
- The coaches idling on the hardstanding briefly before/after being moved, for a total of 15-minutes in the hour, again with a sound power level of 94 dB L_{WA} .
- A jet washer being used for the whole-hour in a fixed position, with a sound power level of 80 dB L_{WA} .

2 - With the exception of higher noise levels from the late evening/early hours of the morning at the receptor position, which does not occur at the site boundary. The receptor position is thought to be more affected by birdsong/wildlife noise.

3 - The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package that implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996, as detailed in Appendix D.

The results of the noise mapping show a noise contribution of ≈ 30 dB $L_{Aeq,1hr}$ outside of the windows/in the external seating area of the nearest residents' property.

This value is 7 dB below the modal/mean/median $L_{A90,5min}$ value determined at position P2. TAN 11 and BS 4142 suggest that noise emissions below the background sound level provide an indication of the specific sound source having a low impact, depending on the context.

Contextually, a specific noise level of 30 dB $L_{Aeq,1hr}$ is a relatively low level.

The version of BS 4142 referenced by TAN 11 states that the assessment method is not suitable for when rating levels are below about 35 dB. Whilst this has been omitted from the current version of the standard, PJA believes that this is still somewhat valid.

Annex G.1 of BS 8233:2014 suggests that *"if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB"*. An external specific noise level of 30 dB would equate to an internal level of **15 dB** if assuming a 15 dB reduction.

An extensive research study published by DEFRA in 2006 (the *Noise from Pubs and Clubs Phase II Final Report*) indicated that the overwhelming majority of people could not perceive music noise levels within their dwelling of <20 dB L_{Aeq} . It is reasonable to believe that this also applies to industrial noise. Professional broadcasting/recording studios will usually have internal noise level designed to be below 20 dB L_{Aeq} to ensure that mechanical ventilation noise is inaudible on recordings. This demonstrates how low a level of 15 dB is.

Additionally, BS 8233:2014 suggests an internal daytime noise target inside living rooms and bedrooms of up to 35 dB $L_{Aeq,16hr}$, a target which is comfortably met. An external level of 30 dB is also well below the 50 dB level suggested by WHO guidelines in external amenity areas at which moderate annoyance would usually occur.

The history of the site is also important contextually, the facility has been operating with Gibbons Coaches as the tenant since 2012. PJA believe that if a significant noise impact were occurring, then it would very likely have been raised and dealt with in the first year or so of operating, not 10 years later. The applicant does not believe the use of the site has intensified significantly, if at all, over that period.

The approved planning application for the use of the building closer to position P2 as an MOT Centre is also relevant, given that no noise concerns were raised during the planning process. There also appear to have been other uses in the area that will have generated potentially higher noise emissions at the residents over the past years albeit have ceased now, such as the building closest to the residents (signs for a 'testing centre' are seen on the access road), and the colliery. The Climbing Centre also continues to operate and PJA understands from discussions with the applicant that noise concerns over this were dismissed in recent years.

Regarding the positioning of the monitor at the receptor's boundary rather than next to the dwelling house (which could not be accessed), the positioning would appear to be a worst-case one, given that:

- Baseline noise levels from the wider area would likely be higher next to the house, given the closer proximity to the road and railway. **Figure D.2** suggests that road traffic noise contributions are around 7 – 8 dB higher next to the house than the monitoring position at the bottom of the hill just outside the boundary of the property.
- The propagation of noise from the site to the dwelling appears to be at a lower level than the boundary monitoring position, given that the position is closer to the site, and that the topography provides some level of screening to the dwelling (only the roof of the dwelling can be seen from the bottom of the valley) – as evidenced in **Figure D.3**, which shows that estimated noise contributions are approximately 5 dB less outside the dwelling compared to the position P2.

Therefore, a lower site noise contribution, and a higher baseline noise level from other sources, would suggest that the perceptibility of noise from the site would be lower outside the dwelling than at the monitoring position. Given that there is little evidence to suggest a significant adverse impact at the monitoring position, this conclusion can also be drawn at the dwelling.

In short, the noise emissions from the site appear to be masked well, and whilst it cannot be said to be completely inaudible, the noise contributions are minimal and appear to be below the background noise level L_{A90} – the level which is usually deemed acceptable by planning authorities based upon the limits in the guidelines referenced in **Section 3.0** designed to limit impacts to a low level.

