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**DEMOLITION OF EXISTING OFFICE BUILDING
PROPOSED NEW COMMERCIAL/RESIDENTIAL BUILDING
15 NORTH STREET, READING**

***IMPACT OF EXTERNAL NOISE
ON
PROPOSED NEW BUILDING***

Planning Consultants

*Edgars Ltd
The Old Bank
39 Market Square
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PWH/jas/1403R/4670/Revised

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EXECUTIVE SUMMARY

Planning permission is to be sought from *Reading Borough Council* for the demolition of the existing office building at *15 North Street, Reading* and its replacement with a new building to accommodate offices, upper floor flats and undercroft parking.

Following submission of the *Pre-Application Statement* to *Reading Borough Council* for the proposed building, the *Council* set out their considerations in their response of the *25th July 2017*. In their response one of the *Council's* concerns was the impact of the various sources of external noise on the occupants of the new building. These sources being the nearby *bus depot*, the *ambulance station*, *storage depot* and neighbouring *industrial units*. In support of the application therefore the *Council* require a *Noise Assessment Report* to be submitted.

To provide the necessary information to satisfy the stated *Council* requirements *W A Hines & Partners* have been appointed to consider the noise implications for the building. A survey around the existing building has been carried out to establish the prevailing noise conditions and the results of the survey and impact on the proposed building have been set out.

1.00 INTRODUCTION

1.01 An application for permission to build a new, part commercial part residential, building on the site of an existing building at *16 North Street, Reading*, is to be submitted to *Reading Borough Council*. As the new building will be subjected to various sources of external noise the *Council* have stated that a *Noise Impact Assessment* be prepared and submitted with the application to show that adequate noise mitigation measures are to be incorporated into the scheme designs. *W A Hines & Partners* have been appointed by *Edgars Ltd* on behalf of *Clients* to prepare such a report.

1.02 For the assessment the preliminary new building layouts and general construction details have been considered and the prevailing noise levels outside the existing building have been measured. This has enabled the prevailing internal noise conditions to be determined against recommended internal noise criteria and for general noise mitigation measures to be established.

1.03 With regard to the requirements of the *Council* the comments made by the *Senior Environmental Health Officer* are set out below.

Noise impact on development

The application site is likely to be significantly affected by noise from the bus depot, the ambulance station, the storage depot and neighbouring industrial units. A noise assessment should be submitted in support of applications for new residential proposed in noisy areas.

The noise assessment will be assessed against the recommendations for internal noise levels within dwellings and external noise levels within gardens / balconies in accordance with BS 8233:2014 and WHO guidelines for Community Noise. The report should identify any mitigation measures that are necessary to ensure that the recommended standard is met.

Where appropriate, the noise assessment data should also include noise events (LAMax) and the design should aim to prevent noise levels from noise events exceeding 45dB within bedrooms at night. Noise levels above 45dB are linked with sleep disturbance.

Internal noise criteria (taken from BS8233:2014)

<i>Room</i>	<i>Design Criteria</i>	<i>Upper Limit</i>
<i>Bedrooms (23:00 to 07:00)</i>	<i>30 dB LAeq 8 hr</i>	
<i>Living Rooms (23:00 to 07:00)</i>	<i>35 dB LAeq 16 hr</i>	
<i>Gardens & Balconies</i>	<i>50 dB LAeq T</i>	<i>55 dB LAeq T</i>

Noise between residential properties – sound insulation of any building

To minimise the disturbance by noise of future residential occupiers of the flats and its effect on neighbouring residents, residential accommodation must be designed and constructed or converted so as to achieve the insulation requirements set out in Building Regulations Approved Document E.

2.00 THE SITE & PROPOSED NEW BUILDING

The Site

2.01 The site for the new building is on the east side of *North Street, Reading* and is within a generally commercial area with a nearby *bus depot*, *ambulance station* and *storage depot*, all of which with some passing traffic, would produce levels of external noise that would impact on the proposed new building. The site at the present time is occupied by an existing 2 storey brick built building which is in office use. This building is to be demolished and the site cleared.

2.02 The relative position of the site to the surrounding areas and roads is shown on the ***Location Plan*** and an ***Aerial View***. Views along *North Street* showing the existing building on the site and the adjoining buildings are shown on the ***Street Views***.

The Proposed Building

2.03 Following the demolition of the existing building on the site the proposal is for a new *brick built building* comprising *B1 offices* and *residential apartments* with associated undercroft parking. The preliminary scheme proposals are shown on the ***Indicative Plans***.

3.00 NOISE ASSESSMENT STANDARDS

3.01 Where commercial/residential development is proposed close to sources of either transport related or industrial noise, which could finally effect the conditions within the development, it is appropriate to assess the prevailing environmental noise conditions by considering the guidance provided in:

- *The National Planning Policy Framework (NPPF)*
- *The Noise Policy Statement for England (NPSE)*
- *BS8233:2014*
- *BS4142:2014 (Industrial Noise)*

National Planning Policy Framework

3.02 The *National Planning Policy Framework (NPPF)* was published on 27 March 2012 and came into force with immediate effect. The *NPPF* however, unlike the previous planning document on noise (*PPG24*) provides purely quantitative guidance.

3.03 Section 8 of the *NPPF* “*Healthy Communities*” makes no specific reference to environmental noise levels, only commenting in Section 11 on enhancing the natural environment, advising that the planning system should contribute to and enhance the natural and local environment by:

- *Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.*
- *avoid noise 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 nearby land uses since they were established and*

- *identify and protect areas of tranquillity that have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

Footnote 27 refers to an explanatory note in the NPSE, which is discussed below.

Footnote 28 refers to “provisions of the Environmental Protection Act 1990 and other relevant law”

Section 13 “the sustainable use of materials” includes guidance relating to noise, but this is provided in the context of minerals extraction activities.

Noise Policy Statement for England

3.04

The *Noise Policy Statement for England* was published by the Department for Environment, Food and Rural Affairs (DEFRA) in March 2010. The complete document includes the *Policy Statement* itself and an *Explanatory Note*. Key concepts used in the NPSE are:

- **NOEL** or “no observed effect” meaning the level (of noise) below which no effect on health or quality of life can be detected;
- **LOAEL** or “lowest observed adverse effect” meaning the level (of noise) above which adverse effects on health and quality of life can be detected; and
- **SOAEL** or “significant observed adverse effect” meaning the level (of noise) above which significant adverse effects on health and quality of life can occur.

3.05

The **first aim** of the NPSE is to: “Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of the policy on sustainable development”

The **second aim** of the NPSE is to: “Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of the policy on sustainable development”

The **third aim** of the NPSE is to: “Where possible, contribute to the improvement of health and quality of life through the effective management of environmental, neighbour and neighbourhood noise within the context of the policy on sustainable development”

- 3.06** The *second aim* refers to the situation which lies somewhere between *LOAEL* and *SOAEL*. However, *Paragraph 2.3* of the *Explanatory Note* makes it clear that the approach to the minimisation of noise from environmental and related sources should be reasonable and balanced in stating:-

Furthermore, the broad aim of noise management has been to separate noise sources from sensitive noise receivers. Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as reasonably practical. This concept can be found in the Environmental Protection Act 1990, where, in some circumstances, there is a defence of “ practicable means” in summary statutory nuisance proceedings.

BS8233:2014

- 3.07** BS8233:2014 “Guidance on sound insulation and noise reduction for buildings”, previously BS8233:1999, provides guidance on internal noise targets for residential accommodation which are set out in **Table 1**. These are considered applicable in this case.

Table 1
BS8233:2014 - Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB LAeq (1 hr)	-
Dining	Dining Room	40 dB LAeq (16 hr)	-
Sleeping	Bedroom	35 dB LAeq (16 hr)	30 dB LAeq (8 hr)

Where development is considered necessary or desirable, despite noise levels above WHO guidelines, the internal target may be relaxed up to 5 dB and reasonable internal levels still be achieved

- 3.08** BS8233 also sets a target range of 50/55 dB LAeq (t) for noise levels in private gardens.

