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66 CHURCH ROAD, BRISTOL

Façade Assessment

David Cahill Design Consultants Ltd

THINKING **DIFFERENTLY**

66 CHURCH ROAD, BRISTOL

Façade Assessment

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CONTENTS

1.0 INTRODUCTION

The purpose of this document is to outline the standards and regulations applicable to the proposed 66 Church Road development and perform a façade assessment to ensure internal noise levels meet the required internal noise level criteria.

It provides details of the environmental noise survey undertaken and the resultant predicted noise levels, assessment levels and specifications to meet the criteria.

The following aspects of acoustics design are therefore addressed within this report.

1.1 Noise Ingress

Achieving appropriate indoor ambient noise levels within residential dwellings is an important consideration as noise can have a significant impact on the health and quality of life of individuals and communities where noise exposure can lead to a range of adverse effects including sleep disturbance, annoyance and health effects.

BS8233 is typically called upon during planning process, providing indoor ambient noise requirements within dwellings. However, this document does not provide a direct correlation between internal noise and ventilation rates. Within urban environments due to noise from transport infrastructure it is not possible to meet the requirements of BS8233 with windows open whilst complying with the overheating criteria within CIBSE TM59.

In light of this, in 2021 the government released Approved Document O – Overheating which provides increased internal noise limits within dwellings during overheating to those outlined within BS8233, with the aim being to promote natural ventilation, while maintaining suitable internal noise requirements.

This document therefore outlines the various internal noise requirements for the various ventilation rates which are discussed in the following section and provides façade specifications such to achieve these criteria.

2.0 PERFORMANCE DOCUMENTS

2.1 Performance Specification

The following documents have been considered in the assessment of environmental noise.

Assessment	Document	Summary
Planning Policy & Guidance	National Planning Policy Framework (NPPF) December 2024	This sets out the UK government's planning policies for England and how these are seen to be applied. See APPENDIX B -
	Noise Policy Statement for England (NPSE).	This aims to provide clarity on current policies and practices to enable noise management decisions to be made and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise. See APPENDIX B -
Indoor Ambient Noise	ProPG – Planning & Noise	Provides guidance on the management of noise within the planning process and introduces concept of Good Acoustics Design
	BS8233:2014	Provides Internal noise requirements for living rooms and bedrooms during the background ventilation condition
	WHO Guidelines for Community Noise	Provides maximum internal noise criteria to prevent sleep disturbance
	Approved Document O	Provides internal noise criteria during overheating during the night time
Amenity Noise	BS8233:2014	Provides guidance on noise levels within outdoor amenity spaces

Table 2.1: Performance Standards

2.2 Planning Policy

2.2.1 PropPG

ProPG Planning and Noise published in May 2017 by the Association of Noise Consultants (ANC) was produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. ProPG aims to encourage better acoustic design of new residential developments promoting good health and well-being through the effective management of noise. ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources.

The process described within ProPG outlines a risk-based 2-stage approach to assess the impact of noise, where an initial risk assessment of the site is undertaken, and where the site is subject to negligible risks of noise should not normally be prevented on noise grounds. Where higher levels of risk from noise are predicted a more detailed noise assessment which considers the following four key elements should be undertaken:

- Element 1 – demonstrating a "Good Acoustic Design Process";
- Element 2 – observing internal "Noise Level Guidelines";
- Element 3 – undertaking an "External Amenity Area Noise Assessment"; and
- Element 4 – consideration of "Other Relevant Issues".

2.4 Indoor Ambient Noise Criteria

2.4.1 Ventilation Modes

The table below provides a summary of different ventilation 'conditions or modes' for bedroom and living spaces which have been adopted for this scheme. Note that there is a difference in definition between 'Purge' and 'Overheating' ventilation scenarios.

Ventilation Condition	Description
Whole Dwelling / Background	Continuous low level flow rates to provide fresh air and remove smells.
Overheating	Potentially long periods of increased ventilation during the summer to maintain occupant thermal comfort. The nighttime acoustic design criteria for external noise ingress for bedrooms can be relaxed if naturally ventilated.
Purge	Short periods of high flow rate ventilation to remove smoke or smells (e.g. from cooking or decorating). The acoustic impact of purge ventilation does not need to be considered as it will only occur over a short period of time.

Table 2.2: Ventilation Types

2.4.2 ProPG

With regards to internal 'Noise Level Guidelines' ProPG comments that suitable guidance on internal noise levels can be found in "BS8233:2014: Guidance on sound insulation and noise reduction for buildings". Table 4 in Section 7.7.2 of the standard suggests indoor ambient noise levels for dwellings (when unoccupied) and states that "in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values".

