



Planning Noise Assessment for a Proposed Residential Development at 37 Broadwater Road, Welwyn Garden City

Report ref.

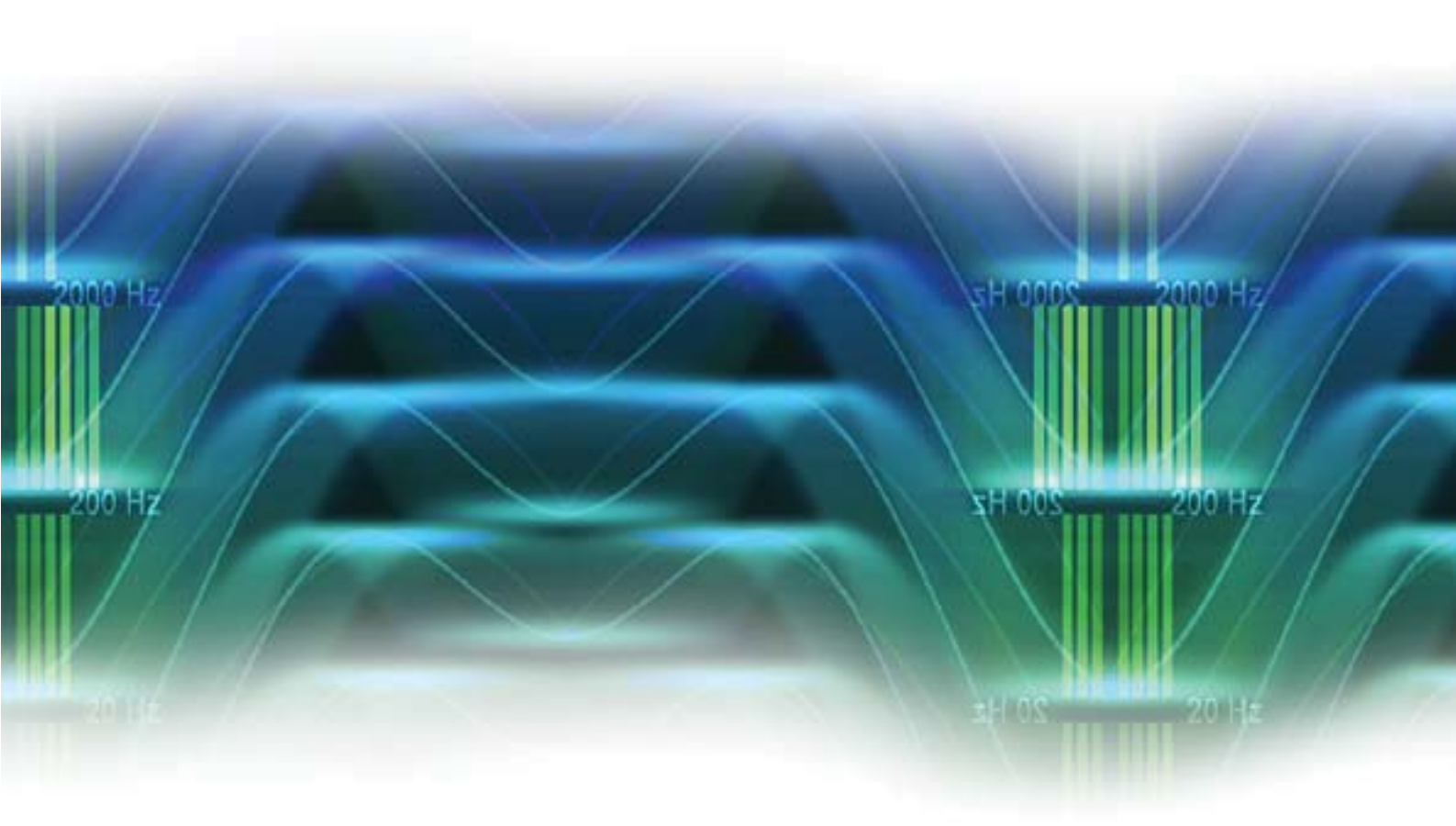
RK1930/16147

Date

June 2016

Issued to

OSO Homes



Issued by

Rob Kirkaldy BSc (Hons) MIOA
Senior Consultant



SECTION	TITLE	PAGE
1.	INTRODUCTION	1
2.	SITE DESCRIPTION AND PROPOSALS.....	1
3.	RELEVANT NOISE GUIDELINES	1
3.1	NATIONAL PLANNING POLICY FRAMEWORK (NPPF).....	1
3.2	PLANNING PRACTICE GUIDANCE (PPG).....	2
3.3	NOISE POLICY STATEMENT FOR ENGLAND (NPSE), DEFRA, MARCH 2010	3
3.4	WHO – GUIDELINES FOR COMMUNITY NOISE	4
3.5	BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS	4
4.	AMBIENT NOISE SURVEY	5
4.1	MEASUREMENT LOCATION	5
4.2	SURVEY DETAILS AND INSTRUMENTATION	5
4.3	RESULTS AND OBSERVATIONS	6
5.	ASSESSMENT	8
5.1	EXTERNAL NOISE LEVELS.....	8
5.2	INTERNAL NOISE LEVELS	9
6.	CONCLUSIONS	10

Appendix A: Existing Site Location Plan with Measurement Position

Appendix B: Proposed Scheme

Appendix C: Noise Prediction Model

Appendix D: Intrusive Noise Level Calculations



1. INTRODUCTION

OSO Homes is seeking planning permission for the conversion of an office development to residential at 37 Broadwater Road in Welwyn Garden City. The proposal involves converting the office building to create 10 flats. Accordingly, OSO Homes has commissioned Spectrum Acoustic Consultants to complete a noise assessment in order to accompany the planning application.

This report includes the results of a long term noise measurement survey, completed for the purpose of establishing existing ambient noise levels at the development site. Based on the measured noise levels, a comparison of the predicted noise levels inside habitable rooms against the appropriate standards is provided.

2. SITE DESCRIPTION AND PROPOSALS

The proposed development site comprises of an existing office building at 37 Broadwater Road, Welwyn Garden City, AL7 3AX. Broadwater Road bounds the site to the west. Opposite the site are newly constructed flats. Beyond the flats is the East Coast Mainline railway. Bounding the site to the south is a former car park which has planning consent for a residential scheme. Bounding the site to the north is an existing car park, with a large office building beyond (No. 29 Broadwater Road). At the rear of the site to the east are school playing fields. Existing site plans are included in Appendix A.

Proposals involve converting the existing two storey high office building to create 10 residential flats. The proposed scheme drawings are included in Appendix B. Note that no external amenity spaces form part of the proposals.

3. RELEVANT NOISE GUIDELINES

3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework (NPPF) sets out the government's guidance for local planning authorities and planning application decision-takers.

It says that the planning system should contribute to and enhance the environment by (among other things) preventing development from contributing to, being put at risk from, or being adversely affected by unacceptable levels of noise pollution. (Para. 109)

Paragraph 123 states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."



The NPPF refers to the Noise Policy Statement for England (NPSE) which sets out the long term vision of Government noise policy as follows: *Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.*

The NPSE aims to clarify the principles and aims in existing policy documents, legislation and guidance that relate to noise. Its noise policy aims are to:

- 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

through the effective management and control of environmental, neighbour and neighbourhood noise.

These aims are developed by reference to concepts from toxicology, namely NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). NPSE also refers to SOAEL (Significant Observed Adverse Effect Level).

It recognises that there is no universally applicable measure for the concepts. Consequently, the SOAEL is likely to be different for different noise sources and receptors and at different times. Even so, significant effects should be avoided, taking account of sustainability aims.

Where noise impact is between LOAEL and SOAEL, the NPSE requires that all reasonable steps should be taken to mitigate adverse effects while taking account sustainable development aims. It notes (para. 2.7) that *the NPSE should consider noise alongside other relevant issues and noise should not to be considered in isolation.*

3.2 PLANNING PRACTICE GUIDANCE (PPG)

The Planning Practice Guidance (PPG) refers to the NPPF and provides further guidance on the interpretation of no, lowest and significant observed adverse effect level described in the NPSE.

The PPG provides a commentary on the noise exposure hierarchy, based on the 'likely average response'.

The PPG recognises a broad range of factors which can influence the relationship between noise level and the impact on those affected. Accordingly, the examples in Table 1 below, copied from the PPG, may not be relevant to a specific development, which should be considered on its merits within the specific context under consideration.



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
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
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.	Lowest Observed Adverse Effect Level 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: Summary of noise exposure hierarchy, based on likely response

3.3 NOISE POLICY STATEMENT FOR ENGLAND (NPSE), DEFRA, MARCH 2010

The first aim of the Noise Policy Statement for England

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- 2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).



The second aim of the Noise Policy Statement for England

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- 2.24 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 taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

The third aim of the Noise Policy Statement for England

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- 2.25 This aim seeks, where possible, positively to improve health and quality of life through the proactive management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

3.4 WHO – GUIDELINES FOR COMMUNITY NOISE

The NPPF requires that significant adverse impacts do not arise as a result of new development. Guidelines for Community Noise - World Health Organization, 1999 (WHO) gives guidance on suitable noise levels for sleeping and resting conditions in dwellings. It sets out these values as table 4.1, and lists them as being guideline values for community noise. WHO recommends internal noise levels of 30dB(A) at night for bedrooms, and 35dB(A) during the day for living-rooms. The guideline levels are based on annual average data.

To avoid sleep disturbance in bedrooms during the night time period, it also recommends that noise levels from single sound events should not regularly exceed L_{Amax} 45dB(A). WHO defines 'regular' as not more than 10-15 events per night.

3.5 BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* gives guidance on indoor ambient noise levels to be achieved in dwellings for reasonable resting and sleeping conditions. The guidance in BS 8233:2014 is based on guidelines issued by the WHO, Guidelines for Community Noise (1999). The guideline levels are shown in Table 1, copied from BS8233:2014.



Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 1: BS8233 guideline noise level limits in dwellings for resting and sleeping

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 facade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.”

It also advises that “Where development is considered necessary or desirable...the internal target levels may be relaxed by up to 5 dB and reasonable conditions still achieved.”

The standard also advises that “Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax} depending on the character and number of events per night. Sporadic noise events could require separate values.” It does not give guidance on what might constitute a guideline value. However, as the standard does cross reference Guidelines for Community Noise - World Health Organization, 1999 (WHO), it is suggested that the guideline value of L_{AFmax} 45 dB, inside bedrooms, should not be exceeded during the night more than 10-15 times, which reflects the WHO position.

4. AMBIENT NOISE SURVEY

4.1 MEASUREMENT LOCATION

The noise monitoring location was selected to quantify noise levels from Broadwater Road that will be incident on the front facade the dwellings, as noise levels are highest at the front of the site. The dwellings are set back further from Broadwater Road than the measurement location, but it was judged conservative to achieve line of site to the bus stop and hoardings were in place which would have blocked this if the measurement position had been further back on the building line.

The microphone was positioned at a height of 1.3 m and exposed to free-field conditions. The location is illustrated on the existing site location plan included in Appendix A.

4.2 SURVEY DETAILS AND INSTRUMENTATION

Noise measurements were completed over the period Monday 25 to Thursday 28 April 2016. Throughout the survey, weather conditions were mild with low wind speeds. Continuous automated five minute noise measurements were carried out throughout the monitoring period using a noise logger at the measurement position.



Noise measurement parameters consisted of equivalent continuous (L_{Aeq}) noise levels and maximum (L_{Amax}) noise levels as well as statistical noise levels (termed L'_n , where n is the percentage of time the level is exceeded during the measurement period). Both overall and 1/1 octave band measurements were stored for later analysis.

The following equipment was used during the survey:

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 2739650
- Bruel & Kjaer Type 4189 Microphone s/n 2983518
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2730221

Before and after the survey, the sound level meter was field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The meter, microphone and field calibrator are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

4.3 RESULTS AND OBSERVATIONS

During the daytime and night-time periods, noise levels at the site are dominated by road traffic movements on Broadwater Road. Rail movements on the nearby East Coast Mainline are also audible.

Chart 1 below shows the noise profile measured by the logger, representative of the front façade of the building overlooking Broadwater Road.

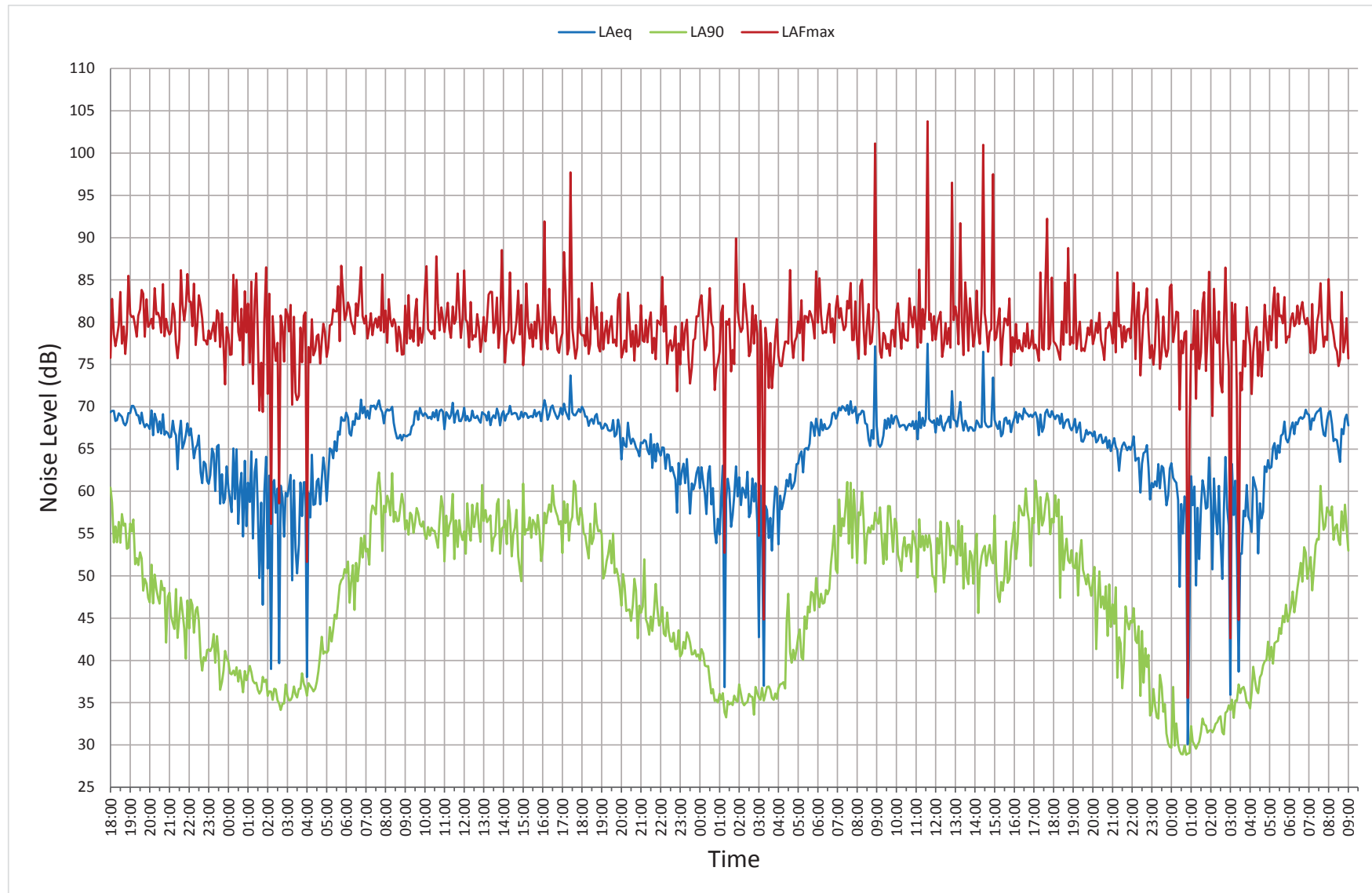


Chart 1: Measured noise levels – Monday 25 to Thursday 28 April 2016



A summary of the noise data recorded at the measurement location during the daytime and night time periods is included in Table 2.