World Health Organisation (WHO)

- 3.09** Section 4.2.3 of *WHO Community Noise Guideline Values* discusses how electrophysiological and behavioural methods have demonstrated that both continuous and intermittent noise indoors lead to sleep disturbance. The more intense the background noise, the more disturbing is its effect on sleep. Measurable effects on sleep start at background noise levels of about 30 dB LAeq. Physiological effects include changes in the pattern of sleep stages, especially a reduction in the proportion of REM sleep. Subjective effects have also been identified, such as difficulty in falling asleep, perceived sleep quality, and adverse after-effects such as headache and tiredness.
- 3.10** Where noise is continuous, the noise level should not exceed 30 dB LAeq indoors, if negative effects on sleep are to be avoided. When the noise is composed of a large proportion of low-frequency sounds a still lower guideline value is recommended, because low frequency noise (e.g. from ventilation systems) can disturb rest and sleep even at low sound pressure levels. It should be noted that the adverse effect of noise partly depends on the nature of the source.
- 3.11** If the noise is not continuous, LAMax is generally used to indicate the probability of noise induced awakenings. Effects have been observed at individual exposures of 45 dB LAMax or less. Consequently, it is important to limit the number of noise events exceeding 45 dB LAMax. Therefore, noise limits should be based on a combination of values of 30/35 dB LAeq and 45 dB LAMax.

Internal Noise Targets

- 3.12** In consideration of the Council's requirements on noise mitigation and internal noise levels set out by their *Senior Environmental Health Officer*, which follow the recommendations and guidance in the *NPPF*, the *NPSE*, *BS8233* and the *World Health Organisation (WHO)*, the appropriate internal noise targets for the proposed development would be those shown in **Table 2**.

Table 2
Internal Noise Targets

Dwellings	Living Room	40 dB LAeq (5 min)	
	Bedroom	35 dB LAeq (5 min)	45 dB LAMax
Offices	Private	40 dB LAeq (5 min)	
	General	45 dB LAeq (5 min)	

External Noise Targets

3.13 BS8233:2014 sets a target range of 50/55 dB LAeq (t) for noise levels in residential gardens and amenity space, although this is frequently difficult to achieve in urban locations and those close to transport related noise sources, as is the case for this site.

3.14 With regard to the criteria for acceptable levels of external noise it is of interest to note the review of *Health effect-based noise assessment methods: A review and feasibility study* (NPL Report CMAM 16 1998) which set out the following:-

“Perhaps the main weakness of both WHO inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values. We know from a national survey of noise exposure carried out in England and Wales that around 56% of the population are exposed to daytime noise levels exceeding 55 dB LAeq and that around 65% are exposed to night-time noise levels exceeding 45 dB LAeq (as measured outside the nearest houses in each case).

The percentages exposed above the WHO guideline values could not be significantly reduced without drastic action to virtually eliminate road traffic noise and other forms of transportation noise from the vicinity of houses. The social and economic consequences of such action would be likely to be far greater than any environmental advantages of reducing the proportion of the population annoyed by noise. In addition there is no evidence that anything other than a small minority of the population exposed at such noise levels find them to be particularly onerous in the context of their daily lives.”

4.00 EXTERNAL NOISE MONITORING

Noise Monitoring

- 4.01 To determine the prevailing noise climates outside the existing building a day/evening survey was carried out on *Monday 12 March 2018* between 16:00 and 20:00 hours. Two monitoring positions were selected, one at the front of the building in the side parking area approximately 3M from the *North Street* curbside, the other at the back of the building again in the side parking area. The monitoring positions, marked **MP1** & **MP2**, are shown on the *Aerial View*.

Equipment Used & Weather Conditions

- 4.02 External noise levels were measured using two *NTi XL2 TA precision grade integrating sound level meters*. The sound level meters were both calibrated prior to measurements and then after the measurements to ensure that no significant drift in accuracy had occurred. During the overall measurement period the weather was *8 degrees C, light rain at times with little wind*.

Survey Results

- 4.03 Measurements were made over individual *15 minute* time averaged values in terms of *LAeq, LA90, LAMax* and *LAMin* and in octaves for design purposes. All the results are shown in **Appendix A**.

5.00 ASSESSMENT

Internal Noise Levels

5.01 The sound reduction provided by the fabric of a building is primarily governed by the type of windows installed, as these generally provide the least resistance to the passage of sound. A typical noise reduction for a brick facade is around 45 LpA whereas a typical reduction for a brick facade containing a well sealed single glazed window is around 28 LpA. This would reduce to around 10/15 LpA, when the window is partially open. A brick facade with standard well sealed double glazed windows (4:12:4) would provide a sound reduction of around 33 dB LpA.

Calculations

5.02 To assess whether or not acceptable internal noise conditions would be achieved within the proposed new building, against the existing external noise levels measured during the survey, a series of calculations have been made. The calculations have considered typical construction elements for the building which is shown on the **Indicative Plans**. These have been taken as *brick external walls* and *standard 6:12:6 double glazing* for all the windows. The types and sizes of windows may change for the final scheme but the glazing profile has been taken as remaining the same. Taking the highest typical average L_{Aeq} noise level measured around the existing site, the calculations show the noise levels expected within a typical *bedroom* and *open plan office*. The calculations are shown in **Appendix B**.

5.03 Considering the **Indicative Plans** and, that the final layouts within the proposed building are likely to change, the respective *room sizes*, *window sizes* and *numbers of windows* used in the calculations, have been assumed. The *typical room/window sizes* used in the calculations for a *bedroom* and a *general open plan office* are:-

Bedroom - 4.5M x 3.0M x 2.4M, window size 1.5M x 1.3M

Open Plan Office - 18.0M x 7.0M x 2.4M, window size 1.5M x 2.0M

- 5.04** It has been taken that all internal space would be furnished and that the *offices* would be airconditioned and have sealed windows and that the *apartments* would have fresh air provided by an in house mechanical ventilation system to meet the requirements of *Part F* of the *Building Regulations*. Also all windows in the *apartments* would be well sealed but openable.

Internal Noise Conditions - Calculation Results

- 5.05** From the calculations in **Appendix B**, which show the expected internal conditions for a typical *bedroom* and *open plan office*, it will be seen that, should standard 6/12/6 *double glazed windows* be provided and internal spaces be *mechanically ventilated*, acceptable internal conditions within the proposed new building would be achieved against the prevailing overall external noise environment. In the calculations for the *apartment* the set back of the windows from the facade due to the balconies has been ignored so that a “*worst case*” is presented. This set back would help to reduce internal noise levels further.
- 5.06** The survey results show that the external environment is effected by short transient noise events (vehicle movements etc) that cause the typical noise environment to increase. The *LAMax* noise levels during these short events therefore need also to be considered in respect of their likely effect on sleep within the *bedrooms*.
- 5.07** When these short events occur it will be seen that typically, excluding the highest (*bin clearance*), the general condition is around 75 *dB LAMax*. A further calculation therefore has been made to determine the expected *LAMax* level within a *bedroom* when these short term events occur. The same bedroom size/window size and building elements have been used in the calculation.

5.08 The calculation shows that with 6:12:6 double glazing and fresh air provided by an “in house system”, the internal noise condition would be below the recommended 45 dB LAMax level in the most exposed bedroom. As such acceptable conditions for sleep at night would be secured. The number of LAMax occurrences at night (22:00 - 07:00) would in any event be expected to be lower than during the day.

5.09 From the calculations, the minimum sound reduction values that require to be achieved for the basic building elements are shown in **Table 3**.

