PROFESSIONAL CONSULT

FUTURE ENVIRONMENTS

Noise Impact Assessment

Proposed Car Showroom & Workshop – Pontefract Road, Barnsley

Client: **Cars2 Limited**

Reference: **20.123.1.R2**

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EXECUTIVE SUMMARY

This Assessment has been undertaken to identify the key sources of noise associated with the proposed showroom and workshop which may adversely impact upon the adjacent residential amenity. Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework and its associated National Planning Policy Guidance in addition to appropriate British Standards and guidance documents relevant to the assessment of noise impacts.

The assessment has shown that the rated level of noise, falls below the typical background sound level during the proposed operating times, as such, no noise mitigation measures are required.

The predicted noise level from proposed operations within the body shop are considered to be sufficiently low enough to compliance with 'No Observed Effect Level' as detailed in the PPG and as such noise should not be deemed to be a determining factor in the granting of planning permission for this Site.

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1 INTRODUCTION

1.1.1 Professional Consult Limited was instructed by Cars2 Limited, to prepare a Noise Impact Assessment ('the Assessment') for a proposed car showroom with associated vehicle workshop ('the Development') on a parcel of land located at Pontefract Road in Barnsley S71 1HF to be referred to hereafter as 'the Site'.

1.1.2 The Development will have the following operating times:

- Car showroom: Monday - Friday 9am to 7pm, Saturday 9am to 6pm and Sundays 10.30 to 5pm; and
- Workshop: Monday - Friday 8am to 5pm and Saturday mornings 8am to 12 noon.

1.1.3 The Site is located within a mixed residential and commercial area with the closest residential dwellings lying to the east of the Site off Elm Row. To the north of the Site lies the A628 Pontefract Road with commercial uses beyond and to the west and south of the Site lies further commercial uses.

1.1.4 The existing sound climate at the closest residential dwellings to the Site is comprised of road traffic on Pontefract Road situated to the north and commercial sound from the Recycling Plant to the south

1.1.5 This Assessment has been undertaken to identify the key sources of noise associated with the proposed showroom and workshop which may adversely impact upon the adjacent residential amenity. Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework and its associated National Planning Policy Guidance in addition to appropriate British Standards and guidance documents relevant to the assessment of noise impacts.

1.1.6 All acronyms used within this report are defined in the Glossary presented in Appendix 2.

1.2 Limitations

1.2.1 The limitations of this report are presented in Appendix 1.

1.3 Confidentiality

1.3.1 Professional Consult has prepared this report solely for the use of the Client. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Professional Consult; a charge may be levied against such approval.

2 POLICY & GUIDANCE

2.1 National Planning Policy Framework & National Planning Practice Guidance

2.1.1 The Government updated the National Planning Policy Framework (NPPF) on 19th February 2019 and its associated National Planning Practice Guidance (NPPG) on 22nd July 2019. Together, the NPPF and NPPG set out what the Government expects of local authorities. The overall aim is to ensure the planning system allows land to be used for new homes and jobs, while protecting valuable natural and historic environments.

2.1.2 The NPPG adds further context to the NPPF and it is intended that the two documents should be read together.

2.1.3 Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

2.1.4 Local planning authorities' plan-making and decision making should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.1.5 In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

2.1.6 The Observed Effect Levels are as follows:

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

2.1.7 Table 1 summarises the noise exposure hierarchy, based on the likely average response.

Table 1. Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable 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			
Noticeable 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			
Noticeable 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 Effect	Avoid
Noticeable 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

2.1.8 The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.

2.1.9 These factors include:

- The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day - this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content of the noise and the general character of the noise. The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.

2.1.10 More specific factors to consider when relevant:

- where applicable, the cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration;
- Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on

windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations; and

- If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.2 BS4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

2.2.1 This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and,
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

2.2.2 The procedure detailed in the standard compares the measured or predicted noise level 'the specific noise level' from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is 'typical.'

2.2.3 The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00 - 23:00): 1 hour; and
- Night-time (23:00 - 07:00): 15 minutes.