World Health Organisation (WHO) guidelines for community noise, define regular as not more than 10-15 events per night. Therefore the L_{Amax} levels measured by the noise logger during the night time periods have been sorted from highest to lowest. It is then possible to read off the 10-15th highest L_{Amax} level during the night which is regarded as being typical. The typical L_{Amax} value for the night-time periods obtained in this survey is shown in Table 2.

Time period	$L_{Aeq,16h}$ dB	$L_{Aeq,8h}$ dB	L_{AFmax}^3 dB
Monday 25 to Thursday 28 April 2016: 0700-2300	68 ¹	-	-
Monday 25 to Thursday 28 April 2016: 2300-0700	-	63 ²	83

Table 2: Summary of results of ambient noise survey

- Notes: 1 Overall $L_{Aeq,16hr}$ taken from log average over all of the daytime periods
 2 Overall $L_{Aeq,8hr}$ taken from log average over all of the night-time periods
 3 The L_{Amax} data is only relevant to the night time period

At the measurement location overlooking Broadwater Road, overall noise levels are $L_{Aeq,16hr}$ 68dB during the daytime and $L_{Aeq,8hr}$ 63dB during the night-time. The night time maximum noise level reported above (L_{AFmax} 83 dB) represents a typical maximum level from the 10th to 15th maximum noise events on each of the 3 evenings.

5. ASSESSMENT

5.1 EXTERNAL NOISE LEVELS

In order to calculate the specific noise levels outside of each of the proposed plots, a computer based noise prediction model for the site has been created using proprietary software (Predictor¹) which meets the requirements of ISO 9613 Part 2:1996². The noise model takes account of the following in its calculations procedures:

- Source sound power level (for point, line and area sources)
- Reflection from nearby structures and source directivity
- Distance from noise source (geometric spreading)
- Atmospheric absorption
- Acoustic screening of intervening structures and topography
- Ground absorption
- Ground effects (which includes the height of ground relative to the noise source)

The site was initially modelled as it was at the time of the noise measurement survey. A sound power level is then allocated to a line source along Broadwater Road. The line source was then calibrated so that the calculated values in the model match the measured values at the measurement location.

¹ Bruel and Kjaer – Predictor V11 Environmental Noise Calculation Software Package, Type 7810

² ISO 9613-2:1996 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation to determine Noise Levels



Accordingly, the sound power level of the road is calibrated for daytime, night-time averaged periods and for the selected L_{AFmax} event which is assumed to be able to occur at any point along the road.

The calibrated noise model is then updated based on the proposed scheme, with receiver points included to establish the levels of noise incident on each of the habitable rooms. A 3D view of the noise prediction model, along with a full breakdown of the results is included in Appendix C.

5.2 INTERNAL NOISE LEVELS

Internal noise levels can be calculated from the predicted external noise levels outside each of the plots, taking into account the size and construction of the elements of the building façade, including glazing and ventilation. It should be noted that Welwyn Hatfield Borough Council specify that noise levels inside habitable rooms should not exceed the target levels stated in BS 8233:2014 during periods when purge ventilation is required, as defined by Approved Document F of the Building Regulations. If future occupants were to open their windows to allow for purge ventilation, noise levels inside habitable rooms during both the daytime and night-time periods would exceed the target levels stated in BS 8233:2014. Therefore, an alternative ventilation scheme is required. In view of this, it is recommended that a mechanical ventilation scheme should be incorporated into the scheme to allow rapid purge ventilation.

The precise external wall construction is currently unknown. Therefore, for the purposes of the calculations, it is assumed that all of the dwellings have a composite wall system, similar to that of a Kingspan AWP 60 panel construction. Sound insulation data for the external walls has been taken from Kingspan's product information. Sound insulation data for glazing systems has also been taken from manufacturers' data.

The proposed sound insulation scheme will be designed to meet the BS8233 recommended $L_{Aeq,16h}$ 35dB for living rooms (resting purpose) and the $L_{Aeq,8h}$ 30dB for bedrooms during the night time (sleeping purpose). The requirement for L_{AFmax} values in bedrooms at night, has been taken as individual events not regularly exceeding 45dB.

The façade insulation requirements for the living rooms and bedrooms are detailed in Table 3 as follows. Comprehensive intrusive noise level calculations are included in Appendix D. The calculations have been carried out on the basis that each dwelling would be mechanically ventilated, thus negating the need to open windows.

Plot	Room	Wall type	Window Performance R_w+C_{tr} dB
Flats 1 and 6.	Living Room	Brick/block	34
	Bedrooms	Brick/block	34
Flats 2, 3, 4, 5, 7, 8, 9, 10.	Living Room	Brick/block	25
	Bedrooms	Brick/block	25

Table 3: Sound insulation specification for the proposed development site



In flats 1 and 6, Acoustic performances in living rooms and bedrooms can typically be achieved with the following glazing specification:

- Acoustic double glazed unit (rated R_w+C_{tr} 34dB), typically comprising of 10mm float glass, 12mm cavity, 6.4mm float glass.

In all remaining flats (2, 3, 4, 5, 7, 8, 9, 10), acoustic performances in living rooms and bedrooms can be achieved with the following glazing specification:

- Standard double glazed unit (rated R_w+C_{tr} 25dB), typically comprising of 4mm float glass, 12mm cavity, 4mm float glass.

6. CONCLUSIONS

Spectrum Acoustic Consultants have been commissioned to complete a planning noise assessment for a proposed residential development at 37 Broadwater Road in Welwyn Garden City.

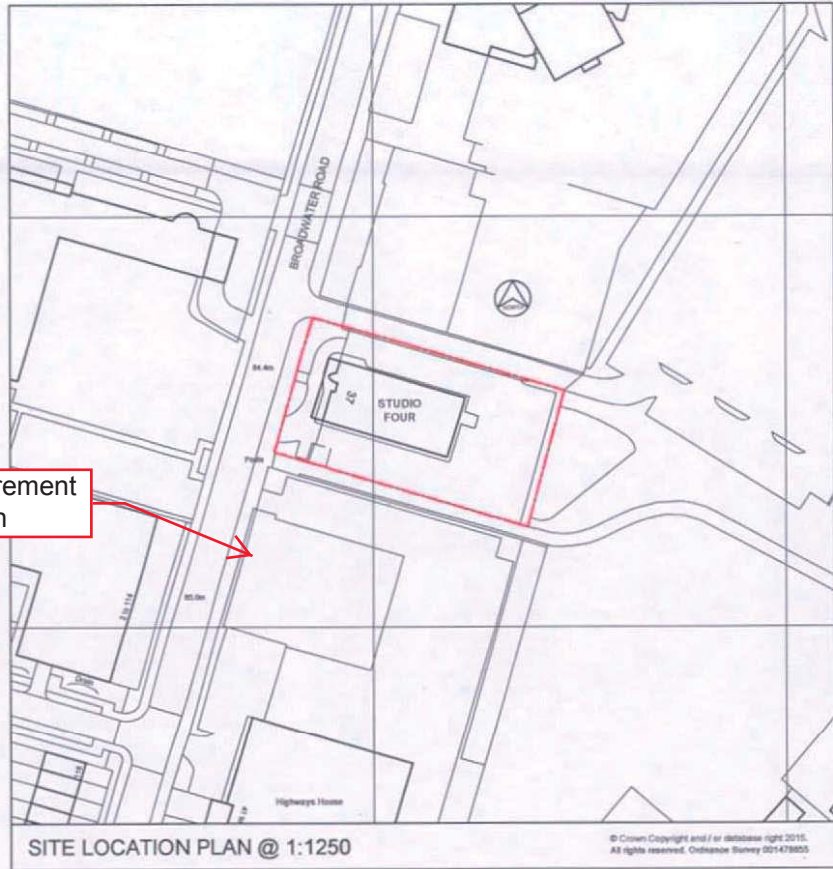
Road traffic noise is the dominant noise source across each aspect of the proposed development. A mitigation strategy has been developed, by considering the noise insulation and noise control requirements for the proposed plot facades. The mitigation scheme that has been proposed and specified satisfies internal noise levels in accordance with BS 8233 and WHO Guidelines for Community Noise.

Report Code: E/RT/EH



APPENDIX A

Existing Site Location Plan with Measurement Positions

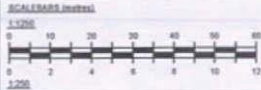


Noise Measurement Location

SITE LOCATION PLAN @ 1:1250

© Crown Copyright and/or database right 2015. All rights reserved. Ordnance Survey 001478855

NOTES
 All stated dimensions to be verified on site and the finished method of any dimensions.
 This drawing to be read in accordance with the specifications of Conditions and related drawings.
 © Crown Copyright and / or database right 2015.
 All rights reserved. Ordnance Survey 001478855



Project
 CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR
 37 BROADWATER RD AL7 3AX

