

Noise impact assessment to a proposed residential development

29 Whitley Street, Reading



Client: Colony Architects Limited

Report Reference: 190912-R001

Date: 30th September 2019

Revision:	Date:	Author:	Checked:
-	30/09/2019	Tommy Burn BSc (Hons) MIOA	Rob Cant MIOA

This report has been prepared by ACA Acoustics Limited (ACA) with all reasonable skill, care, and diligence in accordance with generally accepted acoustic consultancy principles and taking account of the services and terms agreed between ACA and our client. Any information provided by third-parties and referred to herein may not have been checked or verified by ACA unless expressly stated otherwise. Certain statements made in the report may constitute estimates or projections and even though these are based on reasonable assumptions and good industry practice, such forward-looking statements by their nature involve risks and uncertainties which could cause actual results to differ materially from the results predicted. ACA does not guarantee or warrant any estimate or projection contained in this report.

This report is confidential to the client and ACA accepts no responsibility whatsoever to third parties unless formally agreed by ACA. Any such party relies upon the report at their own risk. © 2019 ACA Acoustics Limited.

CONTENTS

0. SUMMARY	2
1. INTRODUCTION	3
2. ACOUSTIC CRITERIA	4
2.1 The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2016	4
2.2 National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE) ...	4
2.3 Planning Practice Guidance – Noise (PPG-N)	6
2.4 British Standard 8233:2014	8
2.5 British Standard 4142:2014+A1:2019	8
3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS	10
4. SOUND LEVEL SURVEYS	11
5. ASSESSMENT OF COMMERCIAL NOISE	14
6. ASSESSMENT OF FAÇADE SOUND INSULATION	17
7. CONCLUSION	19
APPENDIX A	A1

0. SUMMARY

- 0.1. ACA Acoustics Limited have been commissioned to assess acoustic impacts to a proposed new residential development at 29 Whitley Street, Reading. The assessment is required to support an application for permitted development to Reading Borough Council.
- 0.2. Sound level survey to the rear eastern façade has been carried out between 26th – 27th September 2019.
- 0.3. Whilst on site the author subjectively considered the sound climate during the daytime to the western façade is dominated by traffic on Whitley Street. Assessment of environmental noise from transport sources is outside the scope of the GPDO.
- 0.4. The impact of commercial noise sources has been assessed in accordance with BS 4142:2014+A1:2019.
- 0.5. A scheme for sound insulation of the building envelope has been developed such that internal sound levels during the daytime do not exceed LAeq 25dB. Sound levels at night shall not exceed a level of LAeq 25dB to bedrooms. These levels are lower than corresponding recommended guideline limits set out in BS 8233:2014 in order to account for noise from commercial sources potentially being more disturbing. Details of the sound insulation scheme are provided within this report.
- 0.6. It is the author's opinion that, allowing for the recommended acoustic specification for façade elements including mechanical ventilation and comfort cooling to flats, as set out in this report, internal sound levels within the proposed residential flats should not be detrimental to the amenity of future occupants and no further noise mitigation measures shall be necessary to comply with the requirements of The Town and Country Planning (General Permitted Development) (England) Order (Amendment) Order 2016 and the site is suitable for residential development.

1. INTRODUCTION

ACA Acoustics Limited has been commissioned by the client to carry out a survey and assessment of potential acoustic impacts on a proposed residential development at 29 Whitley Street, Reading.

This report presents results of the sound level survey and assessment along with a scheme for sound insulation such that suitable internal sound levels are achieved.

2. ACOUSTIC CRITERIA

2.1 The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2016

The application for prior approval was made under The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2016, Class O (GPDO). In accordance with paragraph 7.(1)(c) of the Order;

“development under Class O is permitted subject to the condition that before beginning the development, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to ... (d) impacts of noise from commercial premises on the intended occupiers of the development”.

It is important to consider the GPDO specifically refers to noise from commercial premises to the proposed development. Noise from other sources, including traffic on nearby routes and from trains, is not considered under the GPDO.

The Order does not include any assessment methodology nor criteria to be achieved and therefore it is relevant to consider guidance provided in relevant British Standards and other documents.