ProPG also advises that '*where a scheme is reliant on open windows to mitigate overheating, it is also necessary to consider the potential noise impact during the overheating condition. In this case a more detailed assessment of the potential impact on occupants should be provided in the ADS'.*

2.4.3 BS8233

BS8233:2014 - Guidance on sound insulation and noise reduction for buildings provides guidance on internal noise levels within dwellings which is typically called upon in planning. BS8233 states that to achieve "ideal" sleeping and living conditions, the following targets should be met.

These limits are the sum of mechanical services and noise breaking in through the façade. Additional guidance is provided within BS 8233:2014 which states that internal noise levels which are 5dB greater than these "ideal" limits, will still result in "reasonable" internal conditions.

Activity	Location	Day (07:00-23:00)	Night (23:00-07:00)
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

Table 2.3: BS 8233 Internal Noise Limits

Note 5 within BS8233 advises that 'If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.' It is therefore considered that these internal noise targets are to be achieved with windows closed and a means of background ventilation enabled, typically through trickle ventilators or whole house ventilation systems.

BS 8233:2014 provides no definitive methodology for assessment of L_{Amax} levels. The WHO Community Noise Guidelines 1998 states that in order to avoid sleep disturbance within bedrooms during the night, the internal sound pressure level should not exceed 45 dB $L_{Amax.}$ It is widely accepted that noise events should not exceed 45 dB L_{Amax} more than 10-15 times during the night-time period (23:00 – 07:00).

2.4.4 Approved Document O

Approved Document O was released on December 15th 2021, and outlines a set of performance criteria for mitigating overheating in residential accommodation. In addition to overheating criteria, the document also outlines a requirement for internal noise levels, if noise has been considered by the local planning authority.

Guidance is provided to minimise the risk of occupants closing windows (and thus overheating) by ensuring that noise levels are below a certain threshold during night-time periods. Approved Document O therefore addresses internal noise levels within bedrooms at night time only. These internal noise criteria, based upon a natural ventilation scheme are outlined in the Table 2.4 below.

Note: If the overheating ventilation scheme is to be via mechanical cooling, the internal noise criteria within BS8233:2014 is the default design criteria.

Location	Time	Maximum Internal Noise Level
Bedroom	23:00 – 07:00	40 dB $L_{Aeq,\ 8\ Hour}$ 55 dB L_{AfMax} *
* Not to be exceeded more than 10 times a night		

Table 2.4: Approved Document O acoustic criteria

2.5 External Noise – Amenity

2.5.1 ProPG

Element 3 as listed within section 2.2.1 relates to the assessment of external amenity space where; the ProPG external amenity area noise assessment reflects and extends the advice contained in BS8233:2014 and the current Government guidance in PPG Noise, where full details of the external amenity area noise assessment should be included in an Acoustic Design Statement (ADS).

2.5.2 BS8233

BS8233 states, for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, the specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB LAeq,T or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.

2.6 Design Criteria

This section provides a summary of the acoustic performance criteria which have been adopted for the 66 Church Road.

2.6.1 Proposed Ventilation Strategy

MACH is not aware of the proposed ventilation strategy at the time of writing this report.

2.6.2 Summary of Indoor Ambient Noise Level Requirements

The table below provides a summary of the indoor ambient noise level requirements for residential dwellings. The table includes criteria for the various ventilation mode types of spaces. Please also note that there is a difference in definition between 'Purge' and 'Overheating' ventilation scenarios as described in Table 2.2.

Ventilation Condition	Day Time Criteria	Nighttime Criteria
Whole Dwelling / Background	Living Rooms – 35dB $L_{Aeq,16hr}$ Bedrooms – 35dB $L_{Aeq,16hr}$	Bedrooms – 30dB $L_{Aeq,8hr}$ Bedrooms – 45dB L_{Afmax}
Overheating	None	Bedrooms – 40dB $L_{Aeq,8hr}$ Bedrooms – 55dB L_{Afmax}*
Purge	None	None
* Not to be exceeded more than 10 times a night		

Table 2.5: Summary of indoor ambient noise criteria

2.6.3 Summary of Amenity Noise Level Criteria

As discussed within Section 2.5, external noise limits may not be achievable in all circumstances where development might be desirable. However, where feasible good acoustic design principles will be adopted in order to achieve lowest practicable levels and ideally provide outdoor amenity which is ≤55dB $L_{Aeq,16hr}$.

3.0 NOISE CLIMATE

To establish the existing environmental noise levels on-site, an attended noise survey was conducted between 05:10 and 10:10 on 01/06/2021. For more information on the methodology of this survey, site information and survey data, see APPENDIX A - Environmental Noise Survey

3.1 Site Description

The site is located at 66 Church Road and is situated in the urban area of Redfield, Bristol. Church Road is the main road and a major route into central Bristol. There are residential properties surrounding the site, as well as shops to the east and a car dealership to the west along Church Road. There is an industrial unit to the south-west of the site along Dove Lane.