Title
 SITE LOCATION PLAN

Scale
 1:1250

Drawn
 MAR 15

Drawing Number
 J1220/P01

Sheet
 A3

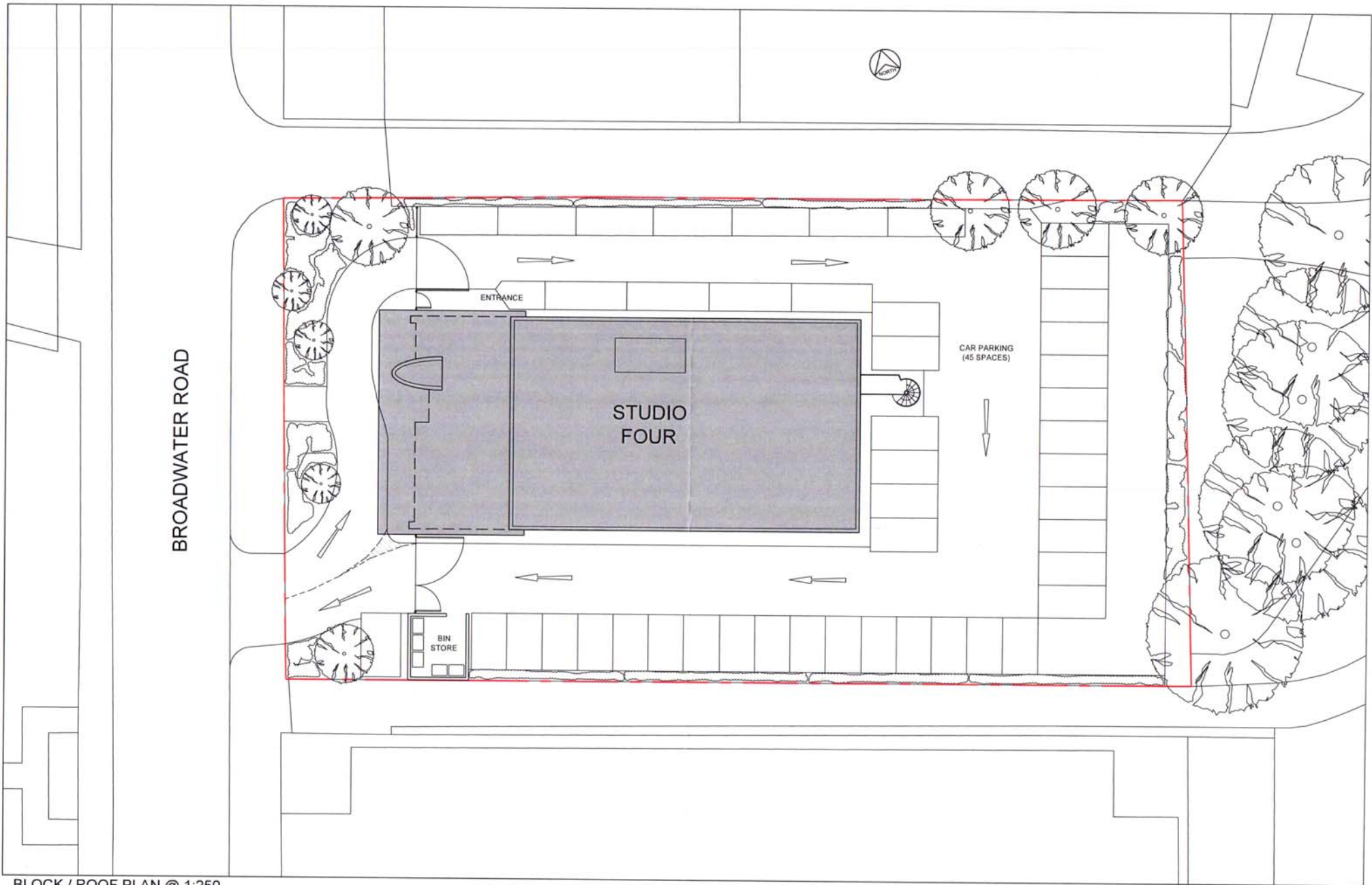
Drawn

Revision

Jonathan D Moffat BA(Hons) DipArch RIBA
 CHARTERED ARCHITECT

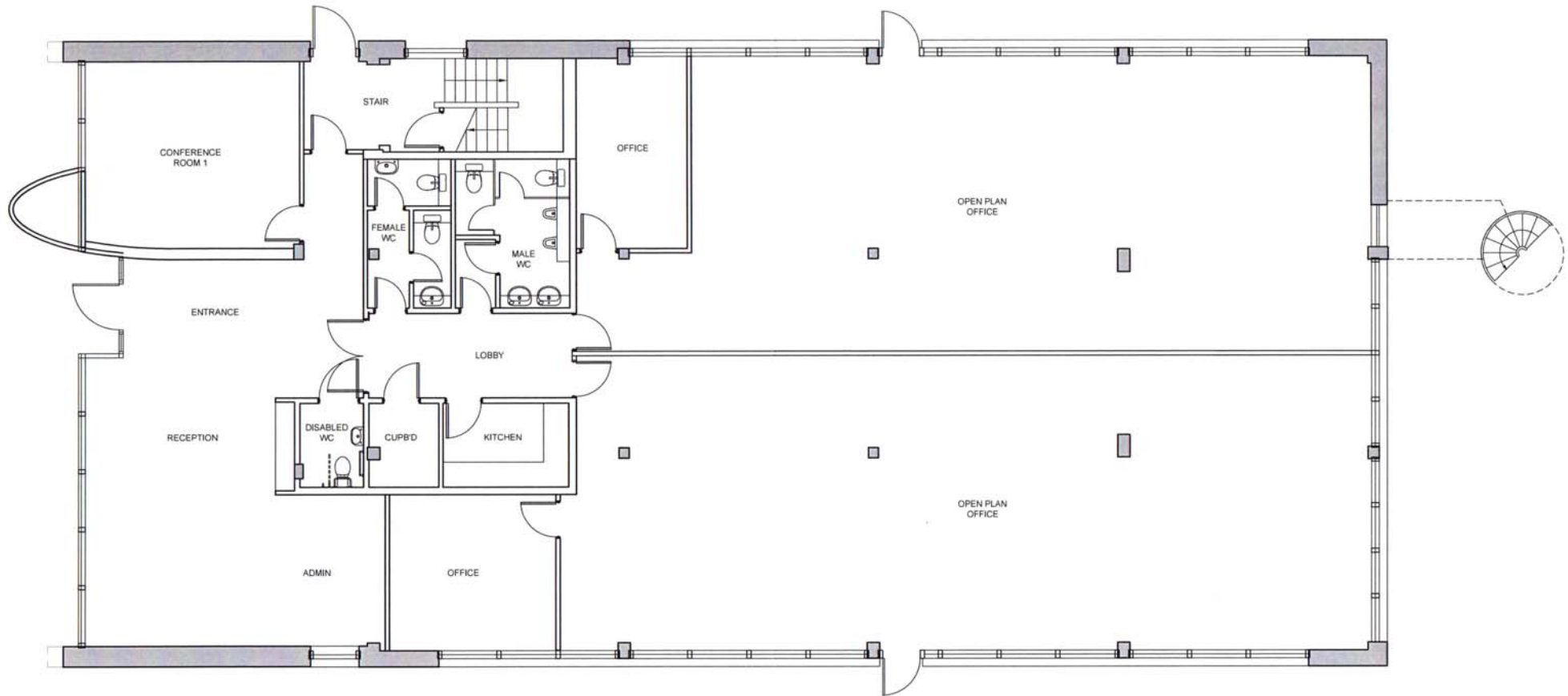
JDM
 ARCHITECTS

245 The Ridgeway, St Albans, Herts, AL4 8SD
 phone: 01727 845190
 mobile: 07792 532171
 email: jonmoffat@jdmarchitects.co.uk



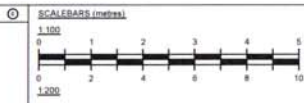
BLOCK / ROOF PLAN @ 1:250

<p>NOTES</p> <p>All stated dimensions to be verified on site and the Architect notified of any discrepancies. This drawing to be read in accordance with the specification/Bills of Materials and related drawings.</p> <p>© Crown Copyright and / or database right 2015. All rights reserved. Ordnance Survey 001478655</p>	<p>SCALEBARS (metres)</p> <p>1:1250</p> <p>1:250</p>	<p>Project</p> <p>CHANGE OF USE FROM OFFICE TO RESIDENTIAL AT STUDIO FOUR 37 BROADWATER RD AL7 3AX</p>	<p>Title</p> <p>BLOCK / ROOF PLAN</p>	<p>Scale</p> <p>1:250 @ A3</p> <p>Date</p> <p>MAR 15</p> <p>Drawing Number</p> <p>J1220/P02</p>	<p>Jonathan D Moffatt BA(Hons) DipArch RIBA CHARTERED ARCHITECT</p> <p>245 The Ridgeway, St Albans, Herts. AL4 5XG phone 01727 845160 mobile 07702 132171 email jonathan@jdmarchitects.co.uk</p> <p>JDM ARCHITECTS</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------	----------------------------------------------	----------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



EXISTING GROUND FLOOR PLAN

NOTES
 All stated dimensions to be verified on site and the Architect notified of any discrepancies.
 This drawing to be read in accordance with the specifications/Bills of Materials and related drawings.



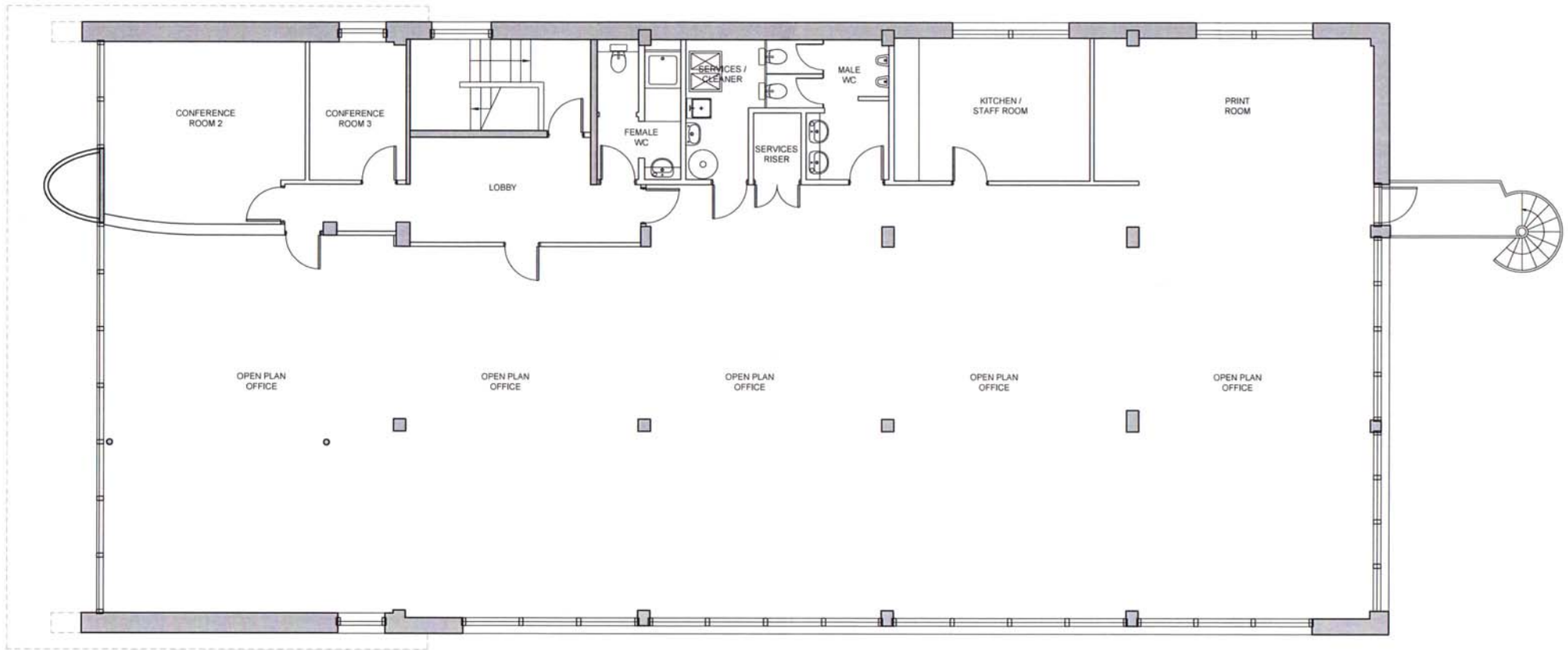
Project
**CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR**
 37 BROADWATER RD AL7 3AX

Title
**EXISTING GROUND
 FLOOR PLAN**

Scale
 1:100 A3
 Date
 MAR 15 Drawn
 Drawing Number Revision
J1220/P03

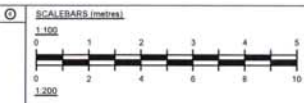
Jonathan D Moffatt BA(hons)/DipArch RIBA
 CHARTERED ARCHITECT
 245 The Ridgeway, St Albans, Herts. AL4 9XG
 phone: 01727 845160
 mobile: 07702 132171
 email: jonathan@jdmarchitects.co.uk





EXISTING FIRST FLOOR PLAN

NOTES
 All stated dimensions to be verified on site and the Architect notified of any discrepancies.
 This drawing to be read in accordance with the specification/Bills of Materials and related drawings.



Project
 CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR
 37 BROADWATER RD AL7 3AX

Title
 EXISTING FIRST
 FLOOR PLAN

Scale
 1:100 @ A3

Date
 MAR 15

Drawing Number
 J1220/P04

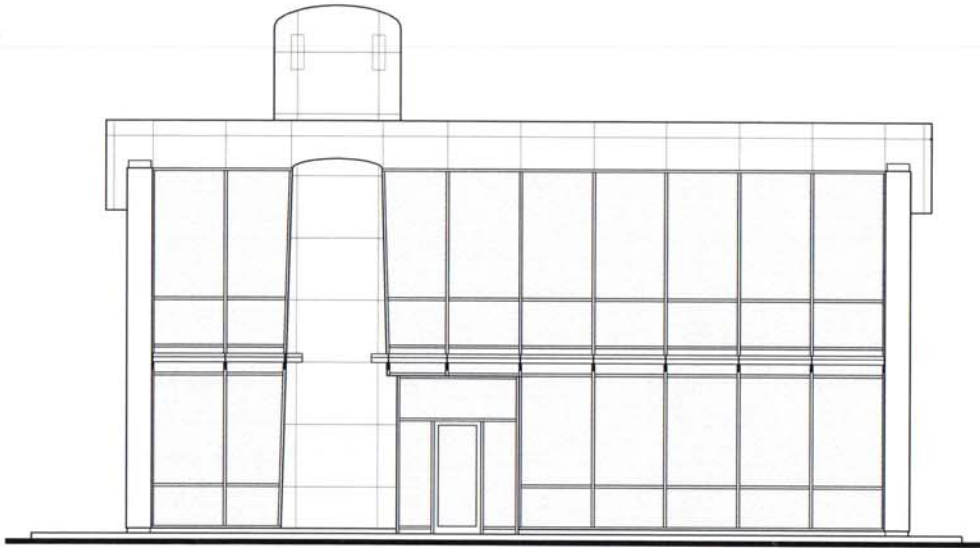
Drawn

Revision

Jonathan D Muffell BA(Hons) Dip Arch RIBA
 CHARTERED ARCHITECT

245 The Ridgeway, St Albans, Herts, AL4 8EG
 phone 01727 845160
 mobile 07702 132171
 email jonathan@jdmarchitects.co.uk

JDM
 ARCHITECTS

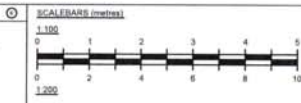


PROPOSED FRONT ELEVATION



PROPOSED SIDE ELEVATION

NOTES
 All stated dimensions to be verified on site and the Architect notified of any discrepancies.
 This drawing to be read in accordance with the specifications/ Bills of Materials and related drawings.



Project
**CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR**
 37 BROADWATER RD AL7 3AX

Title
EXISTING ELEVATIONS
 SHEET 1 OF 2

Scale
 1:100

Date
 MAR 15

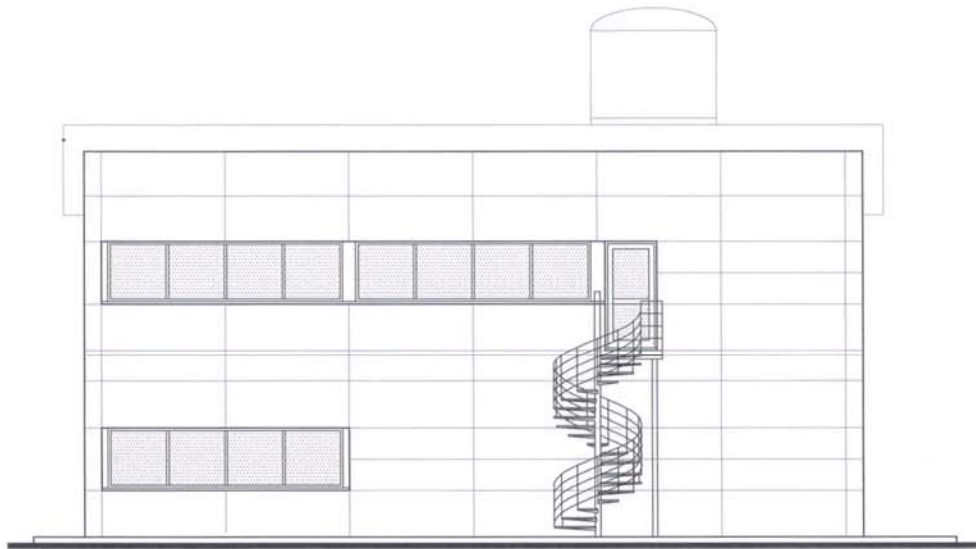
Drawing Number
 J1220/P05

Revision

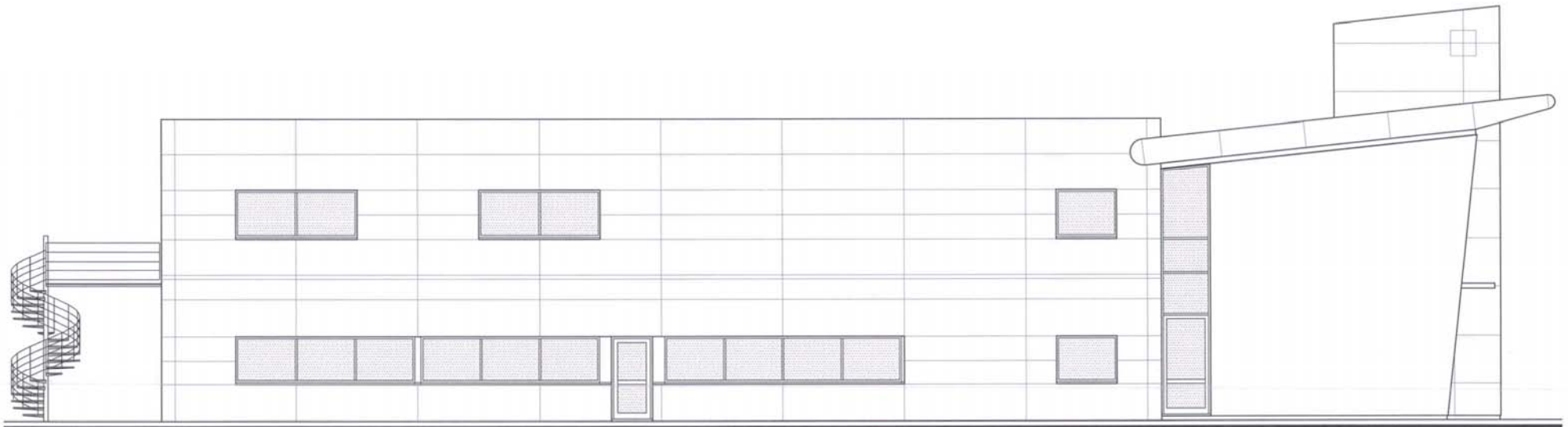
Jonathan D Murrell BA(hons)DipArch RIBA
 CHARTERED ARCHITECT

245 The Ridgeway, St Albans, Herts, AL4 8XG
 phone: 01727 845160
 mobile: 07702 132171
 email: jonathan@jdmarchitects.co.uk





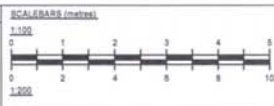
PROPOSED REAR ELEVATION



PROPOSED SIDE ELEVATION

NOTES

All stated dimensions to be verified on site and the Architect notified of any discrepancies.
This drawing to be read in accordance with the specifications/ Bills of Materials and related drawings.