2.2.4 There are a number of 'penalties' which can be attributed to the specific sound level, either subjectively or objectively, depending upon the 'acoustic features' of the sound level under investigation as follows. These penalties vary in their weighting depending upon the severity of the acoustic feature, as follows (with regards to the subject method):

<u>Tonality</u>

- +2dB: where the tonality is just perceptible;
- +4dB: where the tonality is clearly perceptible; and
- +6dB: where the tonality is highly perceptible.

<u>Impulsivity</u>

- +3dB: where the impulsivity is just perceptible;
- +6dB: where the impulsivity is clearly perceptible; and
- +9dB: where the impulsivity is highly perceptible.

Intermittency

- +3dB: where the intermittency is readily distinctive against the acoustic environment.

2.2.5 Where the assessment is carried out using the objective method, the tonality penalty is either 0dB or 6dB and the impulsivity penalty can range from 0dB up to 9dB in increments of 1dB, depending on the level of impulsivity identified.

2.2.6 In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though is readily distinctive against the acoustic environment.

2.2.7 BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

2.2.8 Assessment of the rating level relative to the background noise level can yield the following commentary:

- Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of 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; and
- 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. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

2.2.9 Whilst the amended 2019 Standard does make various references to it not being intended to assess noise impacts at indoor locations, section 1.1 does state 'The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident'. Example 6 in the Standard states 'In addition to the rating/background sound level comparison shown in Table A.6, the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows. Other guidance, such as BS 8233, might also be applicable in this instance'.

2.2.10 With the above in mind, and for a clear need to ensure that any potential commercial or industrial noise impacts at the building façade do not give rise to internal noise level which causes sleep disturbance in bedrooms, this Assessment will ensure that the predicted rating level (specific sound level including any character corrections) does not exceed 30dB in bedrooms.

2.3 Local Authority Guidance and Criteria – Barnsley Metropolitan Borough Council's Environmental Health Department

2.3.1 Consultation was provided to Barnsley Metropolitan Borough Council:

> *'We have been appointed to complete a Noise Impact Assessment for a proposed car showroom and workshop to be located off Pontefract Road, Barnsley S71, 1HF. The Site bound by Pontefract Road to the north, SOS Aerials & Television to the west a glass recycling plant to the south and residential dwellings to the east off Elm Row.*

In order to complete the Assessment, a background sound survey will be undertaken which measures the background sound climate in a location considered to be representative of the closest residential dwellings to the Site which have been identified as the residences located at Elm Row.

A Noise Impact Assessment will be completed for the proposed workshop and showroom which assesses noise levels associated with proposed mechanical and electrical plant upon the closest residential dwellings to the Site and this will be completed in line with the guidance provided in BS4142:2014+A1:2019.

If you have any comments or any specific criteria that you need the Noise Impact Assessment to adhere to, then please advise.'

3 NOISE SURVEYS

3.1 Background Sound Survey

3.1.1 Professional Consult has completed a background sound survey as follows:

- Noise Measurement Position 1: Located on the eastern Site boundary with the residential dwellings between 11am on Friday 16th October 2020 and 11am on Monday 19th October 2020. Noise measurements were taken in free-field conditions and noise levels at the microphone comprised of road traffic on Pontefract Road and commercial sound from the recycling plant located to the south of the Site.

3.1.2 Table 2 presents the measured background sound levels.

Table 2. Measured Background Sound Levels

Period	Measured Background Sound Level, $L_{A90,t}$ (dB)	
	Range	Typical (Mode Average)
Mon – Fri: 09:00 – 19:00 (Car Showroom)	44.3 – 52.7	49
Saturday: 09:00 – 18:00 (Car Showroom)	45.5 – 54.1	50
Sunday: 10:30 – 17:00 (Car Showroom)	41.1 – 45.9	43
Mon – Fri: 08:00 – 17:00 (Workshop)	47.6 – 52.7	49
Saturday: 08:00 – 12:00 (Workshop)	49.3 – 57.2	52

3.2 Source Noise Survey

3.2.1 Professional Consult has completed noise measurements within an existing similar car workshop owned by Cars2 Limited, as follows:

- Noise Measurement Position 2: Located within an existing workshop located at the Hyundai dealership off Pontefract Road, approximately 1km to the west of the Site between 11:00 on Monday 19th October 2020 – 11:00 on Wednesday 21st October 2020. Noise measurements were completed internally in reverberant conditions and noise sources comprised of vehicle engine noise, noise from electrical tools used for vehicle maintenance and a radio.