3.2 Site Map

The site in relation to its surroundings and nearest noise sensitive receivers is presented in Figure 3.1.

Figure 3.1 - Proposed Development (Red) and Nearest Noise Sensitive Receivers (Blue)

3.3 Summary of Noise Survey Results

The tables below present the noise parameters recorded at the fixed microphone position for the ambient (L_{Aeq}) and maximum (L_{Amax}) noise levels. The L_{Aeq} figures presented are the average noise levels during the stated times across the days of the survey, excluding non-representative noise. The L_{Amax} figures presented are the 10th highest measured between 23:00-07:00.

Date	Location	Period, T	Start	End	Typical $L_{Aeq,T}$ (dB)	10th Highest L_{Amax} (dB)
01/06/2021	Fixed Position 1	Daytime (16hour)	07:00	10:00	72	-
		Night Time (8hour)	05:00	07:00	67	81

Table 3.1 Summary of $L_{Aeq,T}$ and L_{Amax}

4.0 NOISE MODEL

To accurately predict noise levels at each façade, a 3D noise model of the site has been created using CadnaA which is an industry standard noise propagation software. The software calculates how sound travels over distance. The models take into account reflections off hard surfaces, ground absorption, geometrical spreading. The calculations are performed in accordance with ISO 9613: Attenuation of sound during propagation outdoors.

4.1 Model Assumptions

The following assumptions have been made in the model, based on observation of the site and proposed development has identified the following features. These features will be included within the calculation model including any other additional parameters stated.

- Ground absorption has been set to acoustically hard
- Noise contour height is 4m above ground, which is considered representative of the NSR
- Topography of the site is assumed to be flat
- Order of reflections has been set to 3

4.2 Modelled Scenario

The figure below illustrates the noise map for the predicted façade levels during daytime and night-time period.