Project
**CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR**
 37 BROADWATER RD AL7 3AX

Title
EXISTING ELEVATIONS
 SHEET 2 OF 2

Scale
 1:100

Date
 MAR 15

Drawing Number
 J1220/P06

AS

Drawn

Revision

Jonathan O Moffat BA(hons)/DipArch RIBA
 CHARTERED ARCHITECT

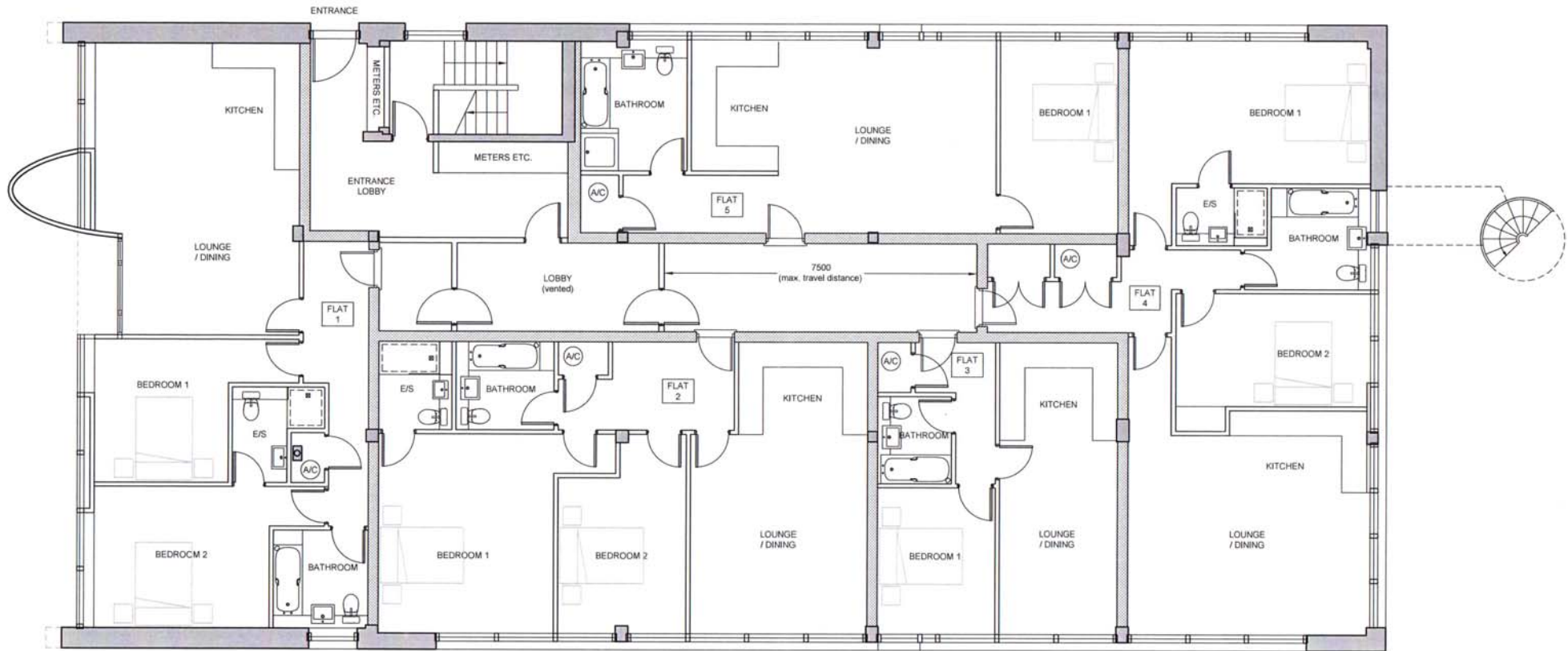
245 The Ridgeway, St Albans, Herts. AL4 6XQ
 phone: 07727 865192
 mobile: 07702 132171
 email: jonathan@jdmarchitects.co.uk

**JDM
 ARCHITECTS**



APPENDIX B

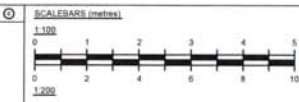
Proposed Scheme



PROPOSED GROUND FLOOR PLAN

FLAT	ACCOMMODATION	m2	sq.ft.
1	2 bed / 2 bath	82.5	888
2	2 bed / 2 bath	82.0	882
3	1 bed / 1 bath	40.4	435
4	2 bed / 2 bath	89.7	965
5	1 bed / 1 bath	59.4	639

NOTES
 All exact dimensions to be verified on site and the Architect notified of any discrepancies.
 This drawing to be read in accordance with the specification/Bills of Materials and related drawings.



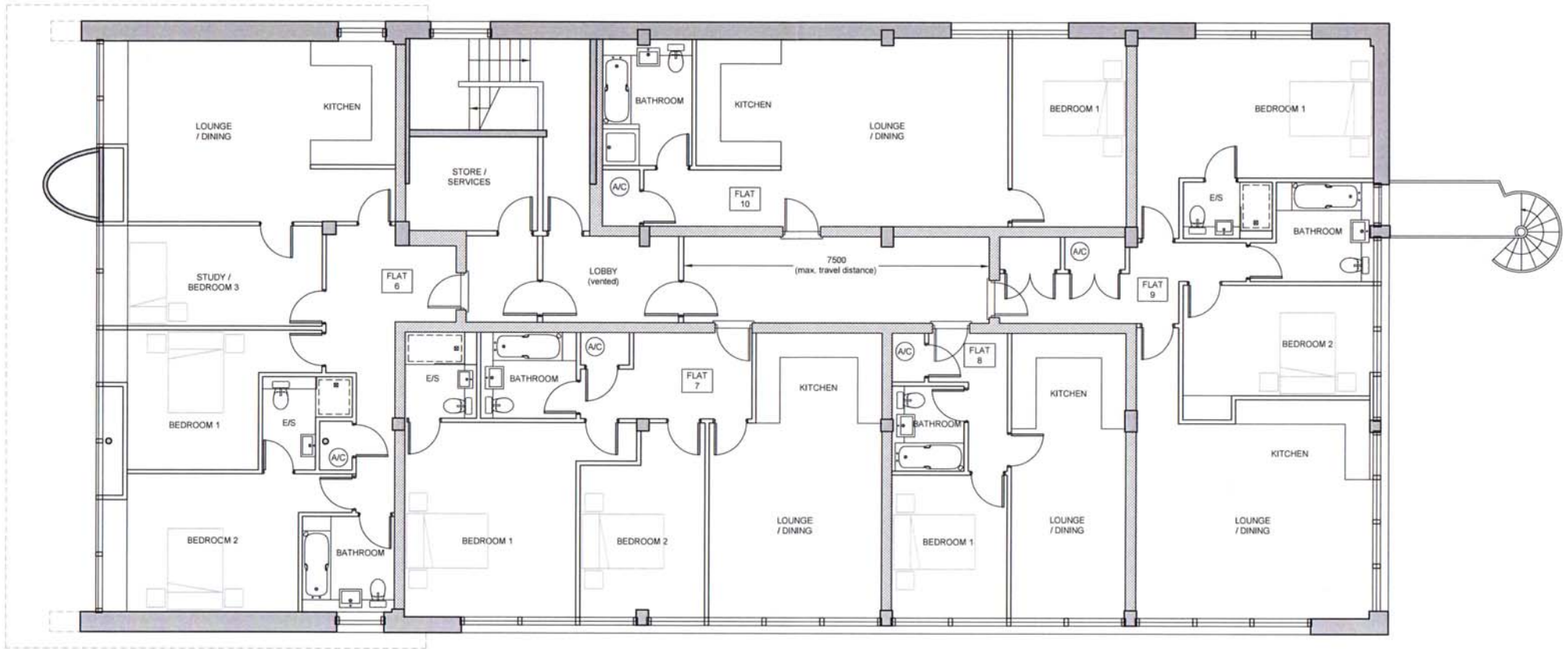
Project
**CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR**
 37 BROADWATER RD AL7 3AX

Title
**PROPOSED GROUND
 FLOOR PLAN**

Scale
 1:100 A3
 Date
 MAR 15 Drawn
 Drawing Number
 J1220/P07 Revision

Jonathan D Mollatt BA(Hons) DipArch FRIBA
 CHARTERED ARCHITECT
 245 The Ridgeway, St Albans, Herts, AL4 5XG
 phone 01727 845160
 mobile 07702 132171
 email jonathan@jdmarchitects.co.uk





PROPOSED FIRST FLOOR PLAN

FLAT	ACCOMMODATION	m2	sq.ft.
6	3 bed / 2 bath	95.2	1025
7	2 bed / 2 bath	82.0	882
8	1 bed / 1 bath	40.4	435
9	2 bed / 2 bath	89.7	965
10	1 bed / 1 bath	59.4	639

NOTES
 All stated dimensions to be verified on site and the Architect notified of any discrepancies.
 This drawing to be read in accordance with the specifications/Bills of Materials and related drawings.

SCALE BARS (metres)
 1:100
 0 1 2 3 4 5
 1:200
 0 2 4 6 8 10

Project
**CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR**
 37 BROADWATER RD AL7 3AX

Title
**PROPOSED FIRST
 FLOOR PLAN**

Scale
 1:100

Date
 MAR 15

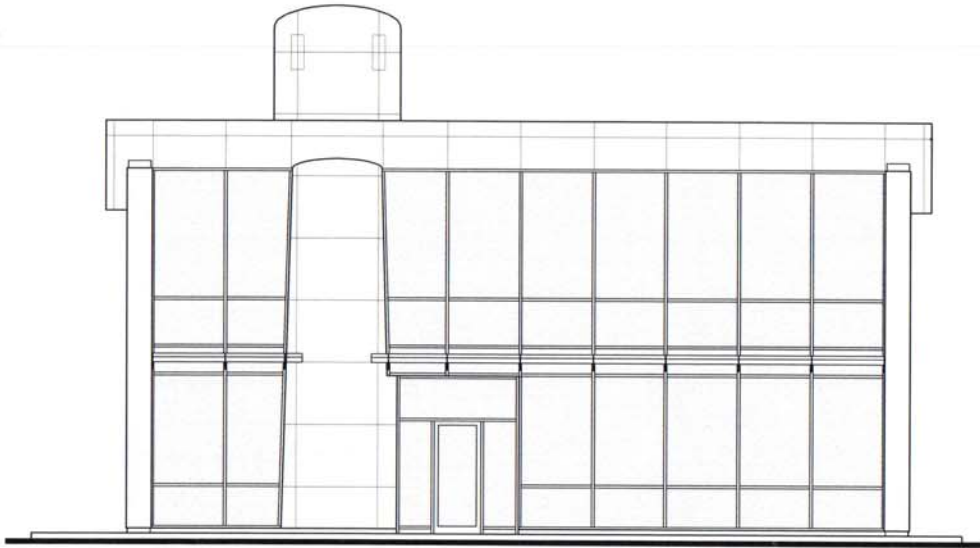
Drawing Number
 J1220/P08

Drawn
 Revision

Jonathan D Mottrell BA(Hons) DipArch RIBA
 CHARTERED ARCHITECT

245 The Ridgeway, St Albans, Herts. AL4 8XG
 phone 01727 845160
 mobile 07702 132171
 email jonathan@jdmarchitects.co.uk

**JDM
 ARCHITECTS**

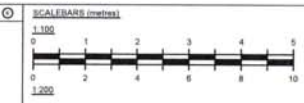


PROPOSED FRONT ELEVATION



PROPOSED SIDE ELEVATION

NOTES
 All stated dimensions to be verified on site and the Architect notified of any discrepancies.
 This drawing to be read in accordance with the specifications/ Bills of Materials and related drawings.



Project
**CHANGE OF USE FROM
 OFFICE TO RESIDENTIAL AT
 STUDIO FOUR**
 37 BROADWATER RD AL7 3AX

Title
EXISTING ELEVATIONS
 SHEET 1 OF 2

Scale
 1:100

Date
 MAR 15

Drawing Number
 J1220/P05

Revision

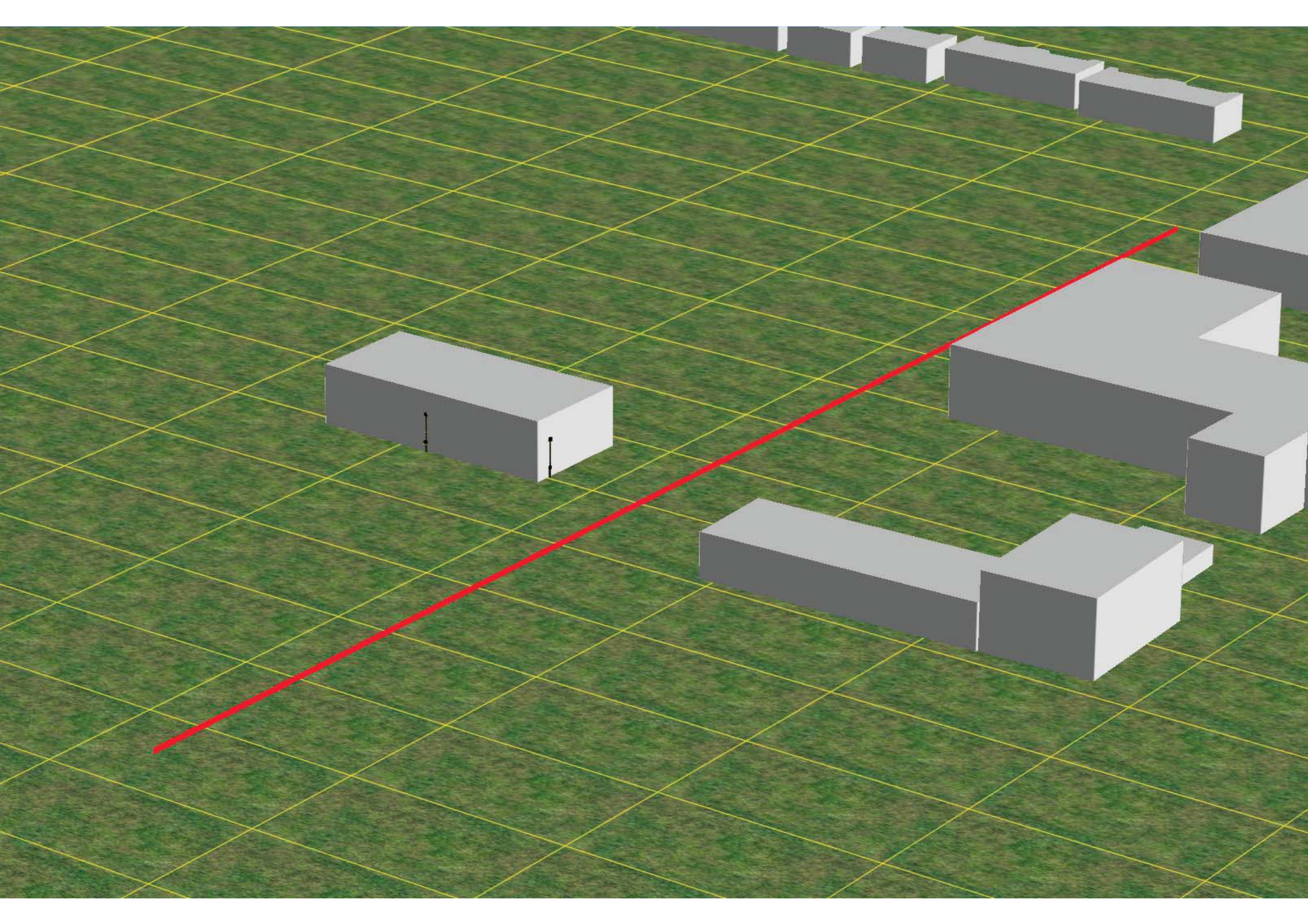
Jonathan D Murrell BA(hons)DipArch RIBA
 CHARTERED ARCHITECT