2.2 National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE)

The current revision of the National Planning Policy Framework (referred to as NPPF) was published by the Ministry of Housing, Communities and Local Government in July 2018. The NPPF sets out the Government’s planning policies for England and provides guidance on how these are expected to be applied, setting a framework within which Local Authorities can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Paragraph 170 of the NPPF states;

“planning policies and decisions should contribute to and enhance the natural and local environment by ... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability”.

Paragraph 180 also talks specifically about noise;

“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:

- *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 quality of life.*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Paragraph 182 discusses the impact of development on existing uses and advises that;

“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”.

In March 2010, the Department for Environment, Food and Rural Affairs (Defra) issued Noise Policy Statement for England (referred to as NPSE). This sets out the Government’s long-term policy aims that are intended to be considered by Local Planning Authorities when developing their own Local Policies relating to noise. Stated aims of NPSE are;

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy of 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.”*

Paragraphs 2.19 to 2.24 clarify the above aims, referring to established concepts from toxicology; NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). It also introduces a new concept relating to “significant adverse” of SOAEL (Significant Observed Adverse Effect Level), however stating that;

“it is not possible to have a single objective noise-based measure that describes SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times”.

The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development, as set out in the NPPF. As neither the NPPF nor NPSE includes any numerical criteria, it is necessary to consider guidance provided in other documents to determine suitable limits that would define the LOAEL on an individual basis.

Paragraph 2.7 states that

“... the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications”

This provides clear guidance that noise must not be considered in isolation but as part of the overall scheme taking into account the overall sustainability and associated impacts of the proposed development; there is no benefit in reducing noise to an excessively low level if this creates or increases some other adverse impact. Similarly, it may be appropriate in some cases for noise to have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance to the development.

2.3 Planning Practice Guidance – Noise (PPG-N)

Related to the NPSE and the NPPF, The Department for Communities and Local Government has published additional guidance and clarifications within the Planning Practice Guidance – Noise (PPG-N), available at <https://www.gov.uk/guidance/noise--2>.

Paragraph 003 of the PPG advises;

“Local planning authorities’ plan-making and decision taking 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.*

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 ... is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.”

This guidance is very like that set out in the NPPF and NPSE, however, Paragraph 005 of the PPG provides outline guidance on the definition of ‘significant adverse effect’ and ‘adverse effect’. Copy of the table provided within Paragraph 005 is repeated below.

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 getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
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

Table 1: Likely average response to noise exposure

Although this provides descriptive definitions for the LOAEL and SOAEL, as with the NPPF and NPSE there are no numerical values provided and consideration of guideline values provided in other

British Standards, including BS 8233:2014, may be considered appropriate. Discussion of BS 8233:2014 is provided below.

2.4 British Standard 8233:2014

The introduction to BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* confirms that;

“this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria.”

Guidance limits for internal sound levels within living rooms and bedrooms, taken from Table 4 of BS 8233:2014, are shown in Table 2 below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35dB LAeq, 16hr	-
Dining	Dining Room/Area	40dB LAeq, 16hr	-
Sleeping (daytime resting)	Bedroom	35dB LAeq, 16hr	30dB LAeq, 8hr

Table 2: BS 8233:2014 indoor ambient sound levels for dwellings

However, whilst the above criteria are generally considered suitable for noise from traffic and other ‘anonymous’ sources, for example during the daytime, Section 7.7.1 notes;

“Occupants are usually more tolerant of noise without a specific character than, for example, that from neighbours which can trigger complex emotional reactions. For simplicity, only noise without character is considered in Table 4... Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate”.

Operational noise from the nearby burger van would be defined as noise with specific character and lower criteria would be appropriate. This is discussed further below.

2.5 British Standard 4142:2014+A1:2019

The scope of BS 4142:2014+A1:2019 advises that;

“This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature ... 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”.

The assessment method of BS 4142:2014+A1:2019 corrects the specific sound level from the source under investigation to account for characteristics that could make the sound more obtrusive to obtain a rating level. This rating level is compared against the prevailing background noise outside the noise-sensitive property. Section 11 of BS 4142:2014+A1:2019 provides a commentary of the assessment result and advises that:

“Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9).

- a) Typically, the greater this difference, the greater the magnitude of the impact;*
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context;*
- d) 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.*

It is important to consider however, that BS 4142:2014 specifically confirms that this commentary provides only an initial indicative conclusion and is dependent on the context of the assessment, which may materially alter the assessment result.