3.2.2 Table 3 details the measured internal noise levels within the workshop.

Table 3. Measured Internal Noise Levels

Measured Internal Reverberant Sound Pressure Level, $L_{Aeq,30mins}$ (dB)
68.4 – 78.1

3.3 Noise Survey Equipment

3.3.1 The following equipment was used for the Noise Surveys.

Table 4. Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No	Serial No.	Calibration Due Date
1 & 2	Sound Level Meter	01dB Fusion	12038	26 March 2021
	Pre-amplifier	01dB PRE22	1805093	
	Microphone	GRAS 40CE	330801	
	Calibrator	01dB CAL-31	87280	02 July 2021

3.3.2 The sound level meter was field calibrated prior to and following the noise surveys and there was no drift beyond the allowable limit of 1dB.

3.3.3 During the noise surveys the weather conditions were conducive to the measurement of environmental noise, i.e. wind speeds of no more than 5m/s and dry conditions and Table 5 details the measured weather conditions.

Table 5. Range of Measured Wind Speeds

Period	Range of Measured Wind Speeds (m/s)	Rainfall Recorded?
Background Sound Survey	0 – 0	No rainfall recorded

4 NOISE IMPACT ASSESSMENT

4.1 Workshop Noise

4.1.1 In the first instance, it is necessary to calculate the sound power level of the proposed facades of the Workshop. In order to complete this, calculation of the individual direct and reverberant sound pressure levels on the inside of the inside of the workshop has been completed. In terms of sound transmission from inside to outside, it is necessary to consider the effect of each façade and roof of the plant room individually, with each becoming noise sources. Accordingly, the facades have been split into the following building components:

- East Façade;
- South Façade;
- West Façade; and
- Roof.

4.1.2 The highest measured internal sound of 78.1dB $L_{Aeq\ 30min}$ has been used in order to represent a worst-case scenario. The highest level of sound during this period was attributed to mechanical tools and hammering.

4.1.3 Calculation of the combined direct and reverberant sound pressure levels on the inside of the above building components by quantity correcting the measured machinery sound pressure levels and conversion to sound power levels.

4.1.4 Calculation of the sound pressure level immediately outside the building components by using the following equation:

- SPL outside = SPL inside - R - 6dB

Where: 'R' is the Sound Reduction Index for the building component

4.1.5 Calculation of the sound power level for each building component by using the following equation:

- L_w = SPL + 10 x log S

Where: 'S' is the surface area in square meters of the building component

4.1.6 The makeup of the existing workshop which is the same as that proposed on Site was inspected and the façades of the building comprise of brick-block up to a height of 3m with single sheet steel above with an approximate thickness of 1.5mm. It is understood that the sound reduction index of 1.2mm sheet galvanised steel has a sound reduction index of 29dB and so this sound reduction index has been used in the interests of informing a worst-case assessment, discounting the increased sound reduction index afforded by the brick-block component of the walls.

4.1.7 Table 6 calculates the sound power levels for the facades of the workshop building.

Table 6. Calculated Sound Power Level for Workshop

Façade	Calculated Sound Power Level $L_{,Wa}$
East	67.7
South	65.4
West	67.7
Roof	72.0

4.1.8 In order to calculate an accurate overall specific sound pressure level at the closest residential receptors, a noise model has been built using CadnaA and the following inputs have been included in the model:

- Proposed Scheme Layout;
- Site elevations have been taken as existing using 1m DTM Lidar height data;
- Vertical area sources have been used for the facades of the workshop and an areas source for the roof. The 3D noise model can be seen in Figure 1 of Appendix 5;
- A reflection order of 2 has been used in all calculations;
- Where nominal dwellings have been included in the grid noise maps, these have been included as 2-storey dwellings with a 7.5m ridge height; and,
- Noise levels generated using ISO 9613-1 and ISO 9613-2 "Acoustics - Attenuation of sound during propagation outdoors" as incorporated into CadnaA software.