245 The Ridgeway, St Albans, Herts, AL4 8XG
 phone: 01727 845160
 mobile: 07702 132171
 email: jonathan@jdmarchitects.co.uk



APPENDIX C

Noise Prediction Model

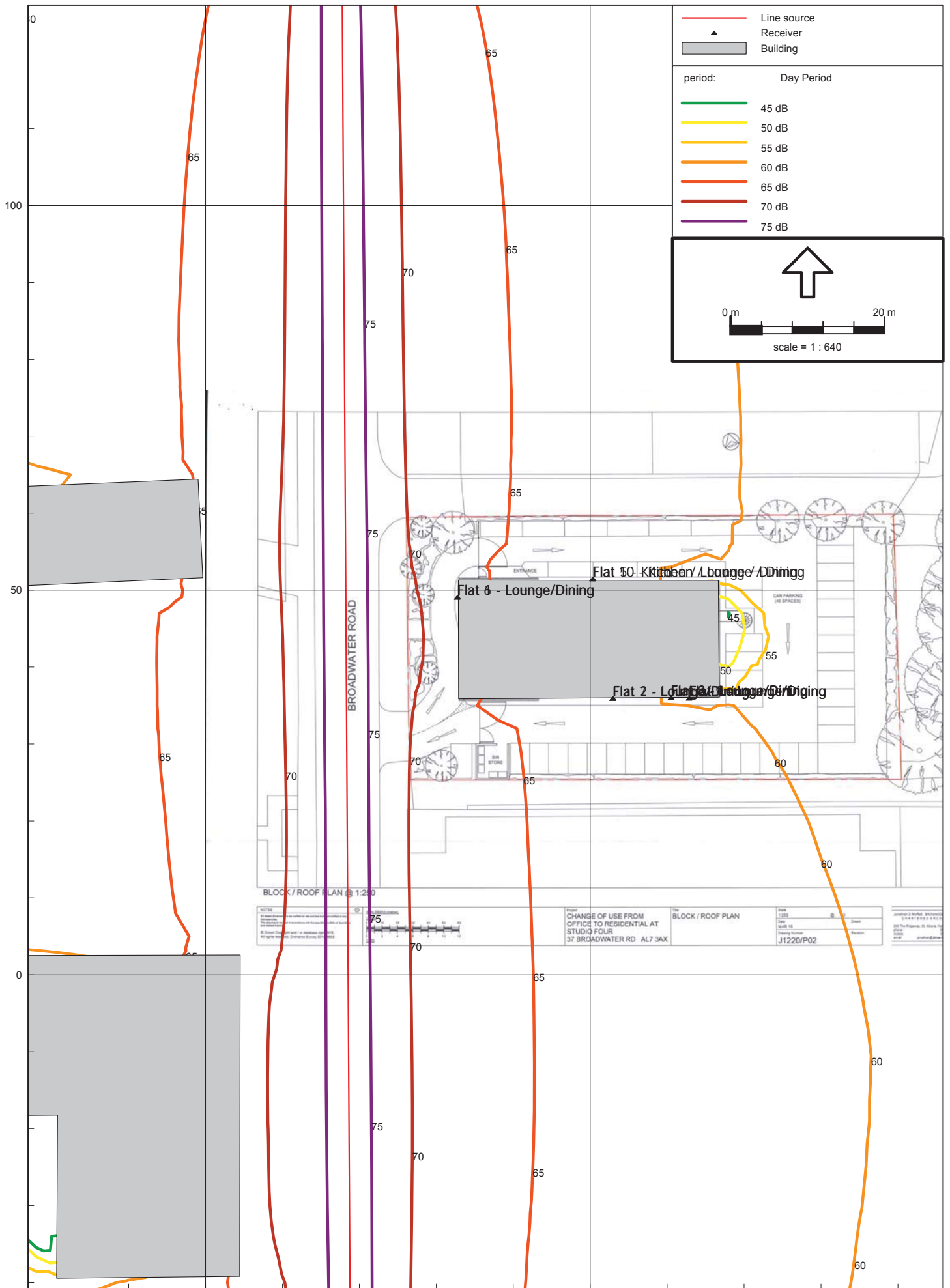


37 Broadwater Road, Welwyn
 Predicted Daytime LAeq Noise Levels Outside of Living Rooms

Report: Table of Results
 Model: Day Time Proposed
 LAeq per octave: total results for receivers
 Group: (main group)
 Group Reduction: No

Name Receiver	Description	Height	Day								
			Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 1 - Lounge/Dining	1.30	67	43	46	52	57	65	62	50	38
_A	Flat 6 - Lounge/Dining	5.00	67	43	46	52	57	64	61	49	38
_A	Flat 2 - Lounge/Dining	1.30	60	37	40	45	51	58	55	42	28
_A	Flat 7 - Lounge/Dining	5.00	60	37	40	45	50	58	54	42	28
_A	Flat 5 - Kitchen / Lounge / Dining	1.30	60	37	40	45	50	58	54	42	29
_A	Flat 10 - Kitchen / Lounge / Dining	5.00	60	37	40	45	50	57	54	42	28
_A	Flat 3 - Lounge/Dining	1.30	60	36	39	45	50	57	54	41	26
_A	Flat 4 - Lounge/Dining	1.30	59	35	39	44	50	57	54	40	25
_A	Flat 8 - Lounge/Dining	5.00	59	36	39	44	50	57	53	40	26
_A	Flat 9 - Lounge/Dining	5.00	59	35	39	44	49	56	53	40	25

All shown dB values are A-weighted

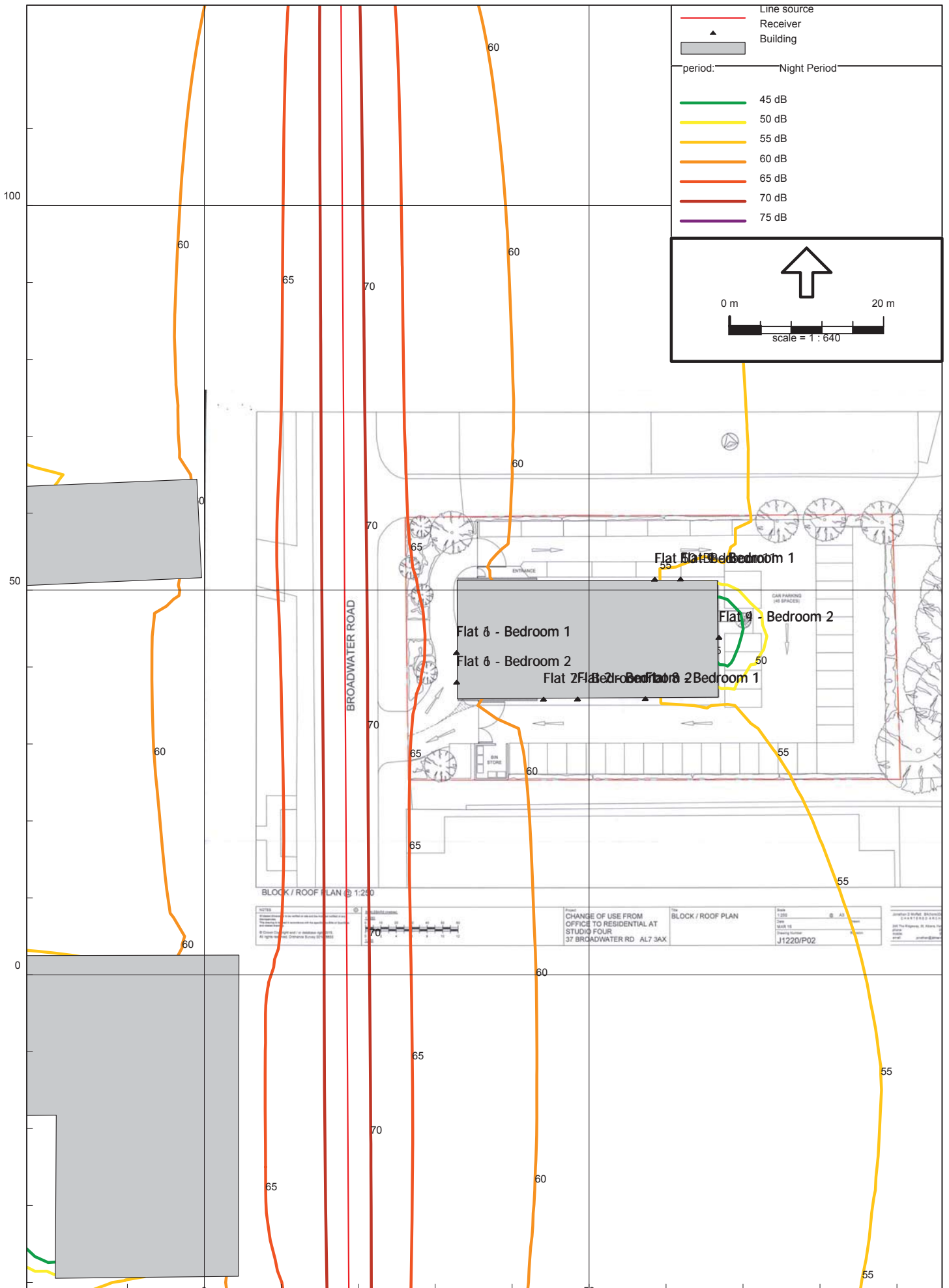


37 Broadwater Road, Welwyn
 Predicted Night-time LAeq Noise Levels Outside of Bedrooms

Report: Table of Results
 Model: Night Time Proposed
 LAeq per octave: total results for receivers
 Group: (main group)
 Group Reduction: No

Name			Night								
Receiver	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 1 - Bedroom 2	1.30	62	37	41	47	53	60	56	46	34
_A	Flat 1 - Bedroom 1	1.30	62	37	41	47	53	60	56	46	34
_A	Flat 6 - Bedroom 1	5.00	62	37	41	47	53	60	56	45	34
_A	Flat 6 - Bedroom 2	5.00	62	37	41	47	53	60	56	45	34
_A	Flat 2 - Bedroom 1	1.30	57	32	36	42	48	55	51	40	27
_A	Flat 7 - Bedroom 1	5.00	57	32	36	42	47	54	51	39	27
_A	Flat 2 - Bedroom 2	1.30	56	32	35	41	47	54	50	39	26
_A	Flat 7 - Bedroom 2	5.00	56	32	35	41	47	54	50	38	25
_A	Flat 3 - Bedroom 1	1.30	55	30	34	40	46	53	49	37	23
_A	Flat 8 - Bedroom 1	5.00	55	30	34	40	45	52	49	37	23
_A	Flat 5 - Bedroom 1	1.30	54	30	33	39	45	52	48	36	23
_A	Flat 10 - Bedroom 1	5.00	54	29	33	39	44	51	48	36	22
_A	Flat 4 - Bedroom 1	1.30	54	29	33	38	44	51	47	36	22
_A	Flat 9 - Bedroom 1	5.00	53	29	33	38	44	51	47	36	21
_A	Flat 4 - Bedroom 2	1.30	37	22	23	26	29	34	28	15	--
_A	Flat 9 - Bedroom 2	5.00	36	22	23	26	29	33	28	15	--

All shown dB values are A-weighted



37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 1 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 1 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 1 - Bedroom 1	1.30	92	65	72	78	84	88	86	78	72
Source		0.80	80	54	61	66	73	77	74	68	62
Source		0.80	80	54	61	66	73	77	74	68	62
Source		0.80	80	54	60	66	72	77	74	67	62
Source		0.80	80	53	60	65	72	76	74	67	61
Source		0.80	79	53	60	65	71	76	73	66	61
Source		0.80	79	52	59	65	71	76	73	66	60
Source		0.80	79	52	59	64	71	75	73	66	60
Source		0.80	78	52	58	64	70	75	72	65	59
Source		0.80	78	51	58	64	70	74	72	65	59
Source		0.80	77	51	58	63	69	74	71	64	58
Source		0.80	77	51	57	63	69	74	71	64	58
Source		0.80	77	50	57	63	69	73	71	64	58
Source		0.80	76	49	57	62	68	73	70	63	56
Source		0.80	76	50	56	62	68	73	70	63	57
Source		0.80	75	48	56	61	67	72	69	62	55
Source		0.80	75	49	55	61	67	72	69	62	55
Source		0.80	75	47	55	61	67	71	69	61	54
Source		0.80	74	48	55	60	66	71	68	61	54
Source		0.80	74	47	54	60	66	71	68	60	53
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	46	54	59	65	70	67	59	52
Source		0.80	73	46	53	59	65	69	67	59	52
Source		0.80	72	46	52	58	64	69	66	58	51
Source		0.80	71	45	52	58	64	68	65	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	45	51	57	63	68	65	57	49
Source		0.80	71	44	51	57	63	67	64	57	49
Source		0.80	70	44	51	56	63	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	56	47
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	70	43	50	56	62	66	63	55	45
Source		0.80	69	43	50	56	62	66	63	55	47
Source		0.80	69	43	50	55	62	66	63	55	44
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	54	43
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	42	49	55	61	65	62	54	45
Source		0.80	69	43	49	55	61	66	62	54	42
Source		0.80	68	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	55	61	65	62	53	42
Source		0.80	68	42	49	54	60	65	62	53	41