Section 11 discusses factors which should be taken into consideration when reviewing the context. These include:

“The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) Façade insulation treatment;*
- ii) Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
- iii) Acoustic screening”.*

Discussion of pertinent factors associated with this development are included in this report.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 29 Whitley Street, Reading. The site currently consists of commercial offices.

The front of the site, to the Western façade overlooks Whitley Street. This is a busy street, where ambient sound levels are dominated by traffic activity. To the rear Eastern façade, levels are dominated by mechanical equipment serving a fast food takeaway. This equipment consists of both fans and condensing units, which operate till just after 23:00 hours for cleaning of the takeaway.

The development proposal is to form 3 apartments over first and second floor levels.

4. SOUND LEVEL SURVEYS

To assess the impact of existing noise sources, a sound level survey was conducted at the development site. Details of the sound level survey carried out by ACA Acoustics are provided below.

Surveys were carried out over nominally a 24-hour period between the 26th – 27th September 2019. Sound levels were recorded in consecutive 15-minute samples of overall LAeq, LAfmax, and LA90 values along with other statistical indices. Whilst on site, subjective assessment of sound levels in the vicinity of the development was also undertaken.

Meteorological conditions over the survey duration have been reviewed at worldweatheronline.com, using the closest available commercial weather station. There was a very light shower (<0.1mm precipitation) on the evening of 26th September. Meteorological conditions are considered acceptable and will not have adversely impacted the survey results.

The following equipment was used during the surveys; the sound level meter was calibrated before each survey and checked after with no deviation noted.

Equipment	Serial Number
Svantek Class 1 sound level meter type SVAN971, complete with MOLES weatherproof and lockable outdoor environmental kit	84045
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	83826

Table 3: Equipment used

Results of the measurement survey are shown in graphical form in Figure 1 on the following page.

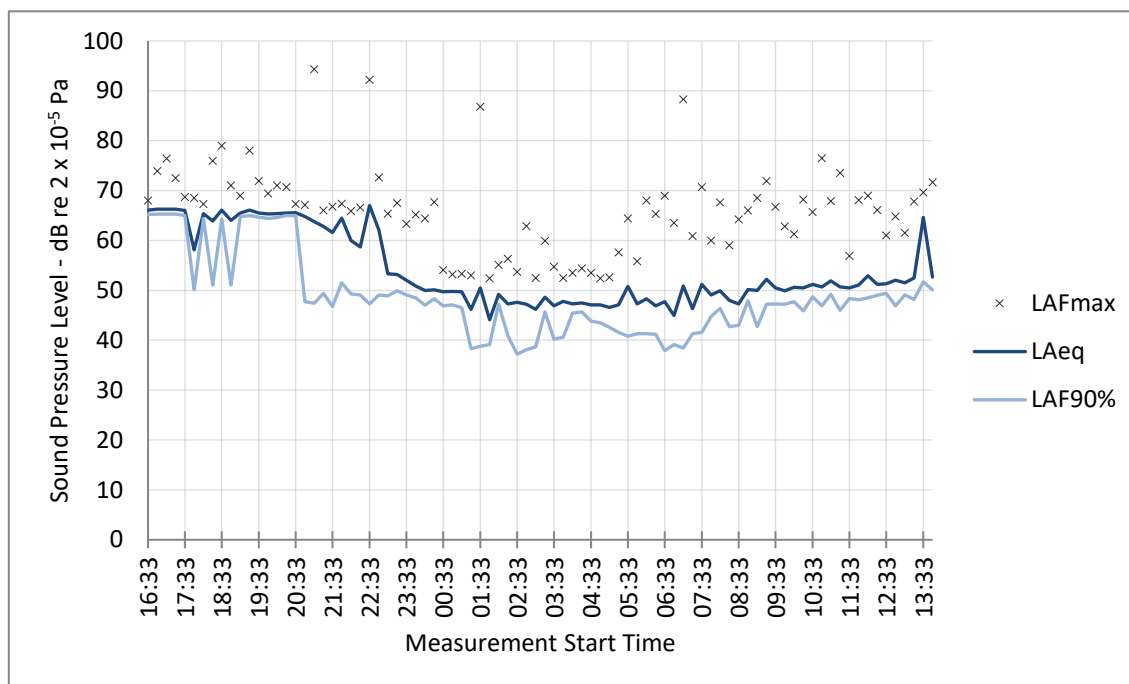


Figure 1: Sound level survey results 26th – 27th September 2019

Summary sound level survey results are shown in tabular form below.