Table 3

Element	125	250	500	1K	2K
Walls (brick/block)	41	45	45	54	58
Windows (6:12:6)	20	19	29	38	34

External Noise Conditions (Amenity Space)

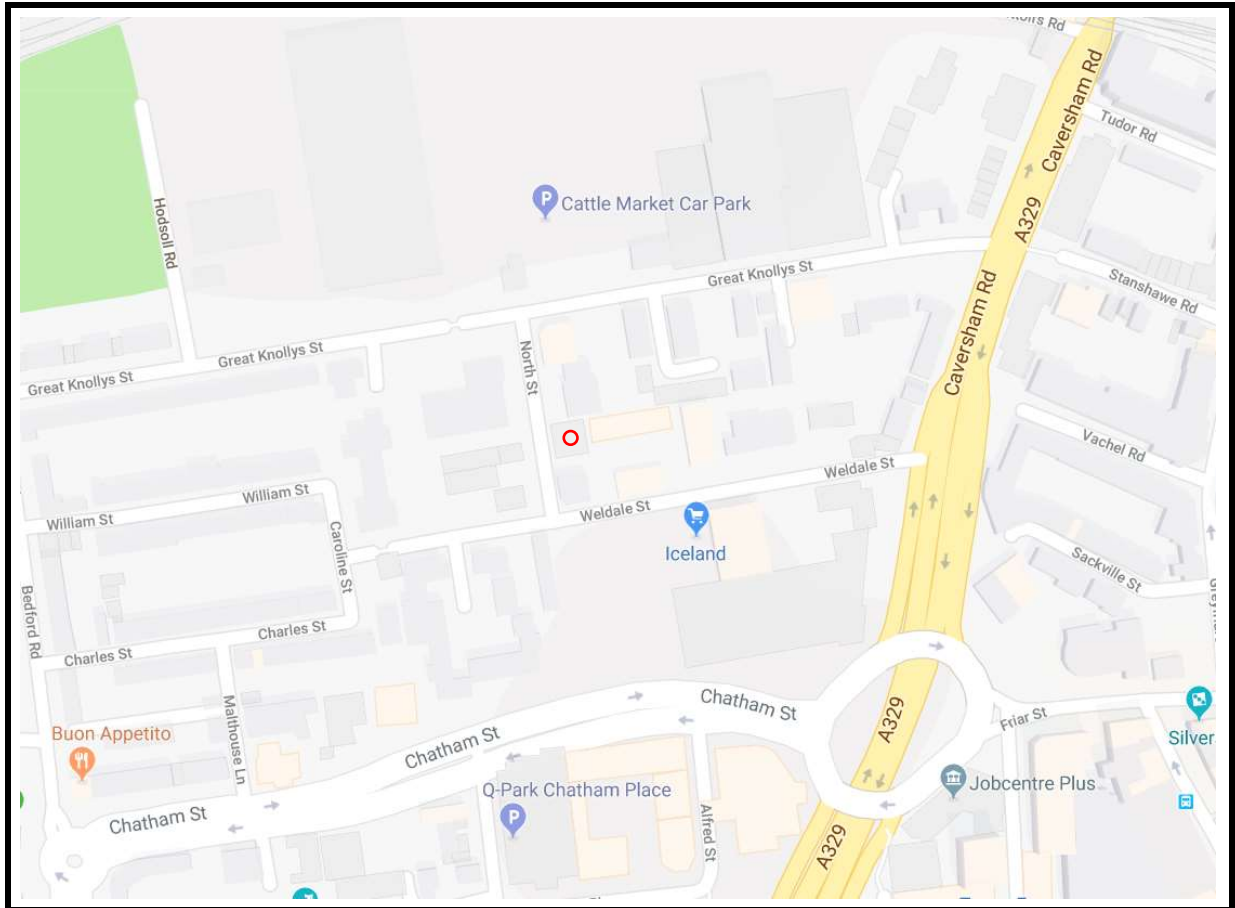
5.10 The external noise limit for *amenity space (Balconies)* is generally set at around 55 dB LAeq. Although this noise condition would be exceeded during the day, it would only just be exceeded. Consideration should be given therefore to the comments made in the NPL Report CMAM 16 1998, as referenced in Paragraph 3.14.

Other Acoustic Considerations

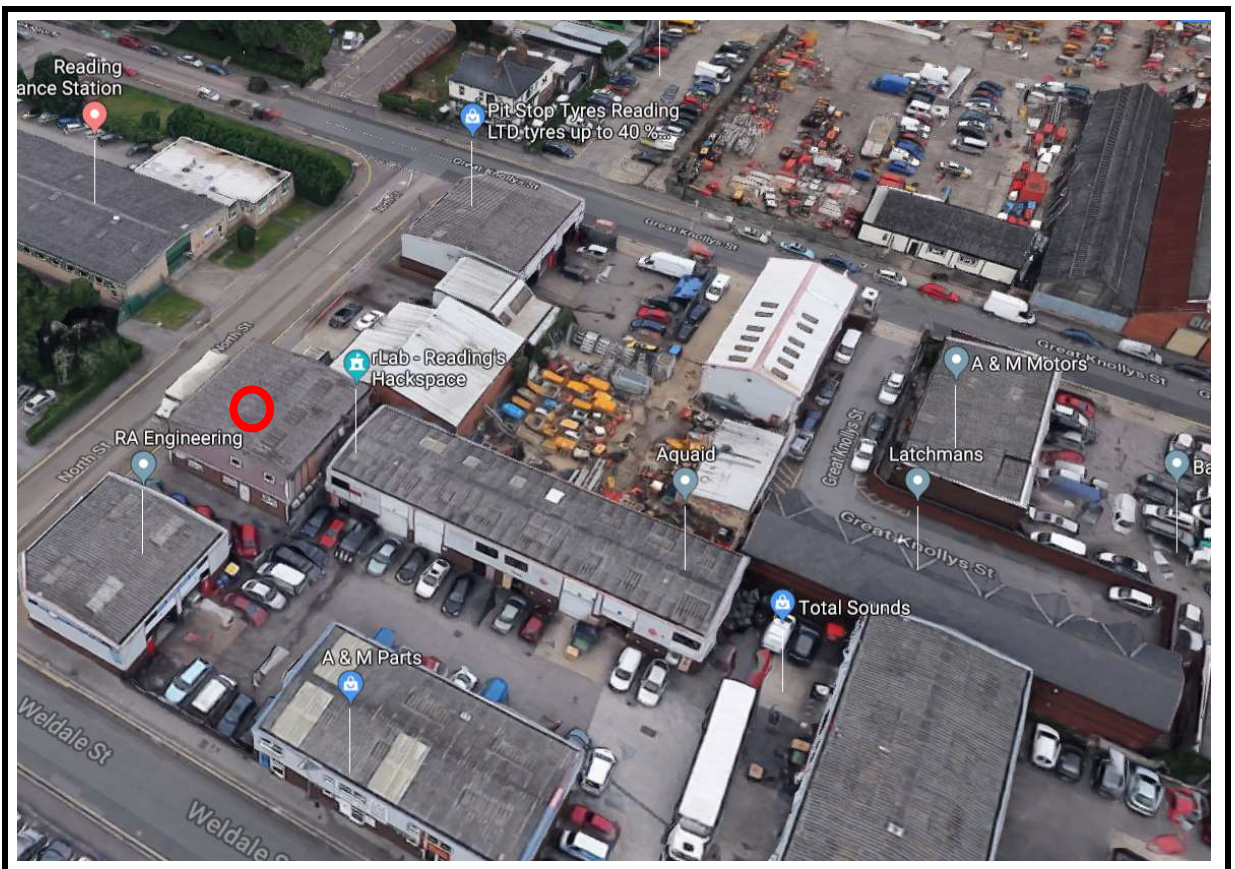
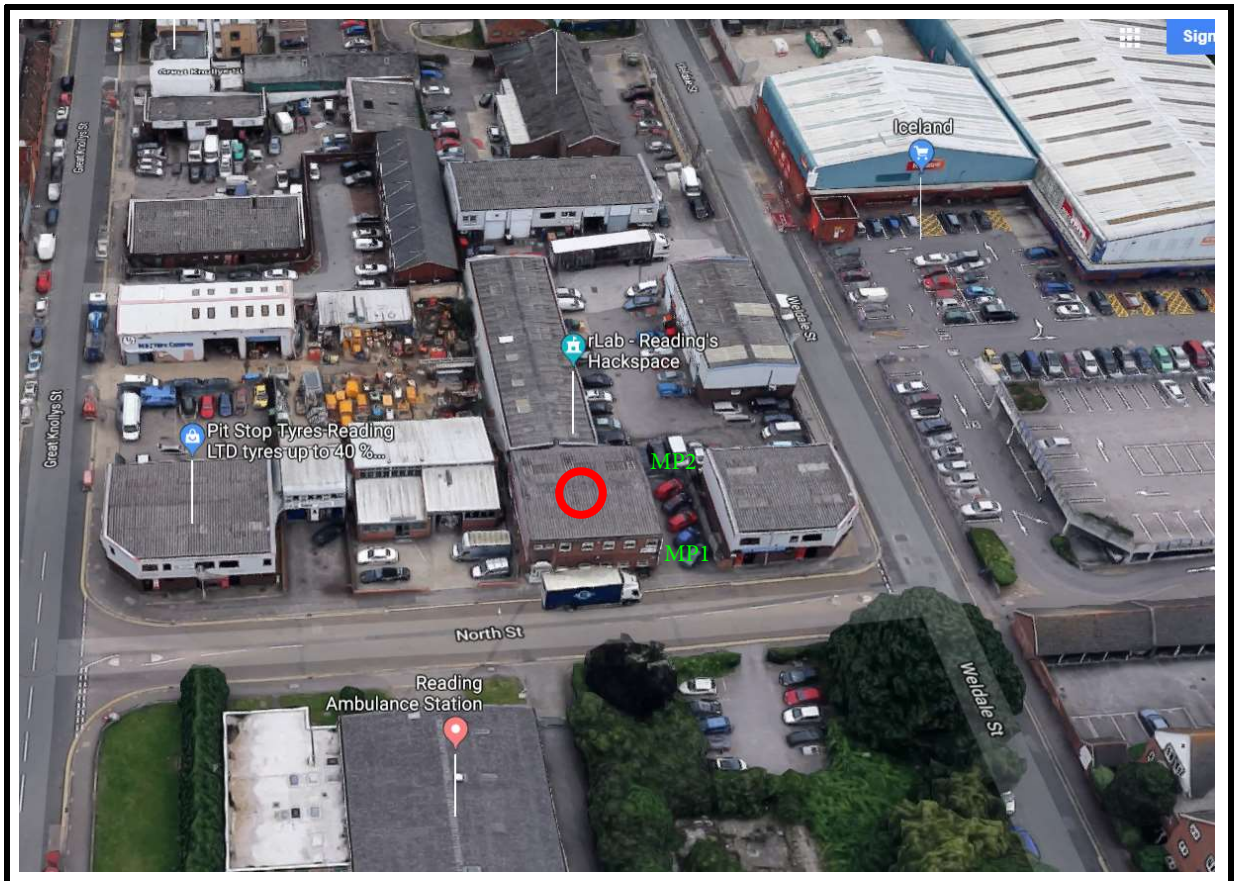
5.11 As several of the *apartments* will be above offices and would immediately adjoin other *apartments* it is essential that all separating party floors and walls are built to the requirements of the *Building Regulations Part E* and follow the construction details as set out *Robust Details*.