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 1 - Bedroom 2

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 1 - Bedroom 2
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 1 - Bedroom 2	1.30	92	65	72	78	84	88	86	78	72
Source		0.80	81	54	61	66	73	77	75	68	62
Source		0.80	80	54	61	66	72	77	74	67	62
Source		0.80	80	54	60	66	72	77	74	67	62
Source		0.80	80	53	60	66	72	77	74	67	62
Source		0.80	80	53	60	65	72	76	74	67	61
Source		0.80	79	52	59	65	71	76	73	66	60
Source		0.80	79	52	59	64	71	75	73	66	60
Source		0.80	78	51	58	64	70	75	72	65	59
Source		0.80	78	51	58	64	70	75	72	65	59
Source		0.80	77	51	57	63	69	74	71	64	58
Source		0.80	77	50	57	63	69	74	71	64	58
Source		0.80	76	50	56	62	68	73	70	63	57
Source		0.80	76	50	56	62	68	73	70	63	57
Source		0.80	75	49	56	61	68	72	69	62	56
Source		0.80	75	49	56	61	67	72	69	62	56
Source		0.80	75	48	56	61	67	72	69	62	55
Source		0.80	74	47	55	60	67	71	68	61	54
Source		0.80	74	48	55	60	66	71	68	61	54
Source		0.80	74	46	54	60	66	71	68	60	53
Source		0.80	74	47	54	60	66	70	67	60	53
Source		0.80	73	46	54	59	65	70	67	59	52
Source		0.80	73	46	53	59	65	70	67	59	52
Source		0.80	73	45	53	59	65	69	66	59	51
Source		0.80	72	46	52	58	64	69	66	59	51
Source		0.80	72	44	52	58	64	69	66	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	44	51	57	63	67	65	57	49
Source		0.80	70	44	51	57	63	67	64	56	46
Source		0.80	70	44	51	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	55	45
Source		0.80	70	43	50	56	62	66	64	56	47
Source		0.80	70	43	50	56	62	66	63	55	45
Source		0.80	69	43	50	56	62	66	63	55	47
Source		0.80	69	43	50	55	62	66	63	55	44
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	54	43
Source		0.80	69	43	49	55	61	66	62	54	42
Source		0.80	68	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	55	61	65	62	53	42

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 2 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 2 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 2 - Bedroom 1	1.30	86	60	67	72	78	83	80	72	65
Source		0.80	75	49	56	61	68	72	69	62	56
Source		0.80	75	49	56	61	67	72	69	62	56
Source		0.80	75	49	55	61	67	72	69	62	55
Source		0.80	75	48	55	61	67	71	69	61	55
Source		0.80	74	48	55	60	67	71	68	61	55
Source		0.80	74	47	54	60	66	71	68	60	54
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	46	53	59	65	70	67	59	52
Source		0.80	72	46	53	58	64	69	66	59	51
Source		0.80	72	45	52	58	64	69	66	58	51
Source		0.80	71	45	52	57	63	68	65	58	50
Source		0.80	71	45	51	57	63	68	65	56	47
Source		0.80	71	44	51	57	63	67	65	57	49
Source		0.80	70	44	51	57	63	67	64	56	46
Source		0.80	70	44	51	56	62	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	45	51	57	62	67	63	55	47
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	70	43	50	56	62	66	63	55	45
Source		0.80	69	43	50	56	62	66	63	55	44
Source		0.80	69	43	50	55	61	66	63	54	43
Source		0.80	69	43	49	55	61	66	62	54	43
Source		0.80	68	42	49	55	61	65	62	54	42
Source		0.80	68	42	49	54	61	65	62	53	41
Source		0.80	68	42	48	54	60	65	62	53	40
Source		0.80	68	42	48	54	60	65	61	52	40
Source		0.80	67	41	48	54	60	64	61	52	39
Source		0.80	67	41	48	53	59	64	61	51	38
Source		0.80	67	41	47	53	59	64	60	51	37
Source		0.80	63	43	49	53	57	59	54	45	36
Source		0.80	59	42	46	49	53	55	50	41	33
Source		0.80	55	39	43	45	49	51	47	38	30
Source		0.80	54	38	41	44	48	50	46	37	29
Source		0.80	53	37	40	43	47	49	45	36	28
Source		0.80	52	36	39	42	46	48	44	36	28
Source		0.80	52	35	39	41	45	48	44	35	27
Source		0.80	51	34	38	40	44	47	43	35	26
Source		0.80	50	32	38	40	44	47	43	34	25
Source		0.80	50	33	37	40	43	47	43	34	25
Source		0.80	50	33	36	38	42	47	44	36	30
Source		0.80	50	33	37	39	43	46	42	33	24

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 2 - Bedroom 2

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 2 - Bedroom 2
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 2 - Bedroom 2	1.30	85	59	66	72	78	82	79	71	64
Source		0.80	74	48	54	60	66	71	68	61	54
Source		0.80	74	48	54	60	66	71	68	61	54
Source		0.80	74	47	54	60	66	71	68	60	54
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	47	54	59	65	70	67	60	53
Source		0.80	73	46	53	59	65	70	67	59	52
Source		0.80	73	46	53	59	65	69	66	59	52
Source		0.80	72	46	52	58	64	69	66	58	51
Source		0.80	72	45	52	58	64	68	66	58	50
Source		0.80	71	45	52	57	63	68	65	57	49
Source		0.80	71	44	51	57	63	68	65	57	49
Source		0.80	70	44	51	57	63	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	44	51	56	62	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	55	45
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	56	62	66	63	55	44
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	43	50	55	61	66	63	54	44
Source		0.80	69	43	49	55	61	66	63	54	43
Source		0.80	69	42	49	55	61	65	62	54	42
Source		0.80	68	42	49	55	61	65	62	53	42
Source		0.80	68	42	49	54	60	65	62	53	41
Source		0.80	68	43	50	55	61	65	61	52	44
Source		0.80	68	42	48	54	60	65	61	52	40
Source		0.80	67	41	48	54	60	64	61	52	39
Source		0.80	67	41	48	54	60	64	61	52	39
Source		0.80	67	41	48	53	59	64	61	51	38
Source		0.80	67	38	47	53	59	64	60	51	37
Source		0.80	61	42	47	51	55	57	52	42	34
Source		0.80	57	40	44	47	51	53	48	39	31
Source		0.80	52	36	40	42	46	49	44	36	28
Source		0.80	52	35	39	41	45	48	43	35	27
Source		0.80	51	34	38	41	44	47	43	35	27
Source		0.80	50	34	38	40	44	47	43	34	26
Source		0.80	50	32	38	40	44	46	43	34	25
Source		0.80	50	31	37	40	44	46	42	34	24
Source		0.80	50	33	37	39	43	46	42	34	25
Source		0.80	49	32	36	38	42	46	42	33	24
Source		0.80	49	32	35	36	41	45	42	35	28
Source		0.80	49	32	34	36	41	45	42	35	27

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 3 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 3 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 3 - Bedroom 1	1.30	84	58	65	70	76	81	78	70	61
Source		0.80	72	45	52	58	64	69	66	58	51
Source		0.80	72	45	52	58	64	69	66	58	50
Source		0.80	72	45	52	58	64	68	66	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	45	51	57	63	68	65	57	49
Source		0.80	71	45	51	57	63	68	65	57	49
Source		0.80	70	44	51	57	63	67	64	57	48
Source		0.80	70	44	51	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	56	47
Source		0.80	70	44	50	56	62	67	63	55	45
Source		0.80	69	43	50	56	62	66	63	55	47
Source		0.80	69	43	50	56	62	66	63	55	44
Source		0.80	69	43	50	55	62	66	63	55	44
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	54	43
Source		0.80	69	43	49	55	61	66	62	54	43
Source		0.80	69	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	55	61	65	62	53	42
Source		0.80	68	42	49	54	61	65	62	53	41
Source		0.80	68	42	49	54	60	65	62	53	41
Source		0.80	68	42	48	54	60	65	61	52	40
Source		0.80	67	41	48	54	60	64	61	52	39
Source		0.80	67	41	48	53	60	64	61	52	39
Source		0.80	67	41	48	53	59	64	61	51	38
Source		0.80	67	41	47	53	59	64	60	51	37
Source		0.80	65	41	47	53	59	62	58	49	40
Source		0.80	64	38	45	51	57	61	58	48	35
Source		0.80	58	39	45	48	52	54	49	39	30
Source		0.80	50	34	37	40	44	46	42	33	25
Source		0.80	50	30	37	40	44	46	42	33	23
Source		0.80	49	33	36	39	43	46	41	33	24
Source		0.80	49	32	36	38	42	46	42	33	24
Source		0.80	49	32	35	38	42	45	41	33	24
Source		0.80	48	31	35	37	41	45	41	32	23
Source		0.80	48	31	34	37	41	44	40	32	22
Source		0.80	47	30	32	34	39	44	41	33	25
Source		0.80	47	30	32	34	39	44	40	33	25
Source		0.80	47	29	32	34	39	43	40	32	25
Source		0.80	46	30	33	35	39	42	38	30	20

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 4 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 4 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 4 - Bedroom 1	1.30	83	57	64	69	75	80	77	69	60
Source		0.80	72	46	52	58	64	69	66	58	49
Source		0.80	72	45	52	58	64	69	66	58	49
Source		0.80	72	45	52	58	64	69	66	58	49
Source		0.80	72	45	52	58	64	68	65	58	49
Source		0.80	71	44	52	58	64	68	65	57	49
Source		0.80	71	44	52	57	63	68	65	57	48
Source		0.80	70	44	50	56	62	67	64	56	47
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	55	62	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	42	49	55	61	66	63	55	45
Source		0.80	68	42	49	54	61	65	62	54	45
Source		0.80	68	42	48	54	60	65	62	54	44
Source		0.80	68	41	48	54	60	65	61	53	43
Source		0.80	67	41	48	54	60	64	61	53	43
Source		0.80	67	41	48	53	59	64	61	53	42
Source		0.80	67	41	47	53	59	64	61	52	42
Source		0.80	67	41	47	53	59	64	60	52	41
Source		0.80	66	40	47	53	59	63	60	52	41
Source		0.80	66	40	47	52	59	63	60	51	40
Source		0.80	66	40	47	52	58	63	60	52	44
Source		0.80	66	40	47	52	58	63	60	51	39
Source		0.80	66	40	46	52	58	63	59	51	39
Source		0.80	65	39	46	52	58	62	59	50	38
Source		0.80	65	39	46	51	58	62	59	50	37
Source		0.80	65	39	46	51	57	62	59	49	37
Source		0.80	65	39	45	51	57	62	58	49	36
Source		0.80	60	39	45	50	54	57	52	42	31
Source		0.80	54	37	41	45	48	50	45	36	26
Source		0.80	52	35	39	42	46	48	43	34	25
Source		0.80	50	34	37	40	44	46	42	33	24
Source		0.80	49	33	36	39	43	45	41	32	24
Source		0.80	49	32	36	38	42	45	41	32	23
Source		0.80	48	32	36	39	42	44	40	31	19
Source		0.80	48	32	36	38	42	44	40	31	18
Source		0.80	48	32	35	37	41	44	40	32	23
Source		0.80	48	31	35	38	42	44	39	30	18
Source		0.80	48	31	35	38	42	44	39	30	17
Source		0.80	47	31	35	38	41	43	39	30	16
Source		0.80	47	31	34	37	41	44	40	31	22
Source		0.80	47	31	34	36	40	43	39	31	22

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 4 - Bedroom 2

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 4 - Bedroom 2
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 4 - Bedroom 2	1.30	66	50	54	57	60	63	58	48	37
Source		0.80	51	32	38	41	45	47	42	34	23
Source		0.80	51	34	38	41	45	47	42	34	24
Source		0.80	51	32	38	41	45	47	42	33	23
Source		0.80	51	32	38	41	45	47	42	33	23
Source		0.80	51	32	38	41	45	47	42	33	22
Source		0.80	50	33	38	40	44	46	42	32	20
Source		0.80	50	33	37	40	44	46	41	32	20
Source		0.80	50	33	37	40	44	46	41	32	19
Source		0.80	50	33	37	40	44	46	41	32	19
Source		0.80	50	33	37	40	44	46	41	31	18
Source		0.80	50	33	37	40	44	46	41	31	17
Source		0.80	50	33	37	40	44	46	41	31	18
Source		0.80	50	33	37	40	43	46	41	31	17
Source		0.80	49	33	37	40	43	46	41	30	16
Source		0.80	49	32	37	40	43	46	41	30	15
Source		0.80	49	33	37	40	43	46	41	30	16
Source		0.80	49	32	37	40	43	46	41	30	14
Source		0.80	49	32	37	40	43	46	40	30	14
Source		0.80	49	32	37	40	43	46	40	29	13
Source		0.80	48	32	36	39	43	45	39	28	14
Source		0.80	48	31	36	39	43	45	39	28	13
Source		0.80	48	32	36	39	42	45	39	28	14
Source		0.80	48	32	36	39	42	45	39	29	15
Source		0.80	48	31	36	39	43	45	39	27	12
Source		0.80	48	31	36	39	43	45	39	28	13
Source		0.80	48	32	36	39	42	45	39	28	15
Source		0.80	48	31	36	39	43	45	39	28	12
Source		0.80	48	32	36	39	42	44	39	29	16
Source		0.80	48	32	36	39	42	44	39	29	16
Source		0.80	48	31	36	39	43	45	39	27	10
Source		0.80	48	32	36	39	42	44	39	29	17
Source		0.80	48	32	36	39	42	44	39	29	18
Source		0.80	48	32	36	38	42	44	40	31	21
Source		0.80	48	32	36	39	42	44	39	29	17
Source		0.80	48	32	36	39	42	44	39	30	18
Source		0.80	48	32	35	38	42	44	40	32	22
Source		0.80	48	32	35	37	41	44	40	32	23
Source		0.80	48	32	36	38	42	44	40	30	20
Source		0.80	48	32	35	37	41	44	40	32	22
Source		0.80	48	32	36	38	42	44	39	30	19
Source		0.80	48	32	35	38	41	44	40	31	22

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 5 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 5 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 5 - Bedroom 1	1.30	84	58	64	70	76	80	77	69	60
Source		0.80	72	46	53	58	65	69	66	58	50
Source		0.80	72	46	53	58	65	69	66	58	50
Source		0.80	72	46	53	58	65	69	66	58	50
Source		0.80	72	46	53	58	64	69	66	58	50
Source		0.80	72	45	52	58	64	69	66	58	50
Source		0.80	72	44	52	58	64	69	66	58	49
Source		0.80	70	44	51	57	63	67	64	57	48
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	43	50	56	62	67	64	56	47
Source		0.80	69	43	50	56	62	66	63	55	47
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	54	61	65	62	54	45
Source		0.80	68	42	48	54	60	65	62	54	44
Source		0.80	68	41	48	54	60	64	61	53	43
Source		0.80	67	41	48	53	60	64	61	53	43
Source		0.80	67	41	48	53	59	64	61	52	42
Source		0.80	67	41	47	53	59	64	61	52	42
Source		0.80	67	41	47	53	59	63	61	53	45
Source		0.80	67	40	47	53	59	64	60	52	41
Source		0.80	66	40	47	53	59	63	60	51	40
Source		0.80	66	40	47	52	58	63	60	51	40
Source		0.80	66	40	46	52	58	63	60	51	39
Source		0.80	65	39	46	52	58	62	59	50	38
Source		0.80	65	39	46	52	58	62	59	50	38
Source		0.80	65	39	46	51	57	62	59	50	37
Source		0.80	65	39	45	51	57	62	58	49	36
Source		0.80	61	40	46	51	55	58	53	43	33
Source		0.80	55	38	42	45	49	51	46	36	27
Source		0.80	52	36	40	43	46	49	44	35	26
Source		0.80	51	34	38	41	45	47	43	34	25
Source		0.80	50	34	37	40	43	46	42	33	25
Source		0.80	49	33	36	39	43	46	41	33	24
Source		0.80	49	32	36	38	42	45	41	32	24
Source		0.80	48	32	36	39	42	44	40	31	19
Source		0.80	48	32	36	38	42	44	40	31	19
Source		0.80	48	32	35	37	41	44	40	32	23
Source		0.80	48	31	35	38	42	44	40	31	18
Source		0.80	48	31	35	38	42	44	39	30	17
Source		0.80	48	31	35	37	41	44	40	31	23
Source		0.80	47	31	35	38	41	44	39	30	17