Therefore, in conclusion, PJA believes that noise should not pose a constraint to the planning application, and that the level of noise impact from the site appears to be relatively low.

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{A10,T}$	The A-weighted noise level that is exceeded for 10% of the measurement period T. This parameter is often considered as the 'average maximum level';
$L_{AFmax,T}$	The maximum A-weighted noise level during the measurement period T.

A.2 – Subjective Changes in Noise Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B - BS 4142:2014

BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* is intended to be used to assess the potential adverse impact of sound of an industrial and/or commercial nature, at nearby noise-sensitive receptor (NSR) locations within the context of the existing sound environment.

B.1 - Definitions

BS 4142:2014 provides the following definitions which are relevant at this pre-construction stage of assessment:

- **Background Sound Level, $L_{A90,T}$:** A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given interval, T , measured using time weighting F and quoted to the nearest whole number of decibels.
- **Rating Level, L_{Ar,T_r} :** Specific sound level plus any adjustment for the characteristic features of the sound.
- **Reference Time Interval, T_r :** Specified interval over which the specific sound level is determined. This is 60-minutes during the day (07:00 – 23:00) and 15-minutes at night (23:00 – 07:00).
- **Specific Sound Level, $L_s = L_{Aeq,T_r}$:** 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 .
- **Specific Sound Source:** Sound source being assessed.

The BS 4142:2014 definition of sound of an industrial and/or commercial nature includes *"sound from fixed installations which comprise mechanical and electrical plant and equipment"*. The scope of BS 4142:2014 is not intended for sound from the passage of vehicles on public roads; people; and 'other sources falling within the scopes of other standards or guidance'.

B.2 - Specific Sound Level

The specific sound level L_s is the 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 , of 60-minutes during the day (07:00 – 23:00) and 15-minutes at night (23:00 – 07:00).

B.3 - Rating Level

The rating level L_{Ar,T_r} is the specific sound level L_s plus any 'penalties' which account for the characteristic features of the sound.

BS 4142:2014 provides the following with respect to the application of penalties to account for *"the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention"*.

- **Tonality** – For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB

for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible;

- **Impulsivity** – A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible;
- **Intermittency** – 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; and
- **Other Sound Characteristics** – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

PJA consider the word 'perceptible' to be important, and variable depending on the context of a site. For example at a site with a relatively high background sound level of 50 dB(A), an 'impulsive' sound source with a specific sound level of 30 dB(A) at an NSR is unlikely to be perceptible and should probably not be penalised.

However, the same source at a site with a lower background level of 30 dB(A) would be perceptible, and therefore a penalty of 3 or 6 dB could be applied to the rating level, with possibly a 9 dB penalty being applied if the specific sound level were to rise from 30 to 40 dB(A). Therefore the context is important in applying rating level penalties.

B.4 - Background Sound Level

BS 4142:2014 states that *"in using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."*

BS 4142:2014 further states that *"a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either minimum or modal value"*. Hence BS 4142:2014 does not provide a 'black and white' method of obtaining the assessment level for background sound $L_{A90,T}$.

B.5 - Assessment of Adverse Impact

The assessment of adverse impact contained in BS 4142:2014 is undertaken by comparing the rating level $L_{A,r,T,r}$ to the measured representative background sound level $L_{A90,T}$ outside the sensitive receptor location.

The significance of the impact of an industrial or commercial sound source depends on both the margin by which the rating level $L_{A,r,T,r}$ exceeds the background sound level $L_{A90,T}$ and the context in which the sound occurs. It is therefore essential to place the sound in context. But in general, *"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."*

Appendix C – Noise Survey Details

C.1 – Survey Equipment

The monitoring equipment used for the baseline noise survey is detailed in the table below. The sound level meter was calibrated before and after the survey, with no significant drifts greater than 0.5 dB observed. The sound level meter has been calibrated to a traceable standard within the 24 months preceding the survey, and the calibrators have been calibrated to a traceable standard within the 12 months preceding the survey. The equipment complies with the standards of a BS EN 60942:2003 Class 1 device.