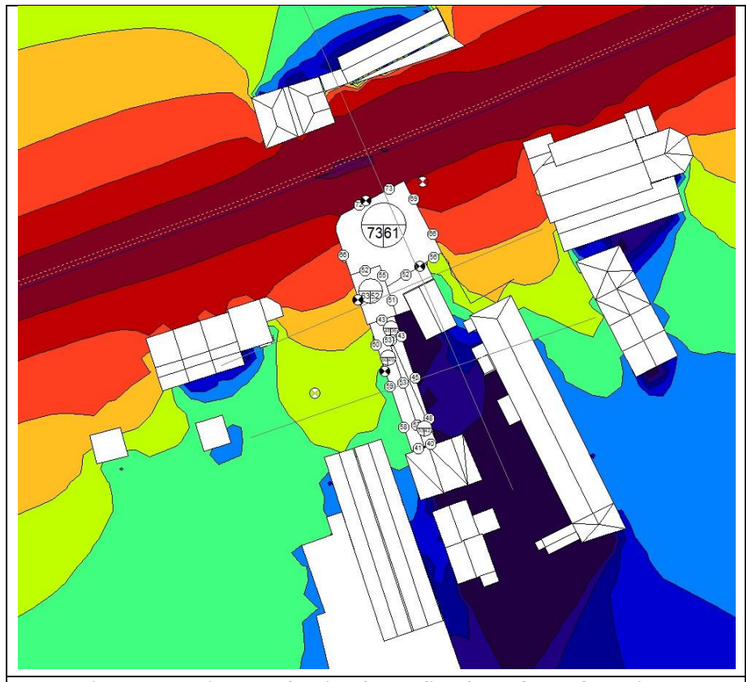

Figure 4.1 – Noise Map Showing the Predicted Façade Level. Daytime

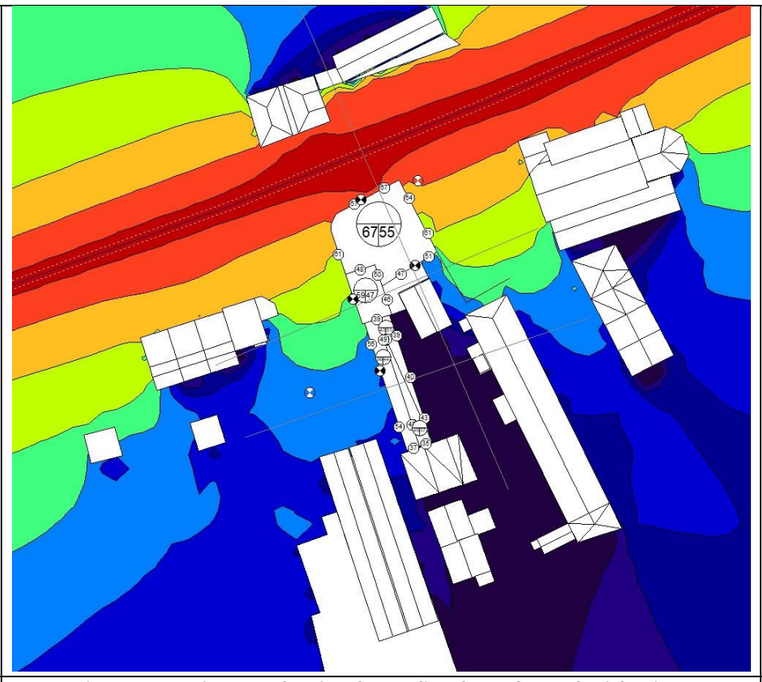

Figure 4.2 – Noise Map Showing the Predicted Façade Level. Night Time

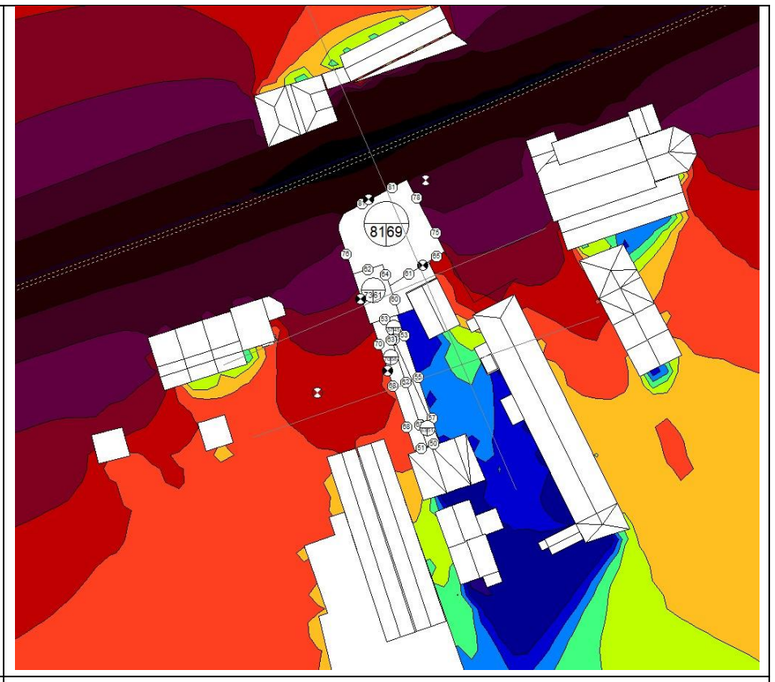

Figure 4.3 – Noise Map Showing the Predicted Façade Level. Night Time $L_{AF,max}$

5.0 FAÇADE ASSESSMENT

This section provides details of the various façade assessments for the ventilation conditions outlined within Table 2.2 previously.

5.1 Background Ventilation

This section provides details of the façade assessment during the background ventilation condition such to comply with the BS8233, internal noise criteria during background ventilation as defined within Approved Document F.

Background ventilation conditions are normally achieved through either trickle ventilators in the façade or provided by a whole house ventilation system, as long as one of these methods are employed, the noise level criteria set out within BS8233:2014 are to be achieve while windows are closed.

5.1.1 Dominant Noise Period During Background Ventilation

By comparing the predicted facade noise levels for each of the different acoustic criteria, $L_{Aeq,Daytime}$, $L_{Aeq,\ Nighttime}$, and $L_{Afmax,Nighttime}$, we have been able to determine which acoustic criteria will require the highest acoustic reduction across the façade. Therefore, the criteria which requires the greatest level of reduction, will be the most onerous criteria. Demonstrating the design meets the most onerous criteria will ensure that all other criteria are achieved. The most onerous criteria are identified below.

Time Period	Predicted Sound Pressure Level, dB(A)	Target	Outside to inside level difference
$L_{Aeq,16hr}$ (Day time)	73	35	38
$L_{Aeq,8hr}$ (Night time)	67	30	37
L_{Afmax} (Night time)	81	45	36

Table 5.1: Façade Noise Levels

Based on the above noise levels and the select design criteria outlined in Section 2.6.2, it is observed that a façade reduction of 38 dB is required for the most onerous scenario.

5.1.2 Façade Exposure Categories

Due to the varied predicted noise levels on different facades of the proposed development, noise exposure categories have been set to allow for different façade specifications, ensuring compliance with the background ventilation conditions, i.e. when windows are closed.

Based on the noise survey and 3D noise modelling, spectral data has been derived which has formed the basis for the break-in calculations. The noise levels used in the assessment are shown below.