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 6 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 6 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 6 - Bedroom 1	5.00	91	65	72	77	84	88	85	78	72
Source		0.80	80	54	60	66	72	77	74	67	62
Source		0.80	80	54	60	66	72	77	74	67	62
Source		0.80	80	53	60	66	72	77	74	67	62
Source		0.80	79	53	59	65	71	76	73	66	61
Source		0.80	79	53	59	65	71	76	73	66	61
Source		0.80	79	52	59	65	71	75	73	66	60
Source		0.80	78	52	59	64	70	75	72	65	60
Source		0.80	78	51	58	64	70	75	72	65	59
Source		0.80	78	51	58	63	70	74	72	64	59
Source		0.80	77	51	57	63	69	74	71	64	58
Source		0.80	77	50	57	63	69	74	71	64	57
Source		0.80	77	50	57	63	69	73	71	63	57
Source		0.80	76	49	56	62	68	73	70	63	56
Source		0.80	76	50	56	62	68	73	70	63	57
Source		0.80	75	48	55	61	67	72	69	62	55
Source		0.80	75	49	55	61	67	72	69	62	55
Source		0.80	75	47	55	61	67	71	68	61	54
Source		0.80	74	48	55	60	66	71	68	61	54
Source		0.80	74	47	54	60	66	71	68	60	53
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	46	54	59	65	70	67	59	52
Source		0.80	73	46	53	59	65	69	67	59	52
Source		0.80	72	46	52	58	64	69	66	58	51
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	44	51	57	63	68	65	57	49
Source		0.80	71	44	51	57	63	67	64	57	49
Source		0.80	70	44	51	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	56	47
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	55	62	66	63	55	47
Source		0.80	69	43	50	55	62	66	63	55	44
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	54	43
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	55	61	65	62	54	43
Source		0.80	68	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	54	60	65	62	54	44
Source		0.80	68	42	49	54	60	65	62	53	42
Source		0.80	68	42	48	54	60	65	62	54	44

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 6 - Bedroom 2

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 6 - Bedroom 2
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 6 - Bedroom 2	5.00	92	65	72	77	84	88	85	78	72
Source		0.80	80	54	60	66	72	77	74	67	62
Source		0.80	80	54	60	66	72	77	74	67	62
Source		0.80	80	53	60	66	72	77	74	67	62
Source		0.80	80	53	60	65	72	76	74	67	61
Source		0.80	79	53	59	65	71	76	73	66	61
Source		0.80	79	52	59	64	71	75	73	66	60
Source		0.80	78	52	59	64	70	75	72	65	60
Source		0.80	78	51	58	64	70	74	72	65	59
Source		0.80	78	51	58	64	70	74	72	65	59
Source		0.80	77	51	57	63	69	74	71	64	58
Source		0.80	77	50	57	63	69	74	71	64	58
Source		0.80	76	50	56	62	68	73	70	63	57
Source		0.80	76	50	56	62	68	73	70	63	57
Source		0.80	75	49	56	61	67	72	69	62	56
Source		0.80	75	49	56	61	67	72	69	62	56
Source		0.80	75	48	56	61	67	72	69	62	55
Source		0.80	74	47	55	60	66	71	68	61	53
Source		0.80	74	48	55	60	66	71	68	61	54
Source		0.80	74	46	54	60	66	71	68	60	53
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	46	53	59	65	70	67	59	51
Source		0.80	73	46	53	59	65	70	67	59	52
Source		0.80	72	45	53	59	65	69	66	59	50
Source		0.80	72	46	52	58	64	69	66	58	51
Source		0.80	72	44	52	58	64	69	66	58	49
Source		0.80	71	45	52	57	63	68	65	58	50
Source		0.80	71	44	51	57	63	67	64	57	49
Source		0.80	70	44	51	56	63	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	55	45
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	56	62	66	63	55	47
Source		0.80	69	43	50	56	62	66	63	55	44
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	68	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	55	61	65	62	54	43
Source		0.80	68	42	49	54	60	65	62	53	42
Source		0.80	68	42	48	54	60	65	62	54	44

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 7 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 7 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 7 - Bedroom 1	5.00	86	60	67	72	78	83	80	72	65
Source		0.80	75	49	56	61	67	72	69	62	56
Source		0.80	75	49	55	61	67	72	69	62	56
Source		0.80	75	49	55	61	67	72	69	62	55
Source		0.80	75	48	55	61	67	71	69	61	55
Source		0.80	74	48	55	60	67	71	68	61	54
Source		0.80	74	47	54	60	66	71	68	60	54
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	46	53	59	65	70	67	59	52
Source		0.80	72	46	53	58	64	69	66	59	51
Source		0.80	72	45	52	58	64	69	66	58	50
Source		0.80	71	45	52	57	63	68	65	58	50
Source		0.80	71	44	51	57	63	67	64	56	47
Source		0.80	71	44	51	57	63	67	64	57	49
Source		0.80	70	44	51	56	63	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	55	46
Source		0.80	70	45	51	57	62	67	63	55	47
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	56	62	66	63	55	45
Source		0.80	69	43	50	55	61	66	63	54	44
Source		0.80	69	42	49	55	61	65	62	54	43
Source		0.80	68	42	49	54	61	65	62	53	42
Source		0.80	68	42	48	54	60	65	62	53	41
Source		0.80	67	41	48	54	60	64	61	52	41
Source		0.80	67	41	48	53	59	64	61	52	39
Source		0.80	67	41	47	53	59	64	60	51	39
Source		0.80	66	40	47	53	59	63	60	51	38
Source		0.80	66	40	47	52	58	63	60	50	37
Source		0.80	65	40	46	52	58	63	59	50	36
Source		0.80	63	44	49	53	57	60	54	45	36
Source		0.80	59	42	47	50	53	55	50	41	33
Source		0.80	56	40	44	47	50	52	48	39	31
Source		0.80	55	39	43	46	49	51	47	38	30
Source		0.80	54	38	42	45	48	50	46	37	29
Source		0.80	53	38	41	44	47	49	45	36	28
Source		0.80	52	37	40	43	46	48	44	35	28
Source		0.80	52	36	40	42	45	48	44	35	27
Source		0.80	51	35	39	41	44	47	43	34	26
Source		0.80	50	35	39	41	44	46	42	34	25
Source		0.80	50	34	38	40	43	46	42	33	24
Source		0.80	49	34	38	40	42	45	41	33	24

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 7 - Bedroom 2

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 7 - Bedroom 2
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 7 - Bedroom 2	5.00	85	59	66	71	78	82	79	71	63
Source		0.80	74	48	54	60	66	71	68	61	54
Source		0.80	74	48	54	60	66	71	68	61	54
Source		0.80	74	47	54	60	66	71	68	60	53
Source		0.80	73	47	54	59	66	70	67	60	53
Source		0.80	73	47	54	59	65	70	67	60	53
Source		0.80	73	46	53	59	65	70	67	59	52
Source		0.80	72	46	53	58	65	69	66	59	52
Source		0.80	72	46	52	58	64	69	66	58	51
Source		0.80	72	45	52	58	64	68	65	58	50
Source		0.80	71	45	51	57	63	68	65	57	49
Source		0.80	71	44	51	57	63	67	65	57	49
Source		0.80	70	44	51	56	63	67	64	56	46
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	55	46
Source		0.80	70	43	50	56	62	66	63	55	45
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	43	50	55	61	66	63	54	44
Source		0.80	69	43	49	55	61	66	62	54	43
Source		0.80	68	42	49	55	61	65	62	53	42
Source		0.80	68	44	50	55	61	65	61	53	44
Source		0.80	68	42	49	54	60	65	62	53	42
Source		0.80	68	42	48	54	60	65	61	53	41
Source		0.80	67	41	48	54	60	64	61	52	40
Source		0.80	67	41	47	53	59	64	60	51	39
Source		0.80	66	40	47	53	59	63	60	51	38
Source		0.80	66	40	47	52	59	63	60	51	37
Source		0.80	66	40	46	52	58	63	59	50	37
Source		0.80	65	37	46	52	58	62	59	50	36
Source		0.80	61	42	47	51	55	57	52	42	34
Source		0.80	57	40	45	48	51	53	48	39	31
Source		0.80	55	39	42	45	48	51	46	37	29
Source		0.80	54	38	41	44	47	50	45	36	28
Source		0.80	52	37	40	43	46	49	44	36	28
Source		0.80	52	36	40	42	45	48	43	35	27
Source		0.80	51	36	39	42	45	47	43	35	27
Source		0.80	51	35	39	41	44	47	43	34	26
Source		0.80	50	34	38	40	43	46	42	34	25
Source		0.80	49	34	38	40	43	45	42	33	24
Source		0.80	49	33	37	39	42	45	41	33	23
Source		0.80	48	33	37	39	41	44	41	32	23

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 8 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 8 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 8 - Bedroom 1	5.00	84	58	65	70	76	81	78	70	61
Source		0.80	72	45	52	58	64	69	66	58	51
Source		0.80	72	45	52	58	64	69	66	58	50
Source		0.80	72	45	52	58	64	68	66	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	45	52	57	64	68	65	58	50
Source		0.80	71	45	51	57	63	68	65	57	49
Source		0.80	71	44	51	57	63	68	65	57	49
Source		0.80	70	44	51	57	63	67	64	57	48
Source		0.80	70	44	51	56	62	67	64	56	48
Source		0.80	70	44	50	56	62	67	64	56	47
Source		0.80	70	44	50	56	62	67	64	55	45
Source		0.80	69	43	50	56	62	66	63	55	47
Source		0.80	69	43	50	56	62	66	63	55	45
Source		0.80	69	43	50	55	61	66	63	55	44
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	54	44
Source		0.80	69	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	55	61	65	62	54	43
Source		0.80	68	42	49	54	60	65	62	53	42
Source		0.80	68	42	48	54	60	65	61	53	41
Source		0.80	67	41	48	54	60	64	61	52	41
Source		0.80	67	41	48	53	60	64	61	52	40
Source		0.80	67	41	47	53	59	64	60	52	39
Source		0.80	66	40	47	53	59	63	60	51	38
Source		0.80	66	40	47	52	59	63	60	51	37
Source		0.80	66	40	46	52	58	63	59	50	37
Source		0.80	66	42	48	53	59	62	59	49	40
Source		0.80	65	39	46	52	58	62	59	50	36
Source		0.80	63	37	44	49	55	60	57	47	34
Source		0.80	58	40	45	48	52	55	49	39	30
Source		0.80	54	38	42	45	48	51	45	36	27
Source		0.80	52	36	40	42	46	48	43	34	26
Source		0.80	51	35	39	41	45	47	43	34	25
Source		0.80	50	35	38	40	44	46	42	33	25
Source		0.80	49	34	37	40	43	46	41	33	24
Source		0.80	49	33	37	39	43	46	42	33	24
Source		0.80	49	33	37	39	42	45	41	33	24
Source		0.80	48	33	36	38	41	44	41	32	23
Source		0.80	48	32	36	38	41	44	40	32	22
Source		0.80	48	32	36	38	41	44	40	31	22
Source		0.80	46	32	35	37	39	42	38	30	20

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 9 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 9 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 9 - Bedroom 1	5.00	83	57	64	69	75	80	77	69	59
Source		0.80	72	45	52	58	64	68	66	58	49
Source		0.80	72	45	52	58	64	68	65	58	49
Source		0.80	72	45	52	58	64	68	65	58	49
Source		0.80	71	45	52	58	64	68	65	57	49
Source		0.80	71	44	52	57	63	68	65	57	48
Source		0.80	71	44	51	57	63	68	65	57	48
Source		0.80	70	44	50	56	62	67	64	56	47
Source		0.80	70	43	50	56	62	66	63	56	47
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	43	49	55	61	66	63	55	46
Source		0.80	69	42	49	55	61	66	63	54	45
Source		0.80	68	42	49	54	60	65	62	54	44
Source		0.80	68	42	48	54	60	65	62	54	44
Source		0.80	68	41	48	54	60	65	61	53	43
Source		0.80	67	41	48	53	60	64	61	53	43
Source		0.80	67	41	47	53	59	64	61	52	42
Source		0.80	66	40	47	53	59	63	60	52	41
Source		0.80	66	40	47	52	59	63	60	52	41
Source		0.80	66	40	46	52	58	63	60	51	40
Source		0.80	66	41	47	52	58	63	60	52	43
Source		0.80	65	39	46	52	58	62	59	51	39
Source		0.80	65	39	46	51	58	62	59	50	39
Source		0.80	65	39	46	51	57	62	59	50	38
Source		0.80	64	38	45	51	57	61	58	49	37
Source		0.80	64	38	45	51	57	61	58	49	36
Source		0.80	64	38	45	50	56	61	58	48	36
Source		0.80	64	38	44	50	56	61	57	48	35
Source		0.80	60	40	45	50	54	57	52	42	31
Source		0.80	54	37	42	45	48	50	45	36	26
Source		0.80	52	36	39	42	45	48	43	34	25
Source		0.80	50	33	37	41	45	47	41	30	18
Source		0.80	50	33	37	41	44	47	41	30	17
Source		0.80	50	34	38	41	44	46	42	33	24
Source		0.80	50	33	37	41	44	46	41	30	17
Source		0.80	50	32	37	40	44	46	41	29	16
Source		0.80	50	32	37	40	44	46	40	29	15
Source		0.80	49	32	36	40	44	46	40	29	15
Source		0.80	49	34	37	40	43	45	41	32	24
Source		0.80	49	32	36	40	43	46	40	28	14
Source		0.80	49	31	36	40	43	45	40	28	13
Source		0.80	49	31	36	39	43	45	39	28	13

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 9 - Bedroom 2

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 9 - Bedroom 2
 Group: (main group)
 Group Reduction: No