Date	Daytime (07:00 – 23:00) LAeq	Night Time (23:00 – 07:00) LAeq
26 th – 27 th September 2019	62dB	49dB

Table 4: Summary sound level survey results at Position A (south façade)

Ambient sound levels measured over the survey period include levels from traffic and other non-commercial and industrial sources. As a result, specific levels from the operation of the equipment are primarily of interest to the assessment for the permitted development application.

Levels measured with the equipment in operation are shown in Table 5 below.

	LAeq,15 minutes
Specific sound level of mechanical equipment operating	66dB

Table 5: Specific sound levels from mechanical equipment

Following the sound level survey, it has been concluded that levels from industrial and commercial noise are subjectively audible from the mechanical equipment to the rear façade of the takeaway. While on site the author discussed the equipment with staff of the takeaway, and it is understood

that the equipment typically operates till slightly after the takeaway closes at 23:00 hours to allowing for cleaning etc.

In accordance with BS 4142:2014, the prevailing background sound level is not necessarily taken to be the lowest recorded values, but rather the level that best represents the typical background sound level in the area over a defined period. A statistical analysis of the measured sound levels during the latest operating times of the equipment between 19:00 hours and 23:30 has been carried out, generally following suggested guidance contained in Section 8 of the Standard.

Distribution of the measured LA90 sound levels to the Eastern facade overlooking mechanical equipment is shown below.

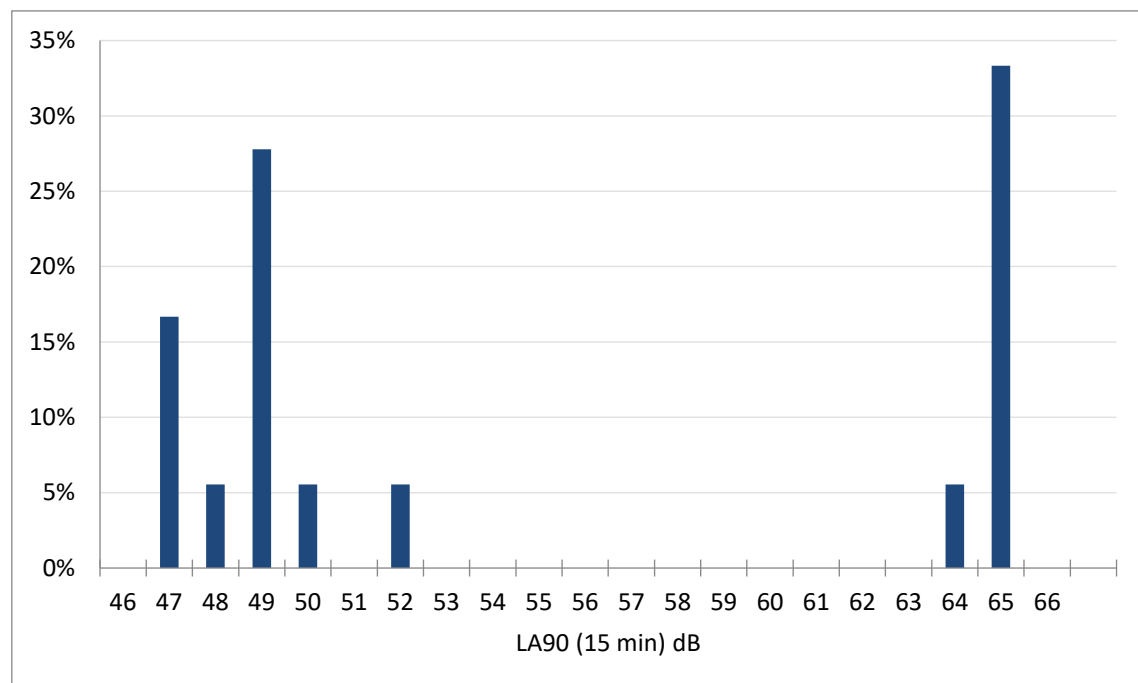


Figure 2: Statistical analysis of LA90 distribution overlooking B&Q car park during early morning period 04:00-05:30.