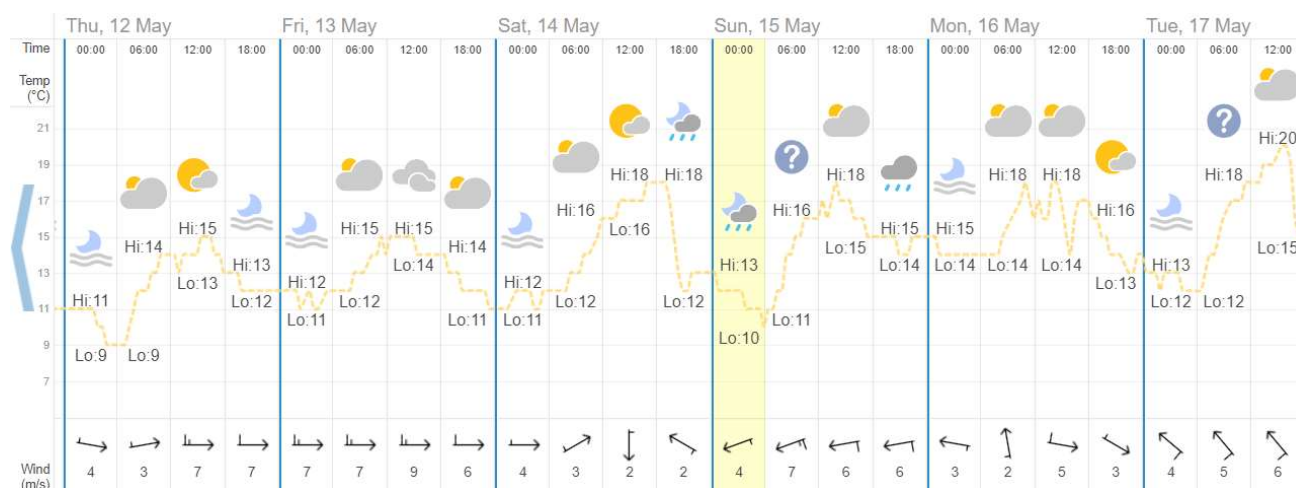
Table C.1 – Equipment used for the noise survey

Name	Serial Number	Last Calibrated	Calibration Due
SVAN 949 Class 1 Sound Level Meter	9719	Nov-21	Nov-23
SV22 Class 1 Microphone	4011862	Nov-21	Nov-23
SVAN 949 Class 1 Sound Level Meter	9720	Nov-21	Nov-23
SV22 Class 1 Microphone	4012386	Nov-21	Nov-23
Cirrus CRL511E Class 1 Acoustic Calibrator	035235	Nov-21	Nov-22

C.2 – Meteorological Conditions

During the survey, weather conditions were mostly dry and mild with wind speeds of around 2 - 7 ms⁻¹ (the microphone was fitted with a weather protection kit/windshield nonetheless). These weather conditions are suitable for the measurement of environmental noise in accordance with BS 7445 'Description and Measurement of Environmental Noise'. The weather data below has been sourced from <https://www.timeanddate.com/weather/@8199609/historic?month=5&year=2022>.

Figure C.1 – Meteorological conditions during the survey



C.3 – Photographs

Figure C.2 – Photographs of position P1 (noise monitor placed at the site)



Figure C.3 – Photographs of position P2 (noise monitor placed at the receptors boundary)



Figure C.4 – Photographs inside the site



Appendix D – Operational Noise Calculations

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package that implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996.

All of the objects within the model (buildings, roads, barriers, foliage, etc) have been imported from OpenStreetMap or drawn in manually where the OSM did not contain sufficient data. The heights of the buildings and roads have been based upon Google Earth Pro, using the 3D view to be able to measure the elevation heights at the tops of objects, and then inserting this manually into the model. Lastly, the scaled site plan, floor plan, and elevation for the proposed development have been accounted for in the model.

The noise model has assumed:

- a ground absorption factor of 1 in grassland/wooded areas, and 0 in tarmacked areas (including the site and the resident property);
- a maximum reflection factor of two where buildings and barriers are assumed to have a 'smooth' reflective façade, as a worst-case;
- receptor heights on the façade representing the noise level on the worst affected floor level;
- the noise contour map plotted at a height of 1.8m (ground floor window height) – as are receptors away from the buildings;
- atmospheric sound absorption based upon a temperature of 10°C and a humidity level of 70%, as per Table 2 of ISO 9613-2:1996.