Name			Night								
Source	Description	Height	Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 9 - Bedroom 2	5.00	67	50	55	57	61	63	58	48	37
Source		0.80	52	33	39	43	46	48	43	33	22
Source		0.80	52	33	39	43	46	48	43	33	23
Source		0.80	52	35	39	42	46	48	43	33	23
Source		0.80	52	33	39	43	46	48	43	33	22
Source		0.80	52	33	39	43	46	48	43	33	23
Source		0.80	51	34	39	42	46	47	42	31	19
Source		0.80	51	34	39	42	45	47	42	31	19
Source		0.80	51	34	39	42	45	47	42	31	18
Source		0.80	51	34	39	42	45	47	41	31	18
Source		0.80	51	34	38	42	45	47	41	30	17
Source		0.80	51	34	38	41	45	47	41	30	17
Source		0.80	50	33	38	41	45	47	41	30	16
Source		0.80	50	33	38	41	45	46	41	30	16
Source		0.80	50	33	38	41	44	46	40	29	15
Source		0.80	50	33	38	41	44	46	40	29	15
Source		0.80	50	33	37	41	44	46	40	29	14
Source		0.80	50	33	37	41	44	46	40	28	13
Source		0.80	50	32	37	40	44	46	40	28	13
Source		0.80	49	32	37	40	44	46	40	28	12
Source		0.80	48	33	37	39	42	44	40	31	21
Source		0.80	48	33	37	39	42	44	40	30	20
Source		0.80	48	33	36	39	42	44	40	31	22
Source		0.80	48	33	37	39	42	44	39	30	19
Source		0.80	48	33	36	38	41	44	40	31	22
Source		0.80	48	32	36	38	41	44	40	32	22
Source		0.80	48	33	37	39	42	44	39	30	20
Source		0.80	48	32	36	38	41	44	40	32	23
Source		0.80	48	33	36	38	41	44	40	31	22
Source		0.80	48	33	36	38	42	44	40	31	22
Source		0.80	48	33	36	39	42	44	40	31	21
Source		0.80	48	33	37	39	42	44	40	30	20
Source		0.80	48	33	37	39	42	44	39	30	19
Source		0.80	48	33	36	39	42	44	40	31	21
Source		0.80	48	33	37	39	42	44	39	30	20
Source		0.80	48	33	37	39	42	44	39	30	20
Source		0.80	48	33	36	39	42	44	39	30	19
Source		0.80	48	33	36	39	42	44	39	29	18
Source		0.80	48	32	36	39	42	44	39	29	18
Source		0.80	48	32	36	39	42	44	39	29	17
Source		0.80	48	33	36	39	42	44	39	29	18
Source		0.80	48	32	36	39	42	44	39	29	17

All shown dB values are A-weighted

37 Broadwater Road, Welwyn
 Predicted Night-time LAFmax Noise Levels Outside of Flat 10 - Bedroom 1

Report: Table of Results
 Model: Lmax Night Time Proposed
 LAeq per octave: by Source for receiver _A - Flat 10 - Bedroom 1
 Group: (main group)
 Group Reduction: No

Name	Description	Height	Night Total	63	125	250	500	1000	2000	4000	8000
_A	Flat 10 - Bedroom 1	5.00	83	57	64	70	76	80	77	69	60
Source		0.80	72	46	53	58	65	69	66	58	50
Source		0.80	72	46	53	58	64	69	66	58	50
Source		0.80	72	46	53	58	64	69	66	58	50
Source		0.80	72	46	52	58	64	69	66	58	50
Source		0.80	72	45	52	58	64	69	66	58	49
Source		0.80	72	44	52	58	64	68	65	58	49
Source		0.80	70	44	51	56	63	67	64	57	48
Source		0.80	70	44	50	56	62	67	64	56	48
Source		0.80	70	43	50	56	62	67	64	56	47
Source		0.80	69	43	50	55	62	66	63	55	47
Source		0.80	69	43	50	55	61	66	63	55	46
Source		0.80	69	42	49	55	61	65	62	54	45
Source		0.80	68	42	49	54	61	65	62	54	45
Source		0.80	68	42	48	54	60	65	62	54	44
Source		0.80	68	41	48	54	60	64	61	53	43
Source		0.80	67	41	48	53	59	64	61	53	42
Source		0.80	67	41	47	53	59	64	61	52	42
Source		0.80	67	41	48	53	59	63	60	53	44
Source		0.80	66	40	47	53	59	63	60	52	41
Source		0.80	66	40	47	52	59	63	60	51	41
Source		0.80	66	40	46	52	58	63	59	51	40
Source		0.80	65	39	46	52	58	62	59	50	39
Source		0.80	65	39	46	51	58	62	59	50	38
Source		0.80	65	39	45	51	57	62	58	50	37
Source		0.80	64	38	45	51	57	61	58	49	37
Source		0.80	64	38	45	50	56	61	58	49	36
Source		0.80	64	38	44	50	56	61	57	48	35
Source		0.80	61	40	46	51	55	58	53	43	32
Source		0.80	55	38	42	46	49	51	46	36	27
Source		0.80	52	36	40	43	46	49	44	35	26
Source		0.80	51	35	39	41	45	47	43	34	25
Source		0.80	51	33	38	41	45	47	41	30	18
Source		0.80	50	33	37	41	45	47	41	30	18
Source		0.80	50	33	37	41	44	47	41	30	17
Source		0.80	50	34	38	40	43	46	42	33	25
Source		0.80	50	32	37	40	44	46	41	29	16
Source		0.80	50	32	37	40	44	46	40	29	16
Source		0.80	50	32	36	40	44	46	40	29	15
Source		0.80	49	34	37	39	43	45	41	33	24
Source		0.80	49	32	36	40	44	46	40	28	14
Source		0.80	49	31	36	40	43	45	40	28	14

All shown dB values are A-weighted



APPENDIX D

Intrusive Noise Level Calculations

Date : 07/06/2016

Project No.: 16147

Project: 37 Broadwater Road, Welwyn

Receiver room for this calculation: Flat 1 - Living Room

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{\text{internal}} = L_{\text{external}} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

- Where: - L_{internal} - estimated indoor reverberant sound pressure level
- L_{external} - measured external sound pressure level (LAeq, 16hr) - i.e. the design external LAeq
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for measurements 2m from the façade)
- ΣR - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

External Noise Spectral Data	dB(A)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
LAeq, 16hr	67.5	43.0	46.0	52.0	57.0	65.0	62.0	50.0	38.0
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Glazing - Pilkington 10/12/6.4	Area: 21 m ²								
	R:	24	27	29	36	41	42	52	52
Wall - Kingspan AWP/60 Wall Panel	Area: 16								
	R:	18	24	37	48	53	55	63	64
Doors	Area: 0 m ²								
	R:								
Rooflight	Area: 0 m ²								
	R:								
Ventilators - None	Number of: 0								
	D_{ne}	0	0	0	0	0	0	0	0
Room Data									
Living Room Reverberation Time		0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area	37 m ²								
Room Volume	78 m ³								
Overall sound reduction of the facade									
Combined sound reduction		20.4	25.4	31.0	38.3	43.3	44.3	54.2	54.3
Estimated Indoor Noise Level									
	dB(A)	63	125	250	500	1k	2k	4k	8k
		33.2	54.2	42.1	34.3	26.6	25.4	20.2	0.0

Date : 07/06/2016

Project No.: 16147

Project: 37 Broadwater Road, Welwyn

Receiver room for this calculation: Flat 1 - Bedroom 1

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{\text{internal}} = L_{\text{external}} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

- Where: - L_{internal} - estimated indoor reverberant sound pressure level
- L_{external} - measured external sound pressure level (LAeq, 8hr) - i.e. the design external LAeq
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for measurements 2m from the façade)
- ΣR - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

External Noise Spectral Data		dB(A)	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
LAeq, 8hr		62.3	37.0	41.0	47.0	53.0	60.0	56.0	46.0	34.0
Façade Correction Factor, C			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements										
Glazing - Pilkington 10/12/6.4										
	Area:	11 m ²								
	R:	24	27	29	36	41	42	52	52	
Wall - None										
	Area:	0 m ²								
	R:	0	0	0	0	0	0	0	0	
Doors										
	Area:	0 m ²								
	R:									
Rooflight										
	Area:	0 m ²								
	R:									
Ventilators - None										
	Number of:	0								
	D _{ne}	0	0	0	0	0	0	0	0	0
Room Data										
Bedroom Reverberation Time			0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2
Total Façade Area			11	m ²						
Room Volume			33	m ³						
Overall sound reduction of the facade										
Combined sound reduction			24.0	27.0	29.0	36.0	41.0	42.0	52.0	52.0
Estimated Indoor Noise Level										
		dB(A)	63	125	250	500	1k	2k	4k	8k
		25.9	41.3	33.2	28.7	22.3	19.9	13.7	0.0	0.0

Date : 07/06/2016

Project No.: 16147

Project: 37 Broadwater Road, Welwyn

Plot name and receiver room: Flat 1 - Bedroom 1

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{\text{internal}} = L_{\text{external}} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

- Where: - L_{internal} - estimated indoor reverberant sound pressure level
- L_{external} - measured external sound pressure level (LAFMax) - i.e. the design external LAFMax
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for measurements 2m from the façade)
- ΣR - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

External Noise Spectral Data		dB(A)	Octave Band Centre Frequency (Hz)								
			63	125	250	500	1k	2k	4k	8k	
LAFMax		80.4	54.0	61.0	66.0	73.0	77.0	74.0	68.0	62.0	
Façade Correction Factor, C			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Reduction of façade elements											
Glazing - Pilkington 10/12/6.4											
	Area:	11	m ²								
	R:	24	27	29	36	41	42	52	52		
Wall - None											
	Area:	0	m ²								
	R:	0	0	0	0	0	0	0	0		
Doors											
	Area:	0	m ²								
	R:										
Rooflight											
	Area:	0	m ²								
	R:										
Ventilators - None											
	Number of:	0									
	D_{ne}	0	0	0	0	0	0	0	0		
Room Data											
Bedroom Reverberation Time			0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2	
Total Façade Area			11	m ²							
Room Volume			33	m ³							
Overall sound reduction of the facade											
Combined sound reduction			24.0	27.0	29.0	36.0	41.0	42.0	52.0	52.0	
			Octave Band Centre Frequency (Hz)								
Estimated Indoor Noise Level		dB(A)	63	125	250	500	1k	2k	4k	8k	
		44.7	58.3	53.2	47.7	42.3	36.9	31.7	15.9	10.2	

Date : 07/06/2016

Project No.: 16147

Project: 37 Broadwater Road, Welwyn

Receiver room for this calculation: Flat 3 - Living Room

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{\text{internal}} = L_{\text{external}} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

- Where: - L_{internal} - estimated indoor reverberant sound pressure level
- L_{external} - measured external sound pressure level (LAeq, 16hr) - i.e. the design external LAeq
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for measurements 2m from the façade)
- ΣR - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

External Noise Spectral Data		dB(A)	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
LAeq, 16hr		59.6	36.0	39.0	45.0	50.0	57.0	54.0	41.0	26.0
Façade Correction Factor, C			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements										
Glazing - Pilkington 4/12/4										
	Area:	3.75 m ²								
	R:	18	24	20	25	35	38	35	35	
Wall - Kingspan AWP/60 Wall Panel										
	Area:	5.25								
	R:	18	24	37	48	53	55	63	64	
Doors										
	Area:	0 m ²								
	R:									
Rooflight										
	Area:	0 m ²								
	R:									
Ventilators - None										
	Number of:	0								
	D _{ne}	0	0	0	0	0	0	0	0	0
Room Data										
Living Room Reverberation Time			0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area			9	m ²						
Room Volume			50	m ³						
Overall sound reduction of the facade										
Combined sound reduction			18.0	24.0	23.7	28.8	38.7	41.7	38.8	38.8
Estimated Indoor Noise Level										
		dB(A)	63	125	250	500	1k	2k	4k	8k
		26.9	45.4	32.3	30.3	24.8	17.7	10.6	0.7	0.0

Date : 07/06/2016

Project No.: 16147

Project: 37 Broadwater Road, Welwyn

Receiver room for this calculation: Flat 3 - Bedroom 1

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{\text{internal}} = L_{\text{external}} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

- Where: - L_{internal} - estimated indoor reverberant sound pressure level
- L_{external} - measured external sound pressure level (LAeq, 8hr) - i.e. the design external LAeq
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for measurements 2m from the façade)
- ΣR - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

External Noise Spectral Data		dB(A)	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
LAeq, 8hr		55.3	30.0	34.0	40.0	46.0	53.0	49.0	37.0	23.0
Façade Correction Factor, C			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements										
Glazing - Pilkington 4/12/4										
	Area:	3.75 m ²								
	R:	18	24	20	25	35	38	35	35	
Wall - Kingspan AWP/60 Wall Panel										
	Area:	5.25 m ²								
	R:	18	24	37	48	53	55	63	64	
Doors										
	Area:	0 m ²								
	R:									
Rooflight										
	Area:	0 m ²								
	R:									
Ventilators - None										
	Number of:	0								
	D _{ne}	0	0	0	0	0	0	0	0	0
Room Data										
Bedroom Reverberation Time			0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2
Total Façade Area			9	m ²						
Room Volume			25	m ³						
Overall sound reduction of the facade										
Combined sound reduction			18.0	24.0	23.7	28.8	38.7	41.7	38.8	38.8
Estimated Indoor Noise Level										
		dB(A)	63	125	250	500	1k	2k	4k	8k
		24.1	40.7	29.5	27.4	22.9	15.5	7.3	0.0	0.0

Date : 07/06/2016

Project No.: 16147

Project: 37 Broadwater Road, Welwyn

Plot name and receiver room: Flat 3 - Bedroom 1

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{\text{internal}} = L_{\text{external}} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

- Where: - L_{internal} - estimated indoor reverberant sound pressure level
- L_{external} - measured external sound pressure level (LAFMax) - i.e. the design external LAFMax
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for measurements 2m from the façade)
- ΣR - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

External Noise Spectral Data		dB(A)	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
LAFMax		72.0	45.0	52.0	58.0	64.0	69.0	66.0	58.0	51.0
Façade Correction Factor, C			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements										
Glazing - Pilkington 4/12/4										
	Area:	3.75 m ²								
	R:	18	24	20	25	35	38	35	35	
Wall - Kingspan AWP/60 Wall Panel										
	Area:	5.25 m ²								
	R:	18	24	37	48	53	55	63	64	
Doors										
	Area:	0 m ²								
	R:									
Rooflight										
	Area:	0 m ²								
	R:									
Ventilators - None										
	Number of:	0								
	D_{ne}	0	0	0	0	0	0	0	0	0
Room Data										
Bedroom Reverberation Time			0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2
Total Façade Area			9	m ²						
Room Volume			25	m ³						
Overall sound reduction of the facade										
Combined sound reduction			18.0	24.0	23.7	28.8	38.7	41.7	38.8	38.8
Estimated Indoor Noise Level										
		dB(A)	63	125	250	500	1k	2k	4k	8k
			41.7	55.7	47.5	45.4	40.9	31.5	24.3	19.4

www.spectrumacoustic.com

TELEPHONE: HEAD OFFICE: +44 (0)1767 318871 WIGAN: +44 (0)1257 473242