Façade Exposure Category	Time Period	Sound Pressure Level, dB (Octave Band Centre Frequency, Hz)						
		125	250	500	1000	2000	4000	dB(A)
A	$L_{Aeq,\ 8\ HOUR}$	68	66	63	67	68	60	72
B	$L_{Aeq,\ 8\ HOUR}$	56	54	51	55	56	48	60
C	$L_{Aeq,\ 8\ HOUR}$	47	45	42	46	47	39	51

Table 5.2: Façade Noise Levels

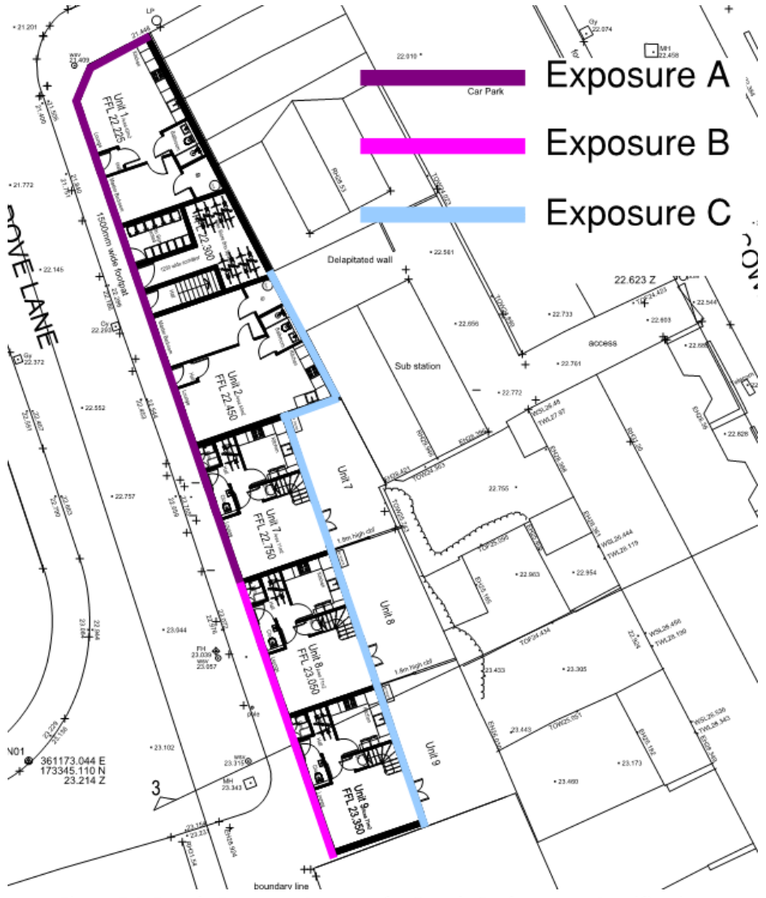

Figure 5.1: Façade Exposure Category for Façade Performance Specification

5.1.3 Façade Specification

The table below provides the minimum sound reduction indices to meet the BS8233 internal noise level requirements. Note that the values presented are representative of the entire window, including frames and other components. The acoustic performance of the selected systems should be verified via a laboratory test certificate. Additionally, the specified sound reduction indices must be achieved including any trickle vents element, if they are part of the proposed design for background ventilation conditions.

MACH has not provided specific build-ups for the façade or roof, such that there can be flexibility in the design of the new build aspects of the scheme.

Façade Exposure Category	Façade Element	Minimum Required Sound Reduction Indices						
		125	250	500	1000	2000	4000	Weighted – dB
A	Windows	27	31	44	45	48	57	**44 R_w**
	Solid Facade	43	47	55	55	55	55	**55 R_w**
	Trickle vents	43	40	44	50	55	65	**49 D_{new}**
B	Windows	24	20	25	34	37	37	**31 R_w**
	Solid Facade	43	47	55	55	55	55	**55 R_w**
	Trickle vents	37	35	30	33	38	49	**34 D_{new}**
C	Windows	24	25	30	33	29	34	**31 R_w**
	Solid Facade	43	47	55	55	55	55	**55 R_w**
	Trickle vents	31	36	31	38	28	28	**32 D_{new}**

Table 5.3: Minimum Façade Reduction Indices Required for Residential Façades

5.1.3.1 Background Ventilators

Ventilators used for background ventilation, such as trickle ventilators or whole house ventilation systems must achieve the acoustic performance specified as a combined performance per room. This is to mitigate against external noise transmitting through the trickle ventilator or through the ventilation system into a single room.

The number of openings or number of trickle vents must be accounted for. For example; if there are to be 2 No. Trickle/ vents to be used within a bedroom the above performance specification per unit would increase by 3dB.