4.1.9 Figure 1 in Appendix 4 details the grid noise map for the workshop. Analysis of the grid noise map indicates that the worst-case specific noise level at the receptor is 48.3dB.

4.1.10 The following has been considered in determining if any acoustic features exist in the predicted noise level at the closest residential receptor:

- Tonality - In determining if any tones exist in the measured noise levels, the methodology set out in BS4142:2014 has been followed using the objective method – either a 0dB penalty is allocated where no tones are present or 6dB penalty is allocated where tonality is present;
- Impulsivity – in determining if any impulsiveness is evident in the measured noise levels, the methodology set out in BS4142:2014 has been followed using the objective method which can result in a penalty from 0dB to 9dB being allocated depending upon the extent of impulsiveness;
- Intermittency – whether or not the measured operations turn on or off during the (1hr) assessment period;
- Other sound characteristics – where no penalties are allocated for the above features, but there will be an audible noise at the closest receptor.

4.1.11 Table 7 allocates the character corrections.

Table 7. Allocation of Character Corrections

Measured Noise Source	Tonality Correction (dB)	Impulsivity Correction (dB)	Intermittency Correction (dB)	Other Sound Characteristics Correction (dB)	Comments
All Noise Sources within Workshop	0	0	0	0	Given that operations take place internally, tonality, Impulsivity and intermittency are not likely to be perceptible as long as the shutter doors are closed.
Highest Correction for Assessment Period	**0**	**0**	**0**	**0**	
Overall Correction to be added to Specific Noise at Receptors	**0**				

4.1.12 Table 8 completes the BS4142 Assessment.

Table 8. BS4142 Assessment

Overall Calculated Specific Noise Level at Receptor (dB)	Total Overall Penalty (dB)	Calculated Rating Level (dB)	Background Sound Level $L_{A90,t}$ (dB)	Difference +/- (dB)
48.3	0	48.3	49	-0.7

4.1.13 Table 8 indicates that the rated level of noise falls below the typical background sound level and so there is no requirement to consider noise mitigation measures. The Assessment has assumed that doors will be kept closed and as a matter of best practice for noise management on Site.

4.2 Mechanical & Electrical Plant Noise Emission Limits

4.2.1 Table 9 sets noise emission limits for the closest residential dwellings for any proposed mechanical and electrical plant items which may be installed on the Show Room.

Table 9. Calculation of Mechanical & Electrical Plant Noise Emission Limits

Period	Typical Measured Noise Level (dB)	Maximum Rated Noise Level from Plant (Cumulative) (dB)
Daytime	43 $L_{Aeq,T}$	43 $L_{A,r}$

4.2.2 Table 9 indicates the maximum rated cumulative level of noise from all mechanical and electrical plant which should not be exceeded at the closest residential dwellings. It should be noted that the rated noise levels may contain acoustic character corrections for tonality, impulsivity and intermittence and so the specific level of noise may need to be lower than the stated noise levels.

5 CONCLUSION

5.1.1 Professional Consult Limited was instructed by Cars2 Limited, to prepare a Noise Impact Assessment for a proposed car showroom with associated vehicle workshop on a parcel of land located at Pontefract Road in Barnsley S71 1HF.

5.1.2 The Development will have the following operating times:

- Car showroom: Monday - Friday 9am to 7pm, Saturday 9am to 6pm and Sundays 10.30 to 5pm; and
- Workshop: Monday - Friday 8am to 5pm and Saturday mornings 8am to 12 noon.

5.1.3 The Site is located within a mixed residential and commercial area with the closest residential dwellings lying to the east of the Site off Elm Row. To the north of the Site lies the A628 Pontefract Road with commercial uses beyond and to the west and south of the Site lies further commercial uses.

5.1.4 The existing sound climate at the closest residential dwellings to the Site is comprised of road traffic sound from Pontefract Road and commercial sound from the Recycling Plant located to the south.