5. ASSESSMENT OF COMMERCIAL NOISE

As discussed above, operational sound from nearby commercial and industrial sources to the proposed development site are clearly audible to at all facades during the early morning period. As such it is necessary to consider the potential for adverse impact using the methodology set out in BS 4142:2014+A1:2019.

Figure 3 confirms that the background sound levels during the latest operating periods of the equipment are at a level of LA90 47dB or higher.

As such, the author considers that using this background sound level as basis for the initial assessment criteria would be adequate to protect the amenity of future residents and is representative of the acoustic climate in the vicinity.

Description	Daytime Assessment	Relevant Clause	Commentary
Existing ambient level at Eastern facade.	LAeq 66dB	7.3.2	Typical level during operation of generator in carpark and patrons of nearby gym arriving
Existing residual level	LAeq 50dB	7.3.3	Ambient level whilst generator is not operating
Specific level	LAeq 66dB		Logarithmic subtraction of residual level from ambient level
Background sound level	LA90 47dB	8.1	Typical background sound level
Acoustic feature correction	+5dB	9.2	The equipment was witnessed as having distinguishable characteristics. A rating correction of 2dB has been applied for tonal characteristics, and 3dB for impulsivity.

Rating level	LAr 71dB	9.2	
Excess of rating level over background sound level	24dB	11	Assessment indicates likelihood of significant adverse impact

Table 6: BS 4142:2014+A1:2019 Assessment of commercial and industrial noise sources at Southern Facade

The initial outcome of a BS 4142:2014 assessment of operational noise emissions from the nearby industrial and commercial sources is that, without mitigation, there is a high likelihood of significant adverse impact, depending on the context, to windows at the rear facade.

The primary context of this assessment is the development of new residential properties to an area of existing commercial use. In the author's experience the likelihood of adverse impact is reduced in this context compared to the reverse situation of bringing a new noise-generating use to an existing residential dwelling; in situations where a new noise source is introduced, residents notice a change in the acoustic climate, potentially causing a reduction of amenity. However, in this instance residents moving into the new residential flats would not be conditioned to any pre-existing lower levels.

Notwithstanding this, 24dB is a significant excess of rating level over background level and indicates that without further mitigation measures there is potential for adverse impact.

Section 11 of BS 4142:2014 discusses potential aspects which may alter the initial assessment result and advises that:

"where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following ... the sensitivity of the receptor and whether dwellings ... will incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) Façade insulation treatment;*
- ii) Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation", and;*
- iii) Acoustic screening.*

This confirms that designing the sound insulation performance of façade elements to achieve appropriate internal sound levels mitigates the adverse impact, particularly where the scheme includes mechanical ventilation such that residents can achieve both background and rapid ventilation rates without needing to open windows.

However, it is generally accepted that achieving a good acoustic design initially considers reducing sound levels at source, mitigating the transmission from source to receiver, and finally through use of façade sound insulation.

It is not practical to reduce sound levels from the source in this instance, due to the type of sources and that these are operated by a third-party.

To control potential for disturbance, ACA Acoustics have corrected the guideline internal sound level criteria of BS 8233:2014 by the value of the acoustic feature correction shown in the tables above. This equates to designing external noise intrusion from the commercial sources to a level of no greater than 30dBA to the during daytime hours and 25dBA during night time hours within habitable rooms to the eastern facade. It is proposed this should be adequate to protect the amenity of residents.

To ensure residents have the potential to achieve both background and rapid ventilation rates without needing to open windows to bedrooms, it is recommended that mechanical ventilation with a boost function is provided to habitable rooms within the development.

6. ASSESSMENT OF FAÇADE SOUND INSULATION

A scheme for sound insulation is necessary to ensure sound levels inside rooms of the new residential apartments are reasonable and do not exceed guideline levels as detailed within Section 2.4 above, and corrected based on levels calculated within Section 5.

A computer model has been set up using the measured sound levels along with anticipated acoustic performance of façade elements. The computer model is based on the calculation procedures outlines in BS EN ISO 12354-3:2000 and BS 8233:2014.