The images on the following pages contain screenshots from the mapping.

Figure D.1 – 3D views of the noise model

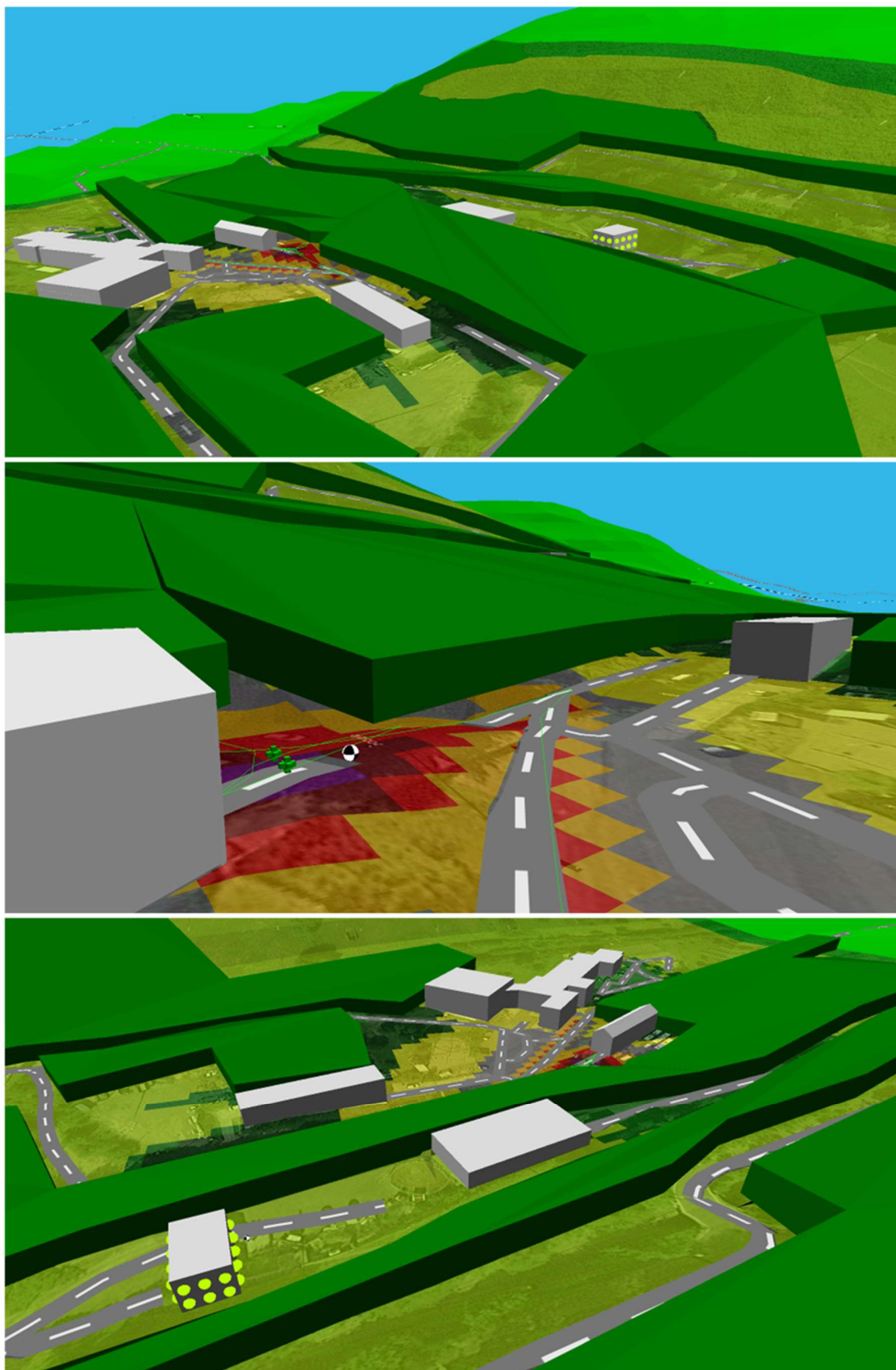


Figure D.2 – Estimated road traffic noise (dB L_{Aeq})