To calculate this increase the following formula should be used;

Dne (per unit) = Dne (as specified above) + 10log10(N)

Where; N is the number of ventilators proposed per room, and Dne, the relevant spectral value.

If the above is unclear, MACH will be happy to explain how the performance specification changes dependant to the number of ventilators required per room for this project at request.

5.1.3.2 M&E Noise Contribution

To comply with the noise level criteria in BS 8233:2014, the M&E noise contribution must not exceed NR19 in habitable spaces.

5.1.3.3 Louvre noise break-in

If any louvres are proposed to be included in the façade design, they should meet the solid façade specifications to ensure they do not compromise the overall façade performance.

5.2 Part O - Overheating Ventilation

This section provides details of the façade assessment during the overheating ventilation condition Assessing this ventilation scenario is not typically required at planning. However, it is required such to comply with the internal noise criteria during overheating ventilation as stated within Approved Document O – Building Regulations.

It is important to note that this assessment addresses internal noise levels only within bedrooms during night-time, assuming the overheating ventilation strategy is based on a natural or hybrid ventilation scheme.

Note: If the overheating ventilation scheme is to be solely via a mechanical cooling with windows closed, the internal noise criteria within BS8233:2014 is the default design criteria. Please refer to the façade specification in the previous section.

5.2.1 Ventilation Strategies Acoustic Performance

The acoustic performance of open windows and other natural ventilation options can vary significantly, reasonable estimates of the acoustic performance of different mitigation strategies of the ventilation method are presented below.

Façade Exposure Category	Ventilation Strategy	Room	Outside to Inside Level Difference
1	Mechanical ventilation, windows closed	Bedroom	20+
2	Openable windows	Bedroom	13

Table 5.4: Ventilation Strategies Depending on Façade Attenuation Required

[1]Note: restricted or enhanced openable windows or vent opening, as a ventilation option would require further detailed design which looks holistically across the site, this would need to consider the building massing, type and direction of window opening direction or other attenuated type openings and information from a detailed dynamic thermal model will also be required to provide minimum open area requirements for the ventilation strategy.

5.2.2 Outline Façade Noise Limits

The table below helps identify when the external noise level associated with this development are too high for an open window strategy to be used for the overheating strategy. This is determined by simply adding the outline potential acoustic performance of the ventilation method, to the internal noise level criteria. Please note these criteria are only applicable for the night-time period. It has been established that the $L_{Aeq,8h}$ noise levels are the limiting factor in regards overheating ventilation strategy.

Façade Exposure Category	Outside to Inside Level Difference	Internal Noise Criteria, $L_{Aeq,8hr}$ (dB)	Façade Noise Level Limit, $L_{Aeq,8h}$
1	20+	40	n/a
2	13	40	53

Table 5.5: Façade Noise Level Limit for Exposure Category

Based on the above established façade noise limits, MACH has determined likely acceptable ventilation strategies for the scheme. The Façade Exposure Categories and the corresponding ventilation strategy are shown in the following noise map.

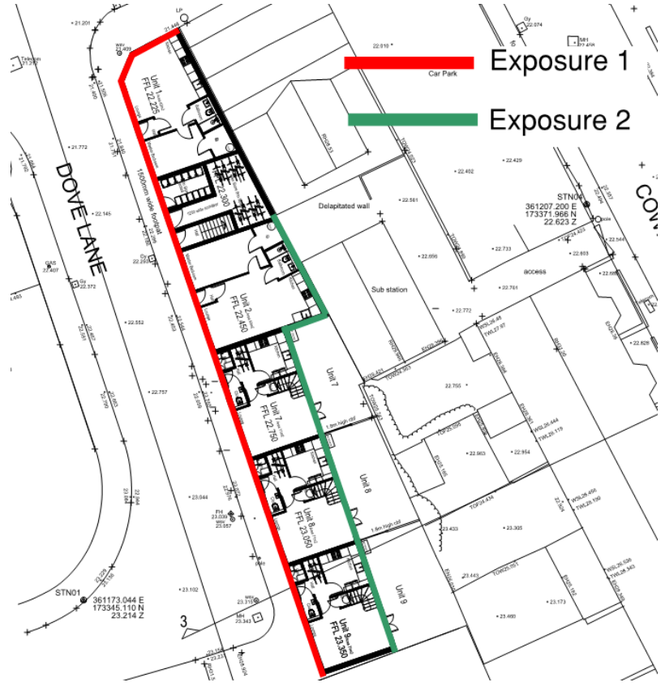

Figure 5.2: Façade Categories for Ventilation Strategies

The latter figure highlights sections of the façade in green, indicating areas that can be naturally ventilated through openable windows while meeting the Part O noise target. Façade sections marked in red indicate that an open-window strategy for overheating mitigation is not feasible due to high external noise levels. Therefore, for these red-marked façades, mechanical ventilation will be required to mitigate overheating.