References

National Planning Policy Framework; Department for Communities and Local Government 2012.
Noise Policy Statement for England; Department for Environment, Food and Rural Affairs 2010.
BS8233:2014 “Guidance on sound insulation and noise reduction for buildings”.



Location Plan



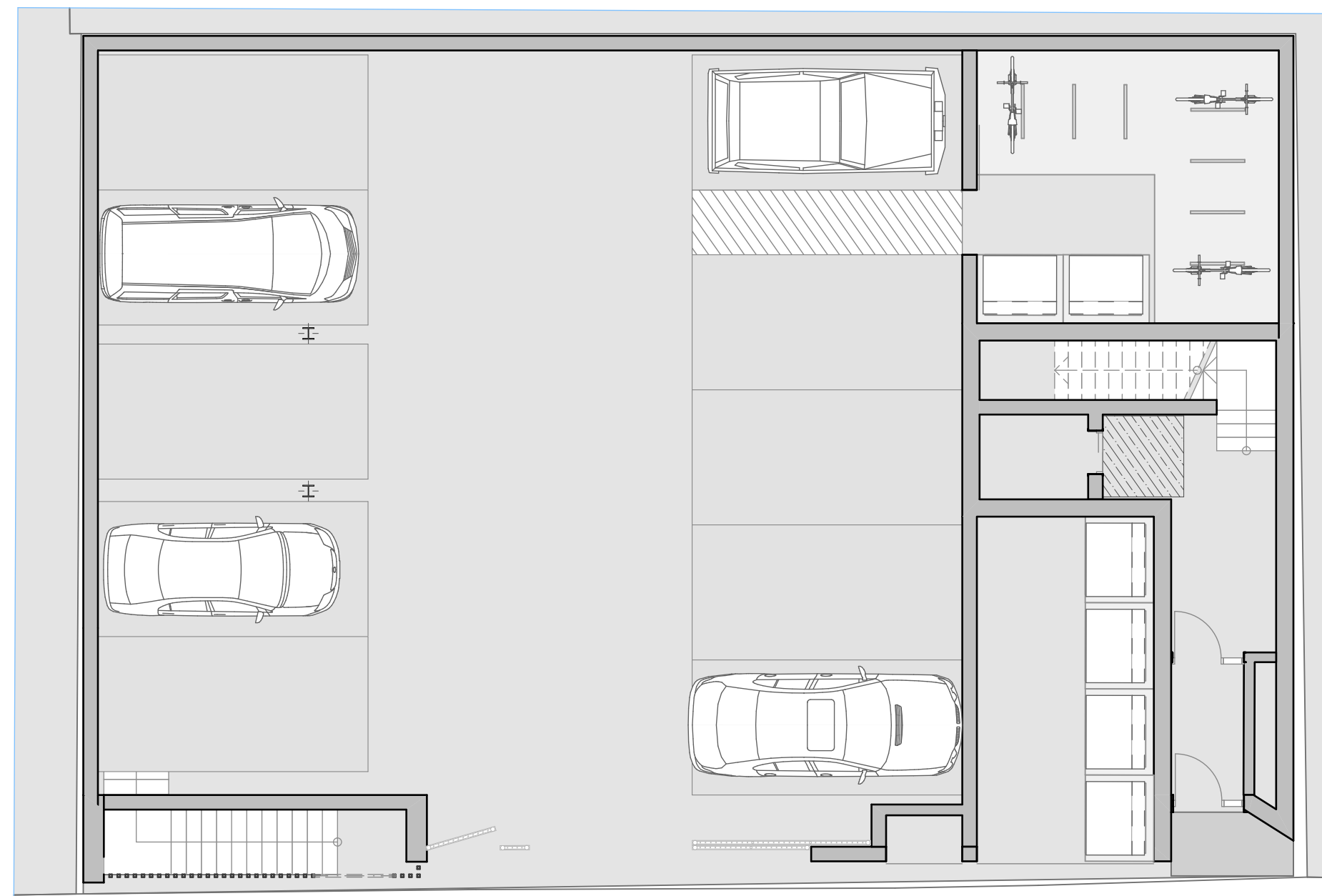
Aerial Views



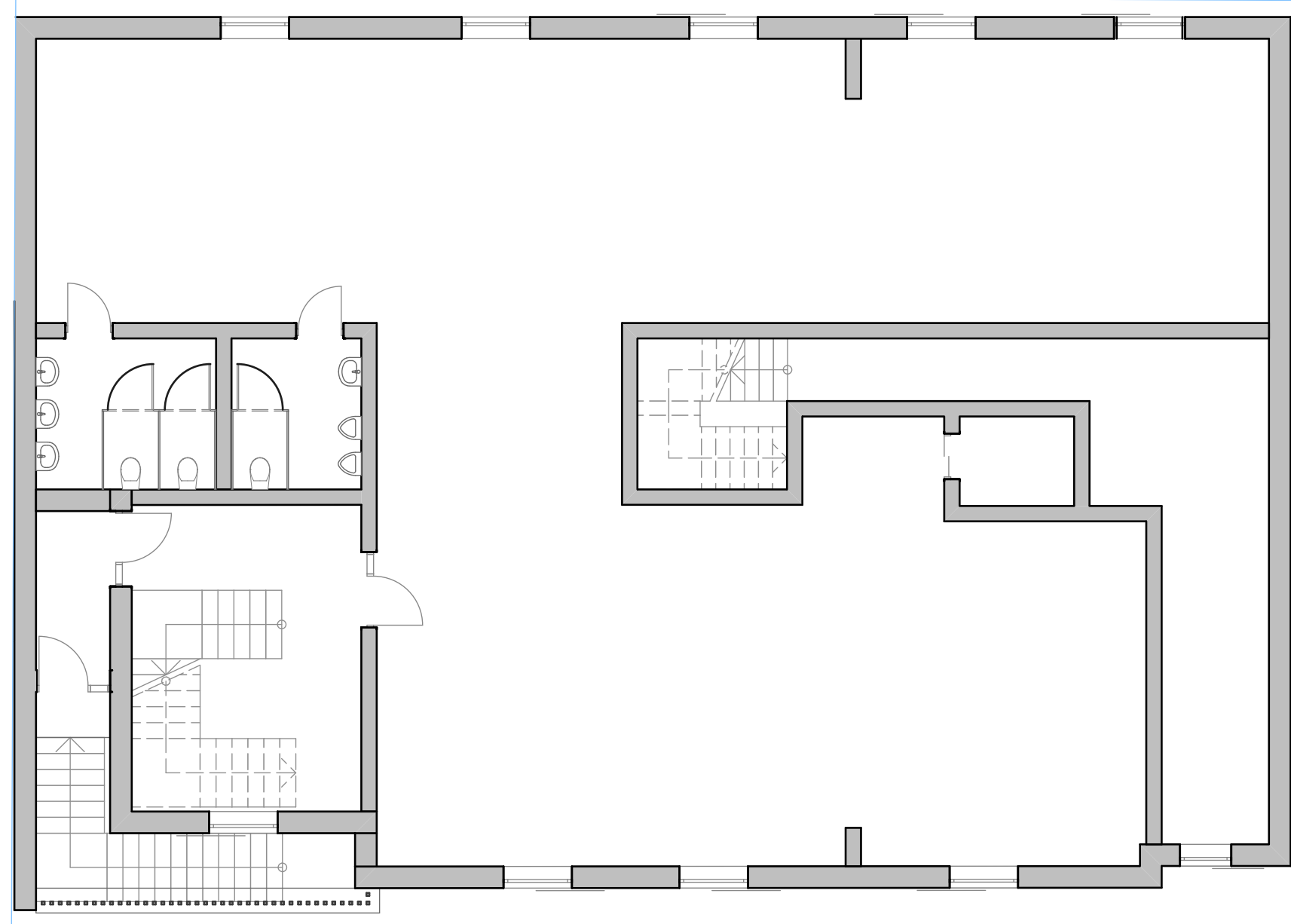
Existing Building from North Street



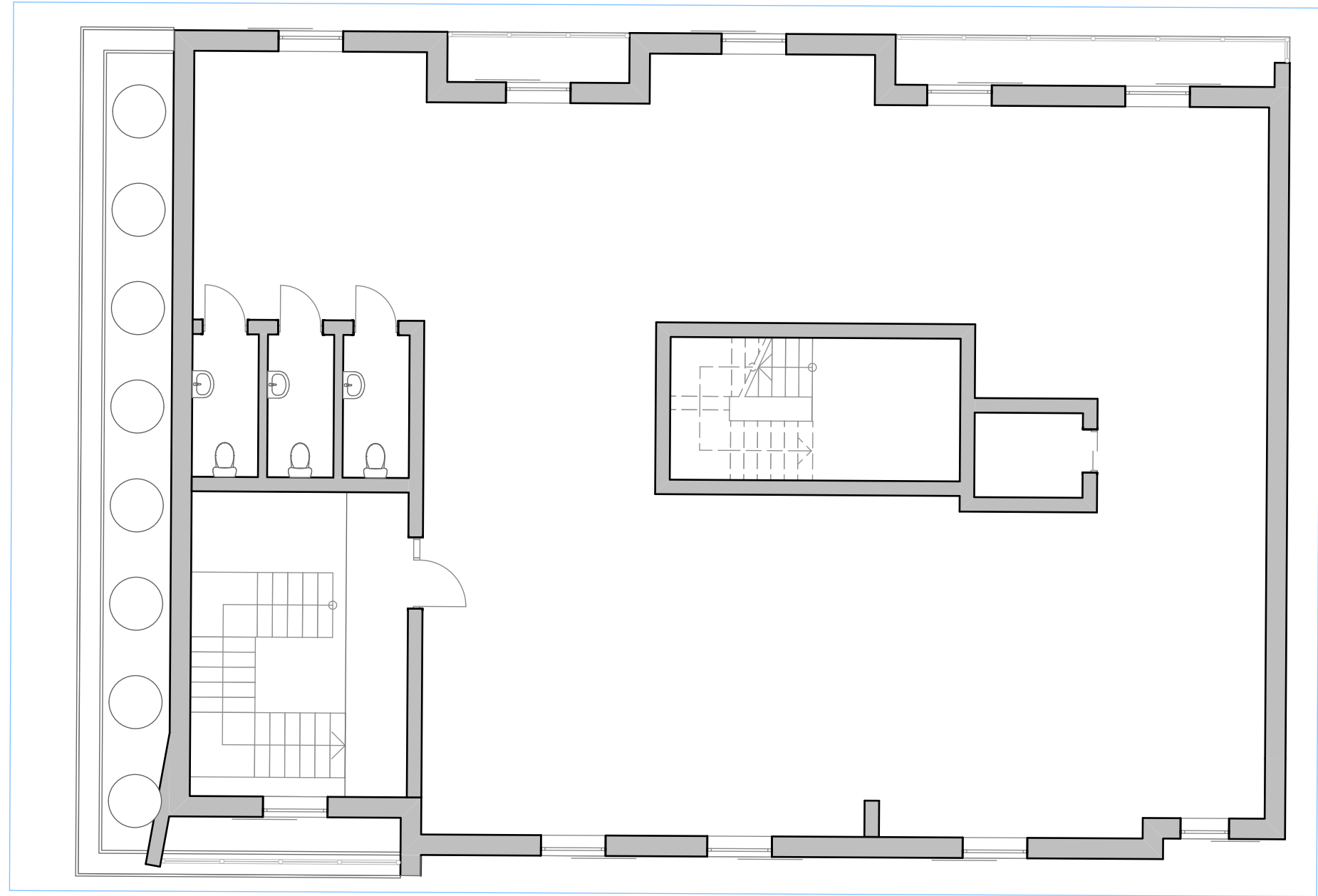
View of North Street to the North



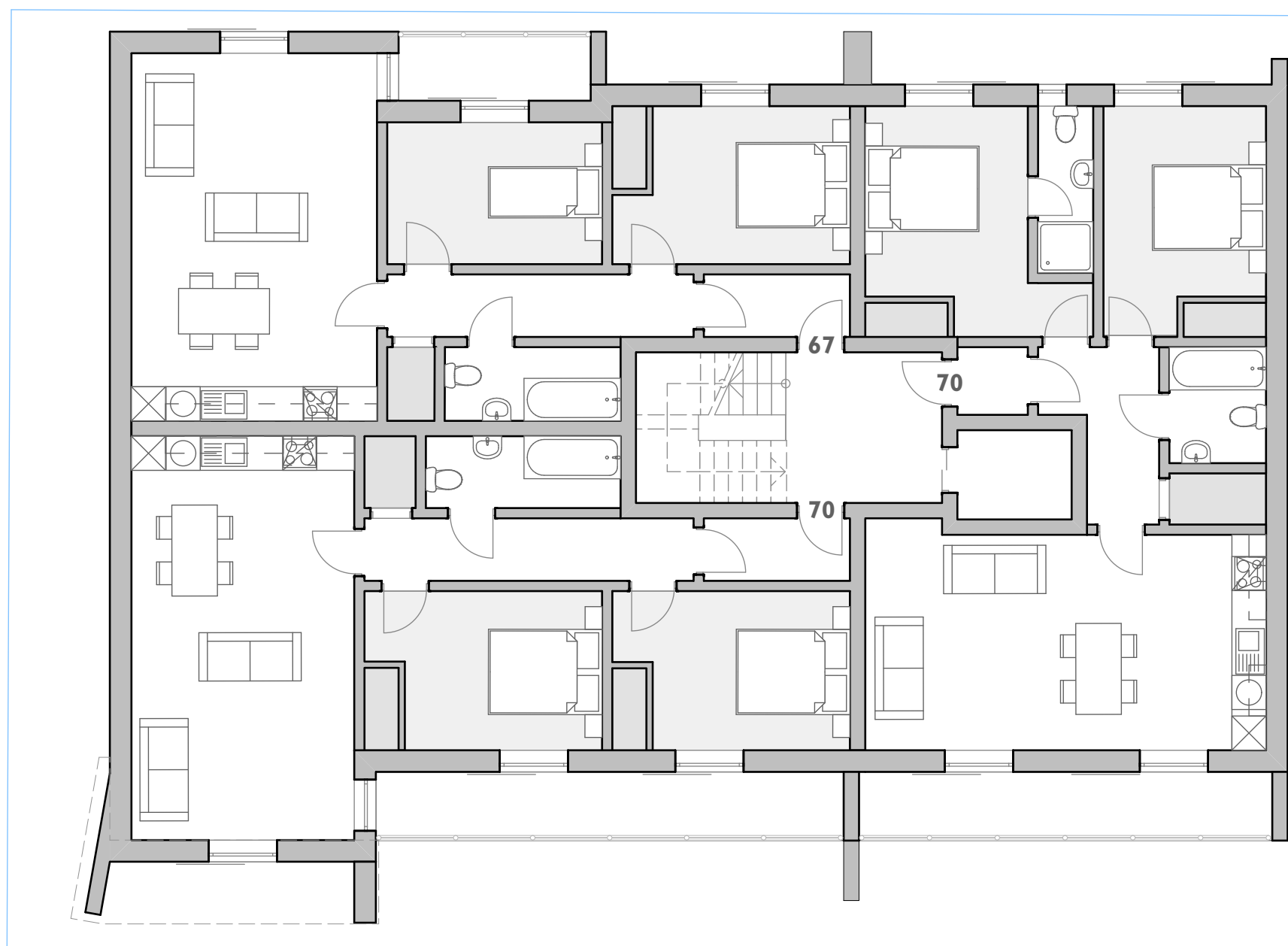
00 - Ground Floor
1:100



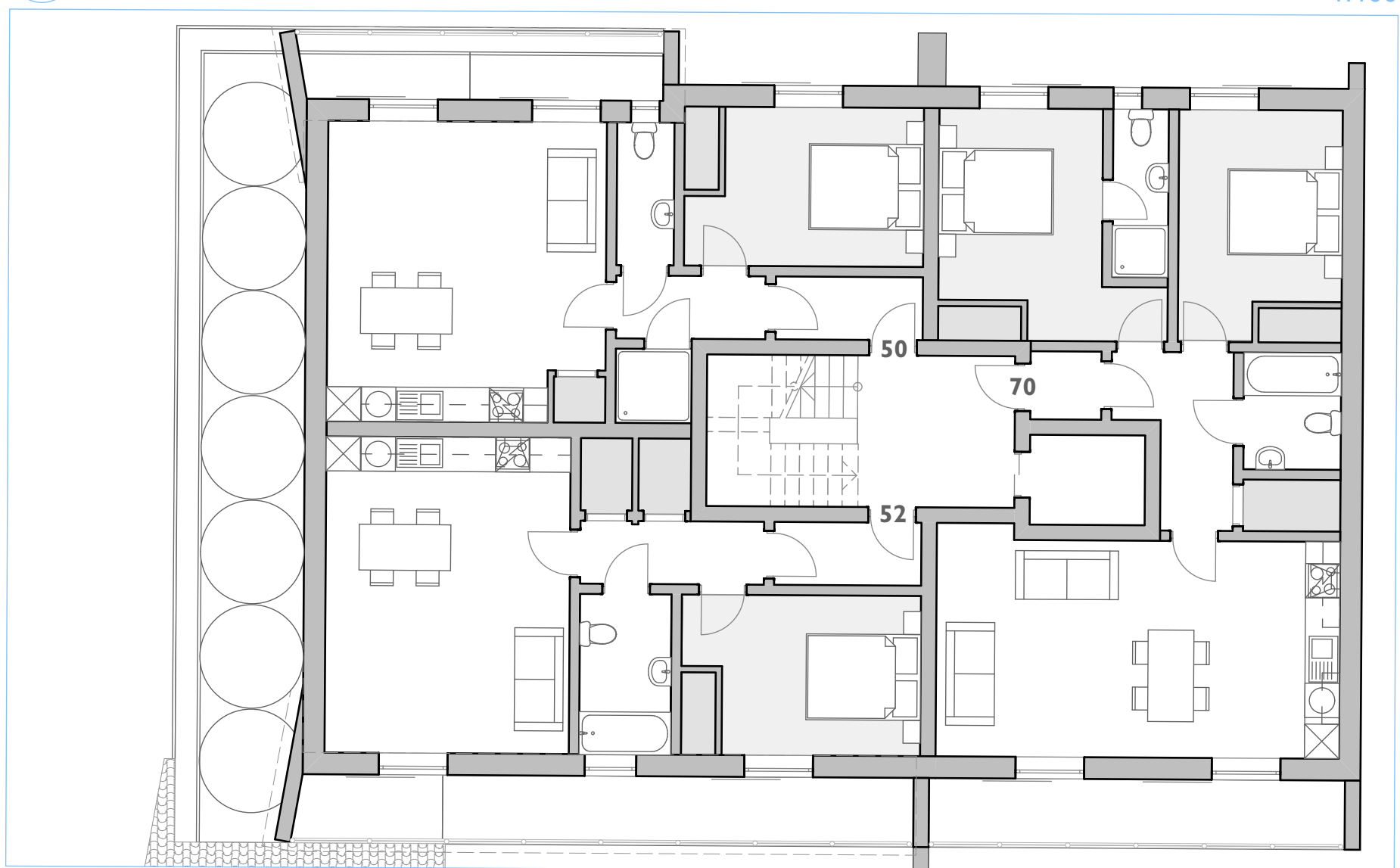
01 - First Floor
1:100