5.1.5 This assessment has been undertaken to identify the key noise sources associated with the proposal which may have the potential to impact upon the closest existing residential dwelling. Accordingly, this assessment has been completed with due regard to the National Planning Policy Framework (NPPF) and its associated National Planning Policy Guidance (NPPG) and BS4142:2014+A1:2019.

5.1.6 The assessment has used CadnaA noise modelling software to accurately model the predicted level of noise at the closest receptors to the Site. Furthermore, a number of worst-case assumptions have been allowed for in the assessment in order to ensure a robust assessment.

5.1.7 This assessment has shown that the rated level of noise, falls below the typical background sound level during the operating times.

5.1.8 The predicted noise level from proposed operations at the Site are considered to be sufficiently low enough to compliance with 'No Observed Effect Level' as detailed in the PPG and as such noise should not be deemed to be a determining factor in the granting of planning permission for this Site.

APPENDIX 1: LIMITATIONS

This report and its findings should be considered in relation to the terms of reference and objectives agreed between Professional Consult Limited and the Client.

The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

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APPENDIX 2: GLOSSARY OF ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 1: Typical Sound Pressure Levels

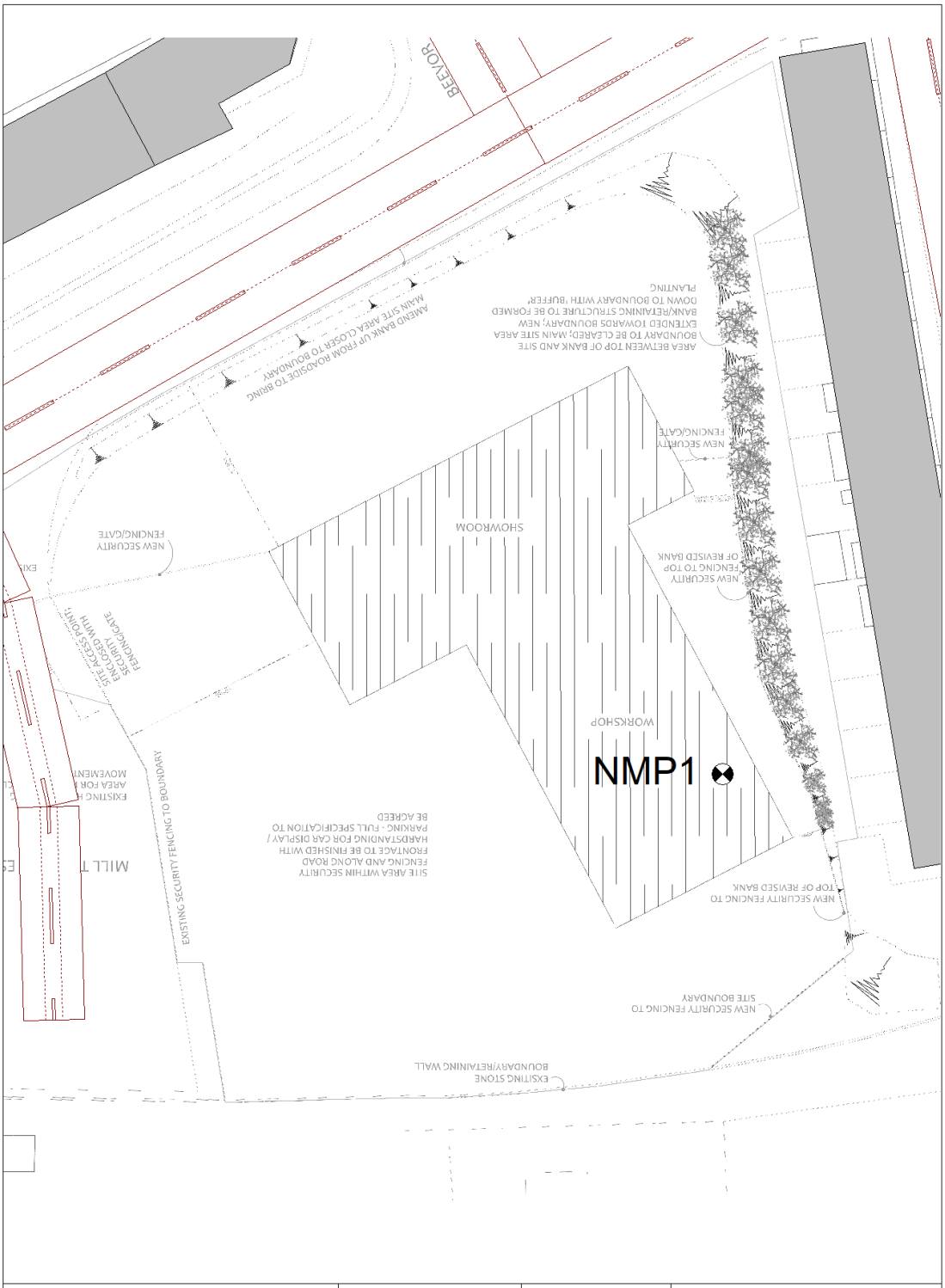
Sound Pressure Level (dB)	Location/Example
0	Threshold of hearing
20 - 30	Quiet bedroom at night
30 - 40	Living room during the day
40 - 50	Typical office
50 - 60	Inside a car
60 - 70	Typical high street
70 - 90	Inside factory
100 - 110	Burglar alarm at 1m away
110 - 130	Jet aircraft on take off
140	Threshold of pain