Confirmation of the acoustic performance of the building envelope elements used in the calculation model is provided below. *Consideration of non-acoustic aspects including, but not limited to, Building Regulations Approved Documents and structural calculations are outside the scope of ACA Acoustics Limited and should be considered by others accordingly.*

Description	Rw (dB)	Rw + C'tr (dB)	Typical Construction
Façade walls	54	48	102mm Brick, 50mm Cavity, 102mm Brick walls.
Roof	56	49	Tile-Slate, Pitched with flat ceiling. 100mm insulation in loft cavity, 2 layers 12.5mm wall board.
Glazing to Eastern facade	45	40	Acoustic secondary glazing, with such as 4-200-4 or equivalent

Table 7: Acoustic performance of facade elements

Note that constructions provided are typical and variations would be acceptable, so long as the installed construction achieved the specified sound insulation performance.

Where doors and windows are fitted within the external façade to habitable rooms, the minimum Rw performance stated within Table 9 includes sound transmission paths through the frame and seals, as well as the leaf.

To ensure noise from external sources is not detrimental to the amenity of future occupants, it will be necessary to incorporate an acoustic ventilation scheme into the design such that residents can achieve adequate ventilation without necessarily needing to open windows.

It is recommended that the client provides a mechanical ventilation system such as MVHR or equivalent to habitable rooms at the eastern façade of the proposed development. Suppliers including Titan or Envirovent would be able to offer suitable ventilation systems for residential purposes. It is important that any self-noise (i.e. noise from the fans) and external noise intrusion through the ducted system must not cause internal sound levels to exceed the design requirements. To achieve these limits, it is recommended that the overall noise from any

mechanical ventilation system will need to be no higher than LAeq 25dB to allow for accumulation of noise sources. Suitable MVHR systems must also incorporate summer bypass mode to minimise the potential for overheating during warmer periods.

Copy of acoustic calculation is provided in Appendix A. Summary results are confirmed in Table 10 below and demonstrate that internal sound levels will comply with criteria in Section 2 of this report.

Plot / Room	Description	Calculated Internal Sound Level	Criteria
Unit 03 Bedroom	Daytime LAeq	25dB	≤ 25dB
	Night-time LAeq	25dB	≤ 25dB

Table 8: Summary internal sound levels within sample habitable rooms

Achieving levels as demonstrated within Table 10 above, will ensure a good standard of amenity for future occupants and no further mitigation would be required.

7. CONCLUSION

ACA Acoustics have been commissioned to provide an acoustic assessment of ambient sound levels at 29 Whitley Street, Reading. The assessment is to be submitted in support of an application for permitted development. A scheme of façade sound insulation has been developed such that industrial and commercial noise sources in the vicinity will have a low likelihood of adverse impact on future residents.

ACA Acoustics have undertaken an external sound level survey, along with subjective listening and clarification of the acoustic environment. Noise from a nearby mechanical equipment is dominant and, following discussion on site with staff at the Chinese take-away, it is understood the equipment operates to past 23:00 hours to allow for cleaning.

A scheme has been proposed such that suitable internal sound levels are achieved and there is therefore a low likelihood of adverse impact to future residents. The scheme includes recommendation for acoustic double glazing, along with mechanical ventilation and comfort cooling to flats.

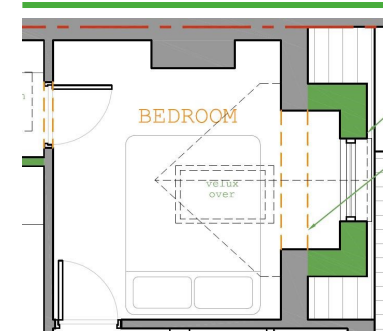
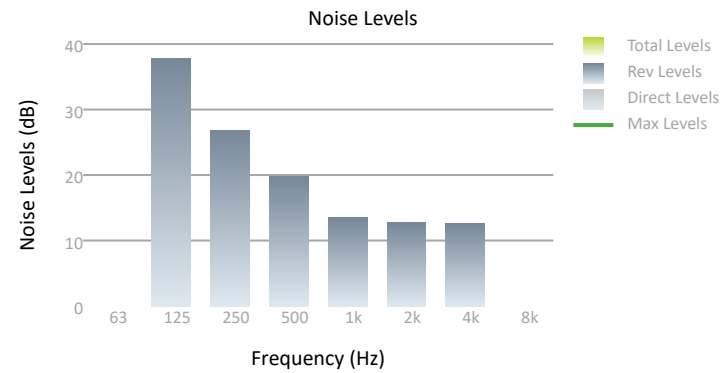
In accordance with the requirements of the GPDO, BS 4142:2014+A1:2019, and BS 8233:2014, levels within residential rooms will not be disturbing to the amenity of occupants, and the author considers that the site is suitable for residential development.