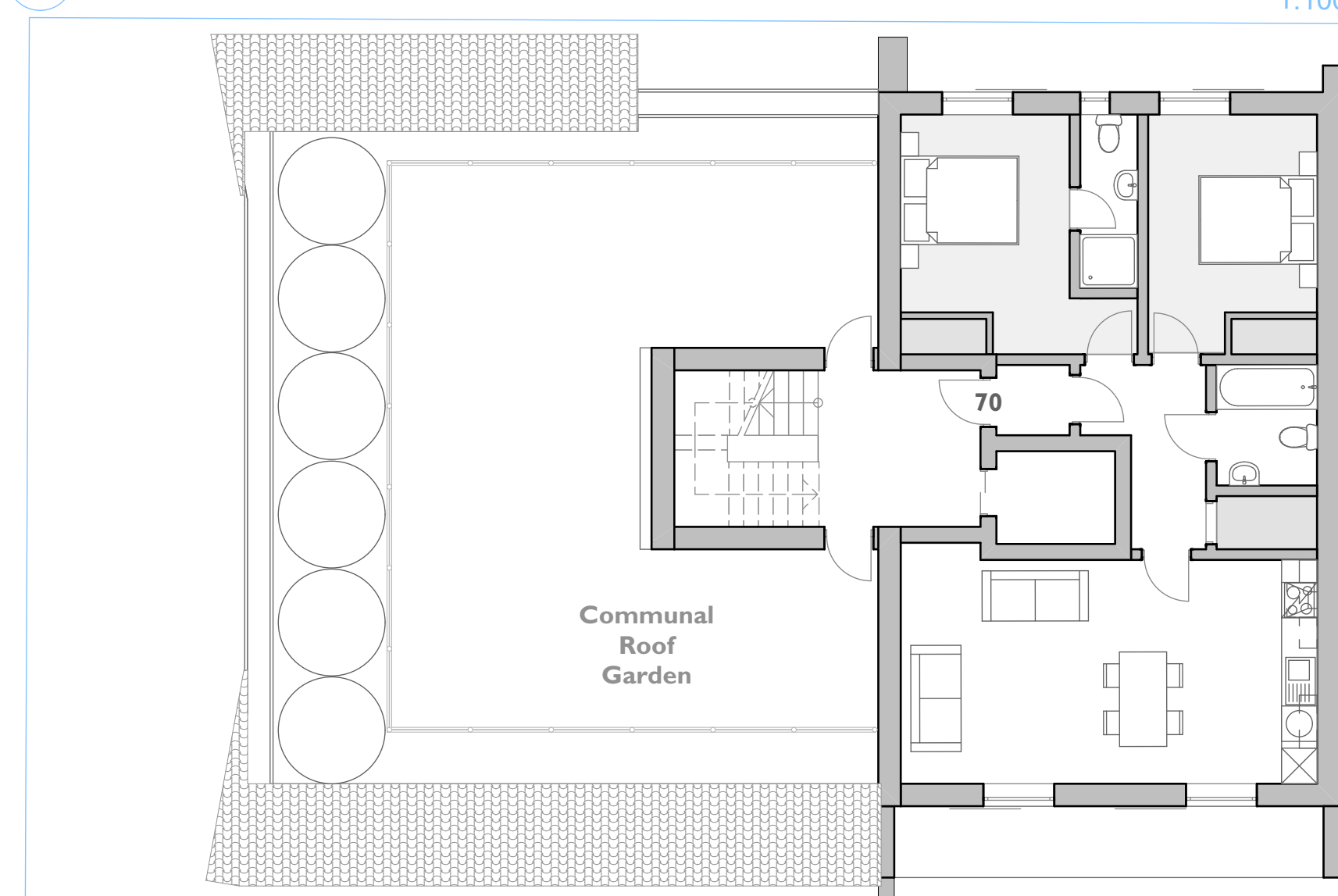
02 - Second Floor
1:100



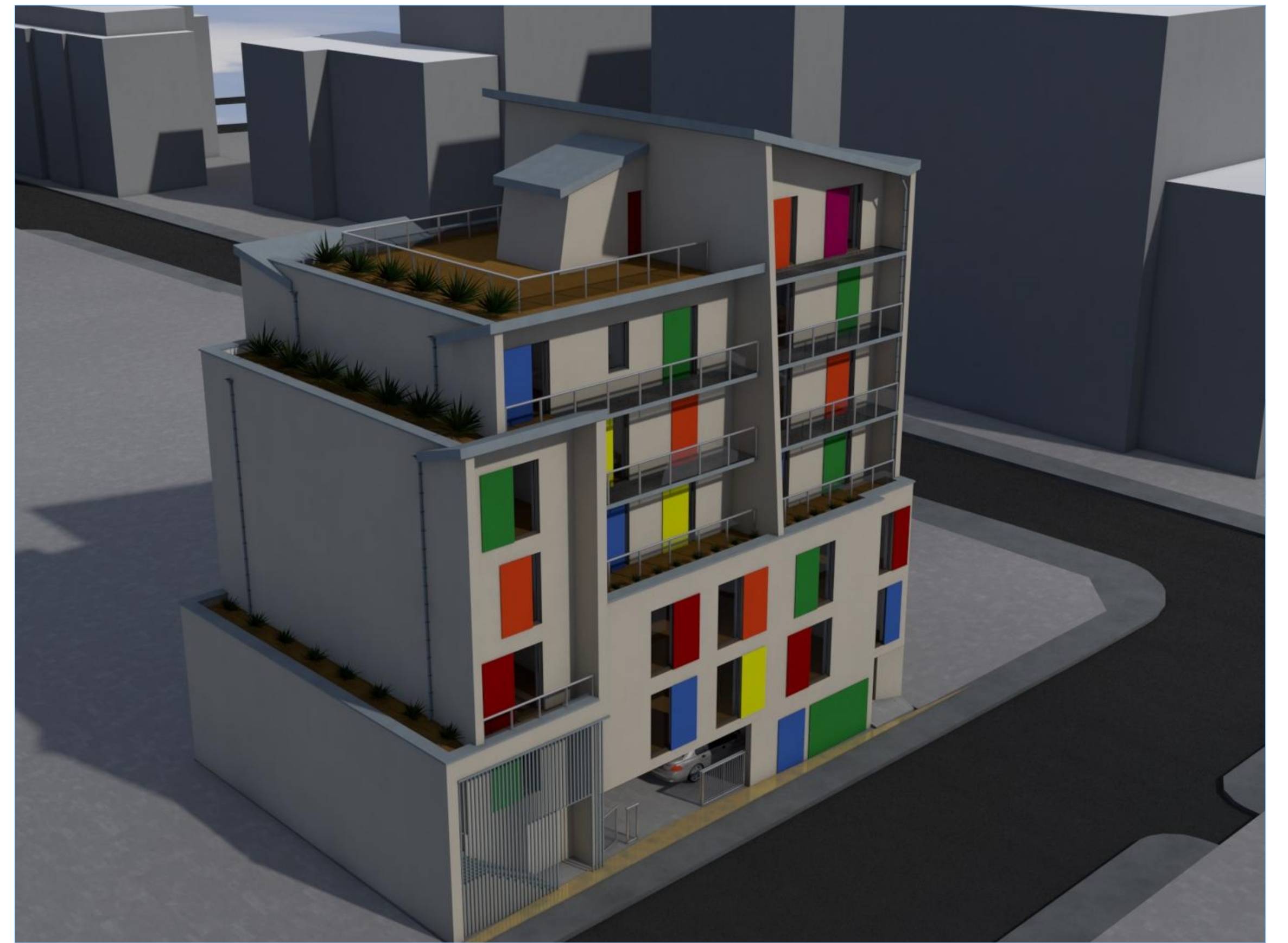
03 - 04 - Third and Fourth Floors
1:100



05 - Fifth Floor
1:100



06 - Penthouse
1:100



North 3.7



South 3.7

Scales as shown - correct at A1

Layout ID
A.01.1
Revision
3.7
Drawing Name
Indicative Plans
Date:
13/06/2018
Project Name
North Street

Project Address
**16 North Street Reading
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Appendix A - Survey Results

16 North Street, Reading

Noise Assessment

Results obtained at Front of existing building on site, approximately 1.0 m to south of south-western corner