Table 2: Terminology

Descriptor	Explanation
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
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.
$L_{Aeq, T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	2A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.

APPENDIX 3: SITE LOCATION PLAN & NOISE MEASUREMENT POSITION

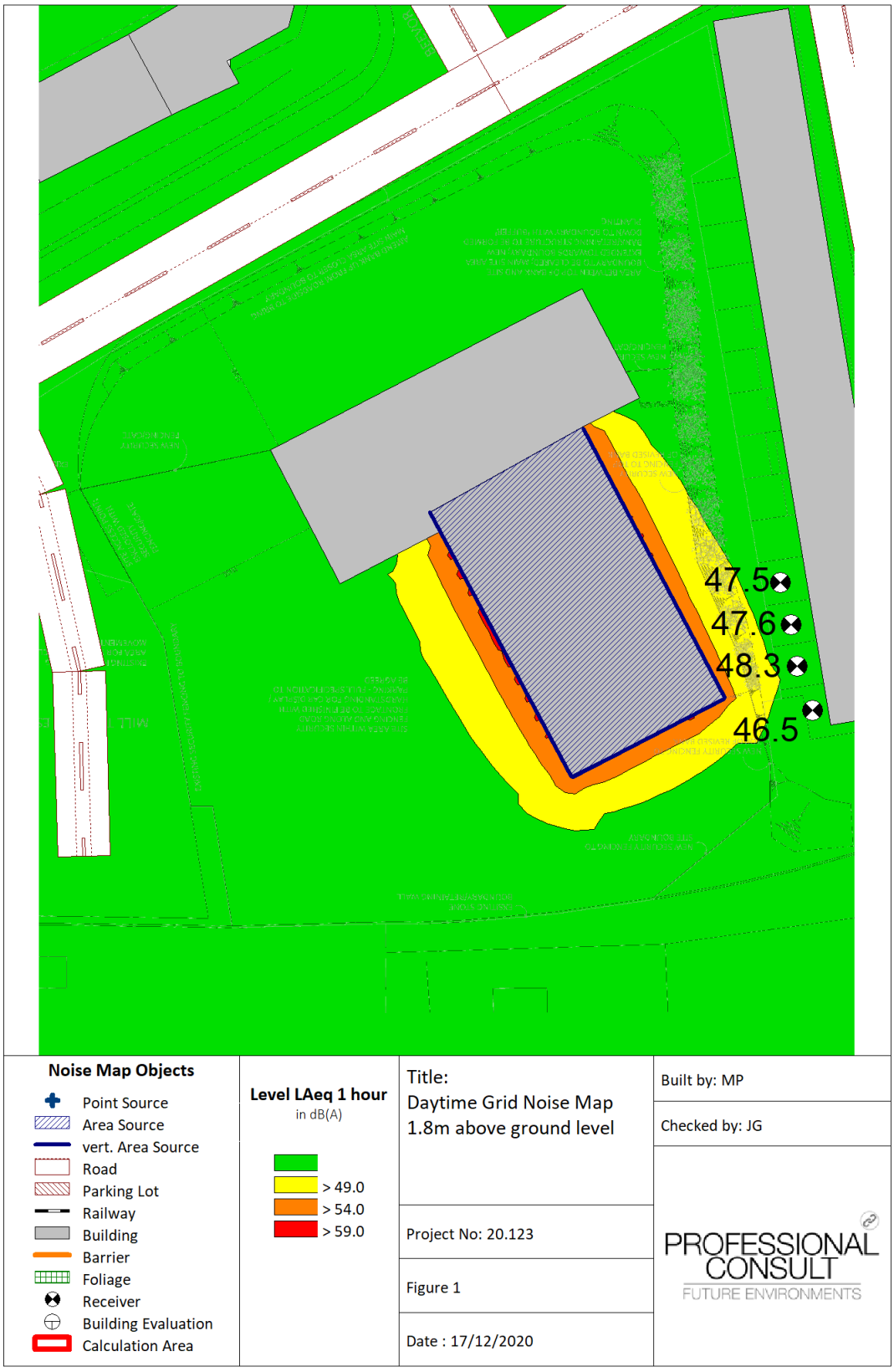
Figure 1 **Proposed Site Plan and Noise Measurement Position**