APPENDIX A

Acoustic Calculations

29 Whitley Street, Reading

Reference	Unit 03 Bedroom Daytime LAeq
Description	
Target Sound Level	-
Max Sound Level	-
Calculated Sound Level	25dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m ³)	15.6



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	-	38	27	20	14	13	13	-

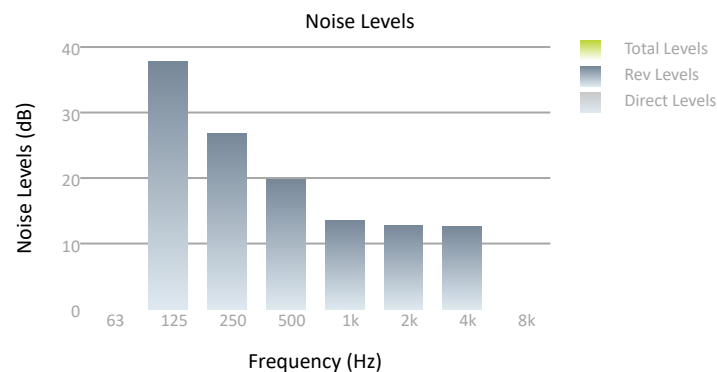
Calculation Sheet

Unit 03 Bedroom Daytime LAeq

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Sound Level at Facade (Leq) - Day								
Source dBA	67.0	65.0	61.0	62.0	59.0	60.0	55.0	48.0
Row A								
Facade Wall Element								
	-36.7	-39.7	-44.7	-54.7	-62.7	-65.7	-70.7	-72.7
Facade Glazed Element								
	-	-42.4	-47.4	-55.4	-58.4	-59.4	-51.4	-
Facade Roof Element								
	-24.0	-41.0	-51.0	-57.0	-62.0	-63.0	-64.0	-
Cumulative Lp								
Result	-	28.9	18.9	11.8	6.1	5.9	6.5	-
ISO 12354-3 Lfs Correction								
	-	0.0	0.0	0.0	0.0	0.0	0.0	-
Room Corrections								
	-	8.8	7.9	7.9	7.4	6.8	6.2	-
Internal Receiver Noise								
Internal Receiver Noise - Unit 03								
Bedroom Daytime LAeq								
Reverberant Field, LPrev:	-	37.7	26.9	19.7	13.5	12.8	12.7	-

29 Whitley Street, Reading

Reference	Unit 03 Bedroom Nighttime LAeq
Description	
Target Sound Level	
Max Sound Level	
Calculated Sound Level	-
Calculated Tmf T60 (s)	0.4
Volume (m ³)	15.6



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	-	38	27	20	14	13	13	-

Calculation Sheet

Unit 03 Bedroom Nighttime LAeq

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Sound Level at Facade (Leq) - Night								
Source dBA	67.0	65.0	61.0	62.0	59.0	60.0	55.0	48.0
Row A								
Facade Wall Element								
	-36.7	-39.7	-44.7	-54.7	-62.7	-65.7	-70.7	-72.7
Facade Glazed Element								
	-	-42.4	-47.4	-55.4	-58.4	-59.4	-51.4	-
Facade Roof Element								
	-24.0	-41.0	-51.0	-57.0	-62.0	-63.0	-64.0	-
Cumulative Lp								
Result	-	28.9	18.9	11.8	6.1	5.9	6.5	-
ISO 12354-3 Lfs Correction								
	-	0.0	0.0	0.0	0.0	0.0	0.0	-
Room Corrections								
	-	8.8	7.9	7.9	7.4	6.8	6.2	-
Internal Receiver Noise								
Internal Receiver Noise - Unit 03								
Bedroom Nighttime LAeq								
Reverberant Field, LPrev:	-	37.7	26.9	19.7	13.5	12.8	12.7	-