Microphone position approximately 4.0 metres above ground level
Façade reflection(s) estimated to have added 1.0 dB to results obtained MP1

Results obtained on Monday 12 March 2018 Late afternoon and evening

NTi XL2-TA Kit B Calibration at start ok Battery level at start ok
Fast response Calibration at end ok Battery level at end ok

Sources: Main noise source is road traffic
No ambulance sirens associated with ambulance station opposite heard between 15.00 and 20.00 hours
Weather: ~9 degrees C, mainly dry with light drizzle on infrequent occasions, overcast, very light variable breeze
Road surfaces dry or slightly damp during monitoring period

Start time	L _{Aeq}	L _{A90}	L _{Amax}	L _{Amin}	Notes
16:00:00	59.3	50.9	73.7	47.3	
16:15:00	56.8	49.7	73.7	46.2	
16:30:00	58.1	49.1	72.7	46.1	
16:45:00	56.7	49.0	74.3	45.8	
17:00:00	57.2	49.8	73.0	44.6	
17:15:00	54.9	48.5	70.5	45.8	
17:30:00	56.7	49.2	78.0	46.9	
17:45:00	57.8	49.3	73.0	47.0	
18:00:00	56.8	49.9	72.0	46.8	
18:15:00	55.2	50.1	70.7	46.3	
18:30:00	55.8	49.1	74.2	46.1	
18:45:00	56.4	49.6	72.4	47.2	
19:00:00	54.3	50.1	70.8	48.1	
19:15:00	54.7	49.5	73.0	47.0	
19:30:00	54.9	49.1	70.5	45.9	
19:45:00	54.7	49.7	66.6	45.3	
Overall:	56.5	49.5	78.0	44.6	

Results obtained at

Front of existing building on site, approximately 1.0 m to south of south-western corner