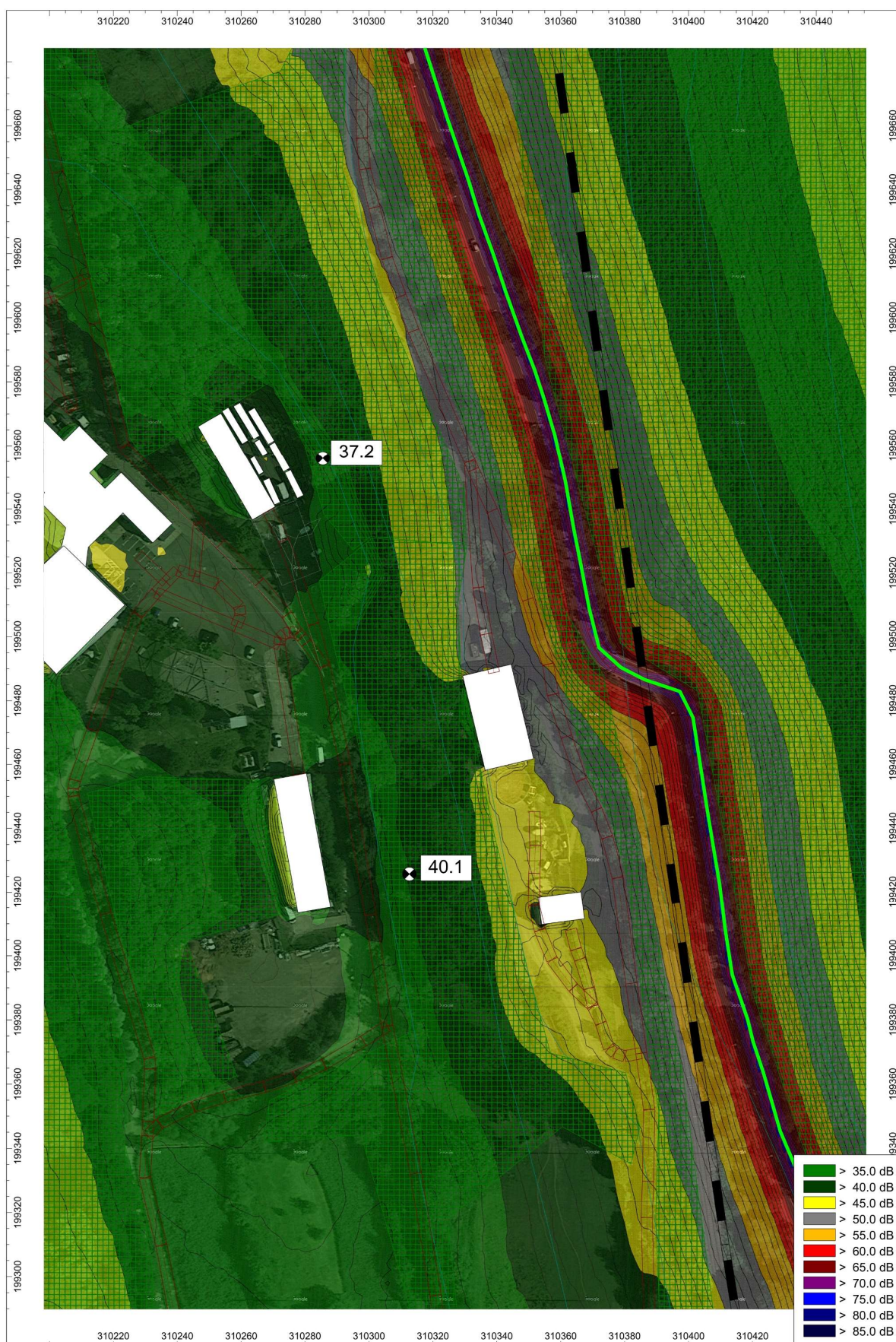


Figure D.3 – Estimated noise contributions from a worst-case daytime 1-hour period (dB $L_{Aeq,1hr}$)





ParkerJones Acoustics Limited

Bristol

11 Bankside Road
Brislington
Bristol
BS4 4LB

London

29 Lincoln's Inn Fields
Holborn
London
WC2A 3EE

Glasgow

126 West Regent Street
Glasgow
G2 2RQ

+44 (0)800 830 3338

+44 (0)117 914 6558

info@parkerjonesacoustics.com

www.parkerjonesacoustics.com

Registered in England and Wales

Company No. 12235614