6.0 OUTDOOR AMENITY

6.1 Predicted impact

The below noise map identifies areas that are within, at the midpoint of or exceeding the recommended noise levels. Particular focus should be given to the gardens, especially the rear gardens, as these are typically used more frequently for relaxation.

Figure 6.1: Noise map. Outdoor amenity.

The noise model has been used to predict noise levels of 54 dB $L_{Aeq,16hr}$ during daytime within the external amenity areas of the townhouses. The noise contour map produced from the noise model is presented opposite. The predicted noise level as experienced in the worst affected amenity area is below the maximum recommended daytime $L_{Aeq,16hr}$ in BS 8233:2014.

7.0 CONCLUSION

In summary the following points set out the conclusions of this report;

Noise Survey

- A noise survey has been conducted at the proposed site to establish the existing noise climate. These noise levels are presented in Section 3.0 of this report and the details of the noise survey itself are included in APPENDIX A -

Design Criteria

- MACH has proposed a set of design criteria, which is considered appropriate for the planning stage, which has been provided in Section 2.6
- Three assessments have been considered;
    - Internal noise levels during the background ventilation condition
    - Internal noise levels during the night time during overheating condition, if naturally ventilated. This is a requirement of Part O Building Regulations.
    - External noise levels within outdoor amenity areas, e.g. gardens.

Façade Assessment

Assessment – Background Ventilation

- The background ventilation assessment in section 5.1 outlines minimum sound reduction indices required for the façade elements such to comply with the established internal noise criteria.

Assessment – Overheating Ventilation

- Such to comply with Part O of the Building Regulations, the feasibility assessment of different ventilation strategies during an overheating scenario, indicates that natural ventilation through openable windows is feasible for a predominant portion of the proposed dwellings. However, for the remaining façades, mechanical ventilation strategy would be required.

Assessment – Outdoor Amenity

- Daytime noise levels in amenity spaces are predicted to be in line with BS8233 recommendations.

APPENDIX A - ENVIRONMENTAL NOISE SURVEY

To establish the existing environmental noise levels on-site, an attended noise survey was conducted between 05:10 and 10:10 on 01/06/2021.

This site assessment was undertaken by Jason Bradshaw of MACH Group.

A.1 Site Description

The site is located at 66 Church Road and is situated in the urban area of Redfield, Bristol. Church Road is the main road and a major route into central Bristol. There are residential properties surrounding the site, as well as shops to the east and a car dealership to the west along Church Road. There is an industrial unit to the south-west of the site along Dove Lane.

A.1.1 Subjective Noise Climate (On-site)

Noise Type	Noise Characteristics	Sources
Dominant	A primary contributor of noise levels on the site.	Road traffic on Church Road, Emergency services sirens, Buses along Church Road, Plant noise from Industrial Unit, Deliveries to Industrial Unit
Ambient	Contributors to the remainder of the noise climate on site.	Birds, Pedestrians

Table 7.1 Subjective Summary of the Noise Sources

A.1.2 Non-Representative Noise Sources

During the attended survey, no noise events occurred which would be deemed as atypical of the site location.

A.2 Measurements Map

To help with the understanding of the site and measurement locations all the measurement positions are presented on the map below. Photos of the locations in situ are in the following sections.

Figure 1.1 – The site location (highlighted blue), as well as fixed (red dot) and spot (blue dot) measurement locations

7.1 Fixed Measurement

A fixed microphone position was used to record noise levels between 05:10 and 10:10 on 01/06/2021. where the fixed long-term meter was set to measure consecutive 'A' weighted 5-minute time samples. Measurements have been taken in free field conditions.

To help with the understanding of the site and the measurement locations, the figure below presents the location of the microphone and site photo of the location. The results of the environmental noise survey are provided within Section A.2.1 of this report.