Title : Site Layout and Noise Measurement Location	Project No: 20.123	Built by: MP	PROFESSIONAL CONSULT FUTURE ENVIRONMENTS
	Figure 1		
	Date : 17/12/2020	Checked by: JG	

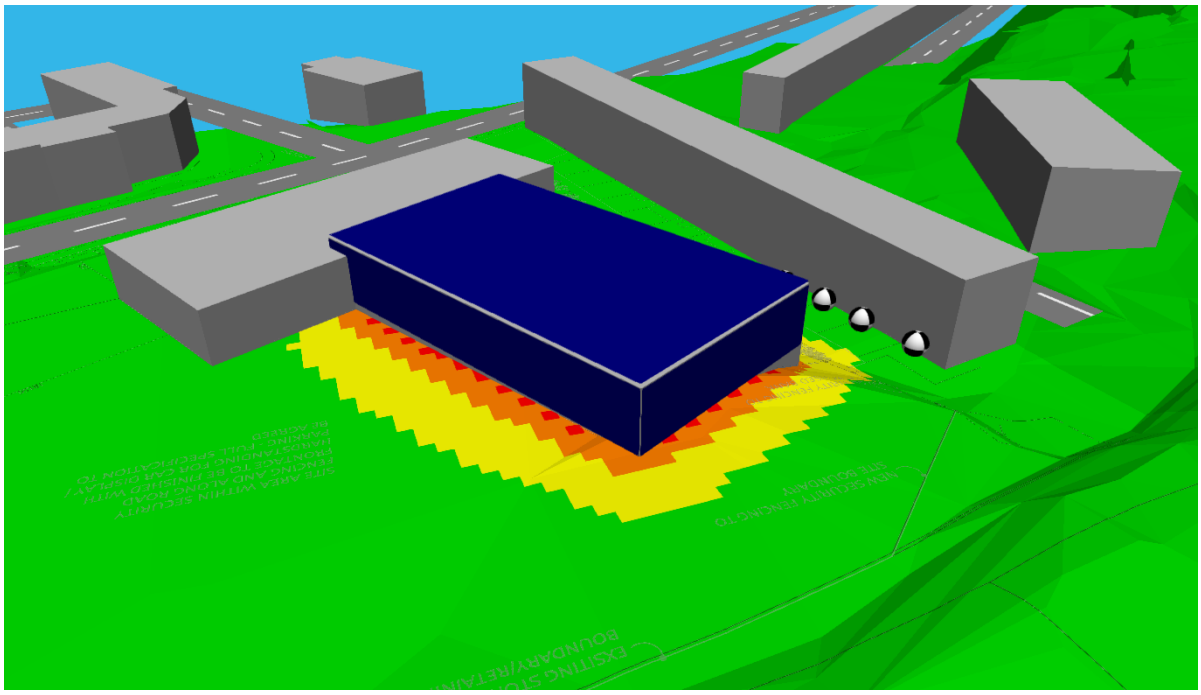
APPENDIX 4: DAYTIME GRID NOISE MAP

Figure 1 **Daytime Grid Noise Map**



APPENDIX 4: 3D VIEW

Figure 1	3D view



APPENDIX 5: MEASURED BACKGROUND SOUND LEVELS

Period start	Measured Sound Pressure Level, dB(A)	
	$L_{eq,30mins}$	$L_{90,30mins}$
16/10/2020 11:00	59	52.7
16/10/2020 12:00	55.2	48.9
16/10/2020 13:00	54.3	48.7
16/10/2020 14:00	54.1	47.6
16/10/2020 15:00	54.2	48.7
16/10/2020 16:00	54.3	48.2
16/10/2020 17:00	52.7	47.2
16/10/2020 18:00	54	44.3
16/10/2020 19:00	51	41
16/10/2020 20:00	49	38.2
16/10/2020 21:00	49.6	37.8
16/10/2020 22:00	47.5	35.7
16/10/2020 23:00	45.8	34.6
17/10/2020 00:00	42.6	32.6
17/10/2020 01:00	42.4	30.8
17/10/2020 02:00	42.3	29.7
17/10/2020 03:00	39.7	29.4
17/10/2020 04:00	41.1	29.4
17/10/2020 05:00	45.6	33.6
17/10/2020 06:00	47.9	36
17/10/2020 07:00	53.2	40.9
17/10/2020 08:00	60.2	57.2
17/10/2020 09:00	59.8	54.1
17/10/2020 10:00	56.4	49.8
17/10/2020 11:00	54.7	49.3
17/10/2020 12:00	54.2	49.6
17/10/2020 13:00	54.6	48.6
17/10/2020 14:00	53.8	48.3
17/10/2020 15:00	53.6	46.7
17/10/2020 16:00	53.5	46.3
17/10/2020 17:00	51.8	45.5
17/10/2020 18:00	50.9	43.2
17/10/2020 19:00	49.3	38.5
17/10/2020 20:00	48.8	37.2
17/10/2020 21:00	48.6	40
17/10/2020 22:00	47.3	36.3
17/10/2020 23:00	44.5	34
18/10/2020 00:00	41.9	31.6
18/10/2020 01:00	40.1	29.9
18/10/2020 02:00	37.9	28.5
18/10/2020 03:00	36.1	27.8
18/10/2020 04:00	36.5	28
18/10/2020 05:00	43.5	30

18/10/2020 06:00	44.5	31.6
18/10/2020 07:00	49.2	36.5
18/10/2020 08:00	49.3	35.9
18/10/2020 09:00	51.6	39.1
18/10/2020 10:00	54.2	43.1
18/10/2020 11:00	52.1	45.2
18/10/2020 12:00	54.3	45.9
18/10/2020 13:00	52.8	45.4
18/10/2020 14:00	52.9	43.7
18/10/2020 15:00	51.5	43
18/10/2020 16:00	50.6	41.1
18/10/2020 17:00	55.7	41.6
18/10/2020 18:00	55.4	39.9
18/10/2020 19:00	49.4	40.4
18/10/2020 20:00	49.8	39.5
18/10/2020 21:00	47.9	38.4
18/10/2020 22:00	46	36.9
18/10/2020 23:00	42.8	31
19/10/2020 00:00	40.2	26.4
19/10/2020 01:00	40.1	26.8
19/10/2020 02:00	38.7	26.7
19/10/2020 03:00	43.3	33.2
19/10/2020 04:00	49.5	45.1
19/10/2020 05:00	51	45.8
19/10/2020 06:00	52.5	47.3
19/10/2020 07:00	59.4	50.4
19/10/2020 08:00	59.5	52
19/10/2020 09:00	58.6	51.3
19/10/2020 10:00	59.3	51.4