Figure 7.1 Fixed Measurement location

A.2.1 Fixed Measurement Results

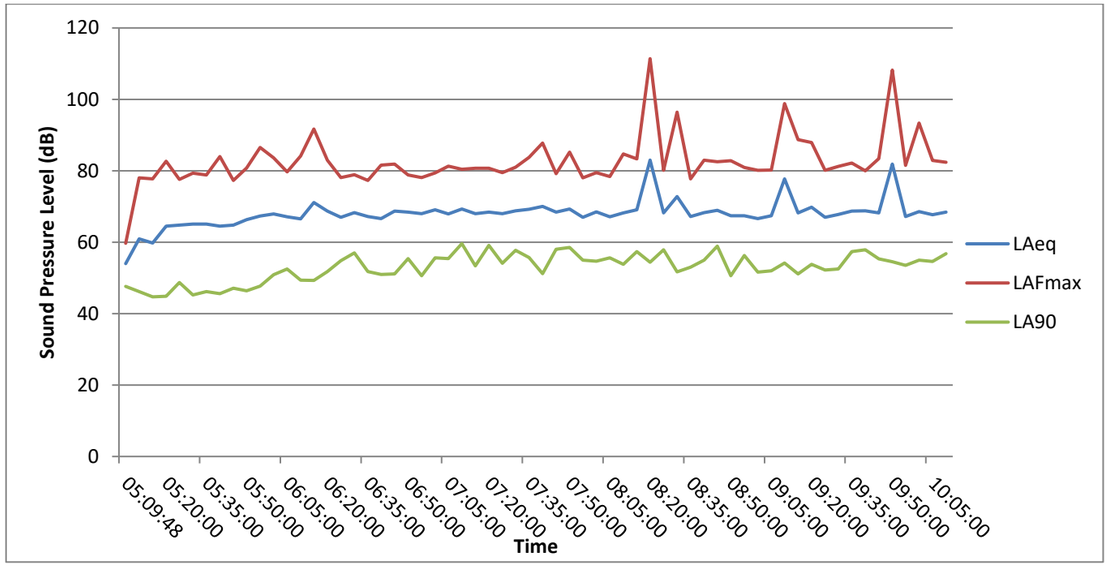

Figure 7.3 - Sound Pressure Level at fixed location, F1

7.2 Spot Measurements S1 & S2

Spot measurements to help quantify existing noise levels at different points around the site. To help with the understanding of the site and spot measurement locations, the figures below present the location of the microphone position in situ. The results of the measured levels at the spot measurements are also presented in Table 7.2. The measurement was taken between 05:10 and 10:10 on 01/06/2021.

Figure 7.4 - Spot Measurement S1 in situ

7.3 All Spot Measurement Results

The LAeq, LAFmax, and LA90 levels measured from all spot measurements are shown in Table 4.2 below.

Start	End	Duration	$L_{Aeq,\,T}$ (dB)	L_{AFmax}	L_{A90}
05:20:00	05:30:00	10 mins	51	67	36
06:20:00	06:30:00	10 mins	55	69	43
07:20:00	07:30:00	10 mins	63	80	55
08:20:00	08:35:00	15 mins	63	91	55
09:20:00	09:35:00	15 mins	60	80	57

Table 7.2 - Spot Measurement 1 Results Table

7.4 Measurement Equipment

Item	Serial No.	Last Calibration	Certificate No.	Calibration Due
NTI Precision Sound Analyser XL2 TA	A2A-18713-E0	Mar-21	UK-21-018	Mar-23
NTI Pre-amplifier MA220	9517	Mar-21	UK-21-018	Mar-23
NTI Microphone Capsule MC230A	A19763	Mar-21	UK-21-018	Mar-23
NTI Precision Sound Analyser XL2 TA	A2A-08695-E0	Jan-20	136759	Jan-22
NTI Pre-amplifier MA220	7182	Jan-20	136759	Jan-22
NTI Microphone Capsule MC230	9173	Jan-20	136757	Jan-22

7.5 Meteorological Conditions

Date	Time (hh:mm)	Temperature (°C)	Humidity (%)	Pressure	Wind Speed	Wind Direction	Conditions
01/06/2021	05:50	12 °C	77%	1015 mbar	12 mph	W	Cool.
	06:20	12 °C	82%	1015 mbar	12 mph	W	Cool.
	06:50	13 °C	77%	1015 mbar	12 mph	W	Cool.
	07:50	14 °C	77%	1015 mbar	12 mph	W	Cool.
	08:20	15 °C	72%	1015 mbar	12 mph	W	Cool.
	08:50	16 °C	72%	1015 mbar	12 mph	W	Cool.
	09:20	18 °C	64%	1015 mbar	10 mph	W	Mild.
	09:50	19 °C	60%	1015 mbar	10 mph	W	Mild.

APPENDIX B - NATIONAL PLANNING LEGISLATION

B.1 National Planning Policy Framework

The current National Planning Policy Framework (NPPF), December 2024, sets out the Government's planning policies for England.

With regards to noise impact, Paragraph 198 of the NPPF states the following:

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life60;

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

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

Paragraph 200 goes on to state:

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

B.2 Noise Policy Statement for England

The aim of the Noise Policy Statement for England (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims: Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life

Observed Effect Level: In order to fit an objective assessment of "significant adverse" and "adverse" impacts, the NPSE introduced the concept of categorising the impact from noise pollution into different observed effect level categories. This has been expanded further within the more recent document "National Planning Policy Guidance – Noise".