MP1

Microphone position approximately

4.0 metres above ground level

Façade reflection(s) estimated to have added

1.0 dB to results obtained

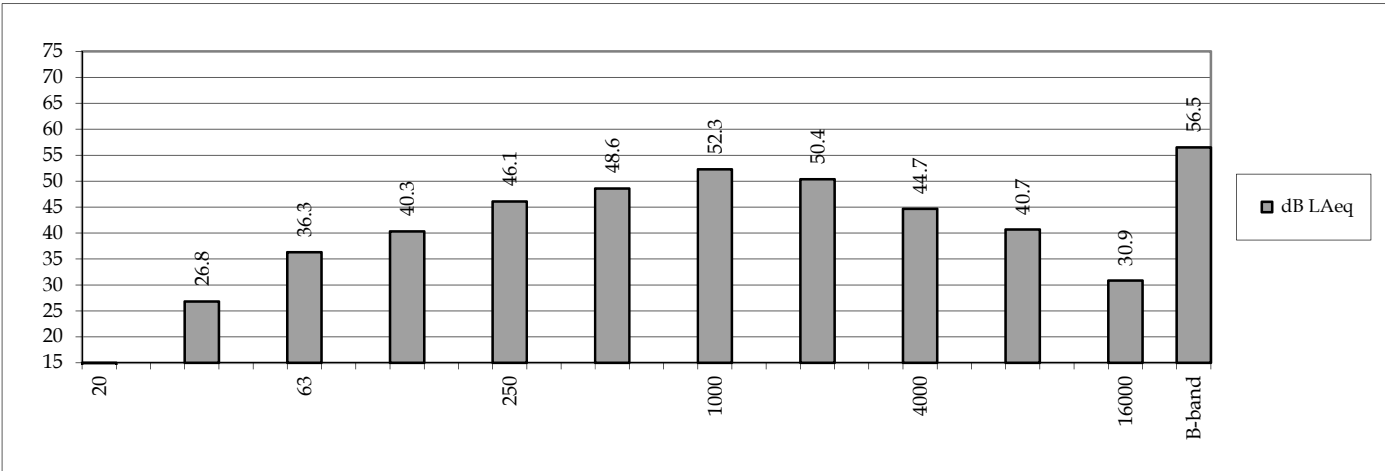
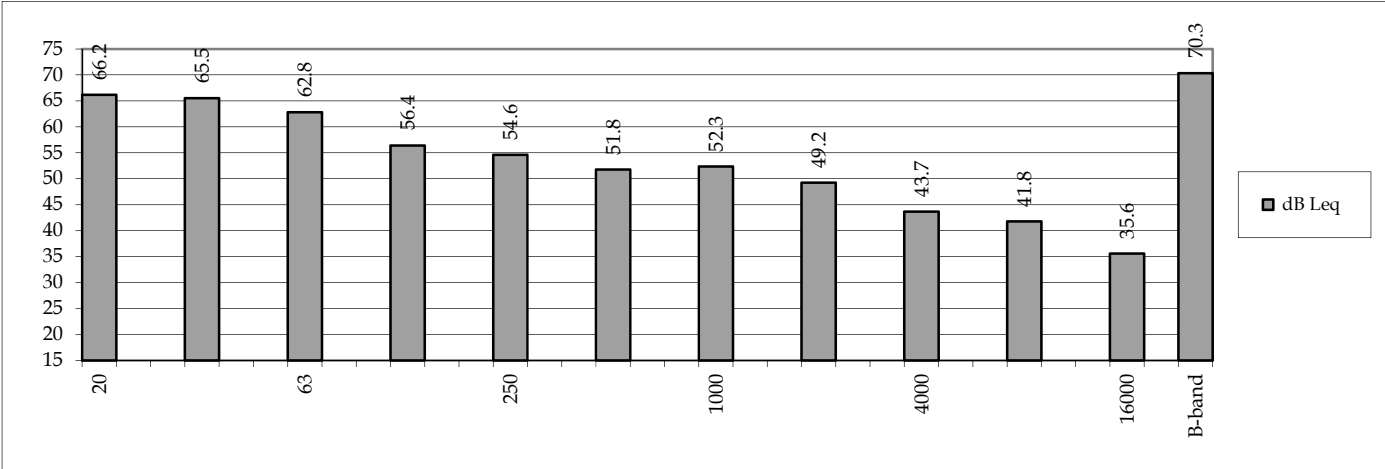
Average spectra for

Monday 12 March 2018

including any façade reflection(s)

Late afternoon and evening

Centre Freq Hz	Averages dB Leq	Averages dB LAeq
20	66.2	13.0
31.5	65.5	26.8
63	62.8	36.3
125	56.4	40.3
250	54.6	46.1
500	51.8	48.6
1000	52.3	52.3
2000	49.2	50.4
4000	43.7	44.7
8000	41.8	40.7
16000	35.6	30.9
B-band	70.3	56.5



Results obtained at **Rear of existing building on site, approximately 1.0 m to east of south-eastern corner** **MP2**
Microphone position approximately **4.0** **metres above ground level**
Façade reflection(s) estimated to have added **1.0** **dB to results obtained**

Results obtained on **Monday 12 March 2018** **Late afternoon and evening**

NTi XL2-TA Kit A Calibration at start ok Battery level at start ok
Fast response Calibration at end ok Battery level at end ok

Sources: Main noise source is road traffic, with noise from vehicle movements and conversation in yard to rear on occasions

No ambulance sirens associated with ambulance station opposite heard between 15.00 and 20.00 hours

Weather: ~9 degrees C, mainly dry with light drizzle on infrequent occasions, overcast, very light variable breeze

Road surfaces dry or slightly damp during monitoring period

Start time	L _{Aeq}	L _{A90}	L _{Amax}	L _{Amin}	Notes
16:00:00	53.9	50.2	71.0	47.0	
16:15:00	53.4	49.9	75.6	47.2	
16:30:00	53.3	49.4	65.9	46.8	
16:45:00	53.3	49.6	66.1	46.1	
17:00:00	53.8	49.4	67.3	45.0	
17:15:00	54.3	49.3	69.4	45.9	
17:30:00	54.3	49.6	75.5	46.9	
17:45:00	54.3	49.3	76.8	46.8	
18:00:00	53.4	48.9	70.2	45.6	
18:15:00	51.9	49.2	64.8	46.6	
18:30:00	61.3	49.7	92.2	47.2	
18:45:00	53.8	49.1	71.6	47.2	
19:00:00	54.6	50.5	72.3	48.0	
19:15:00	52.6	49.6	69.1	47.4	
19:30:00	52.4	49.5	68.0	47.3	
19:45:00	53.0	49.7	67.2	46.6	
Overall:	54.7	49.5	92.2	45.0	

Results obtained at

Rear of existing building on site, approximately 1.0 m to east of south-eastern corner
Microphone position approximately 4.0 metres above ground level
Façade reflection(s) estimated to have added 1.0 dB to results obtained

MP2

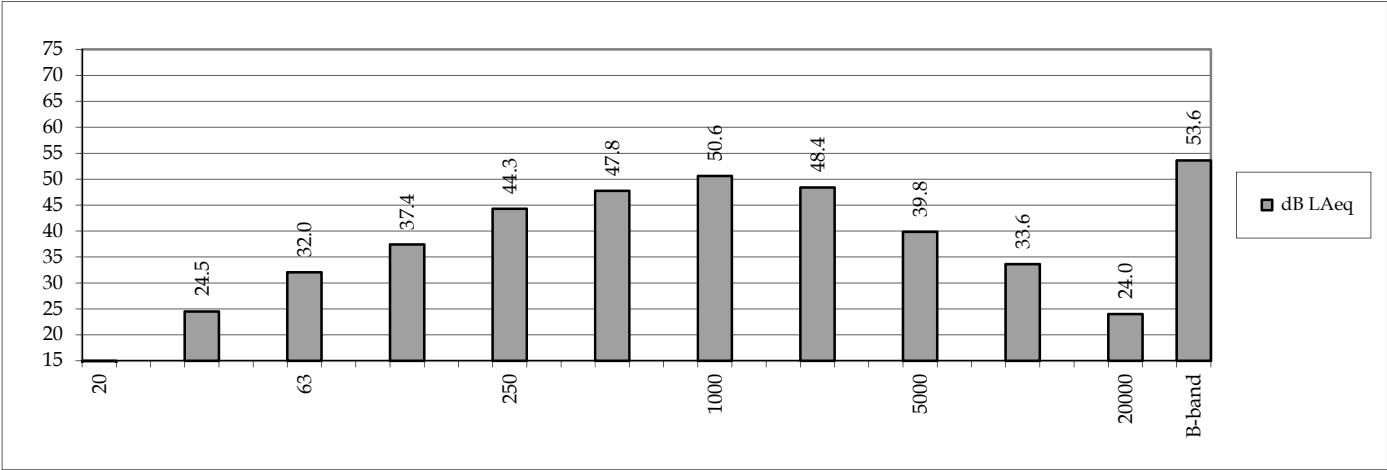
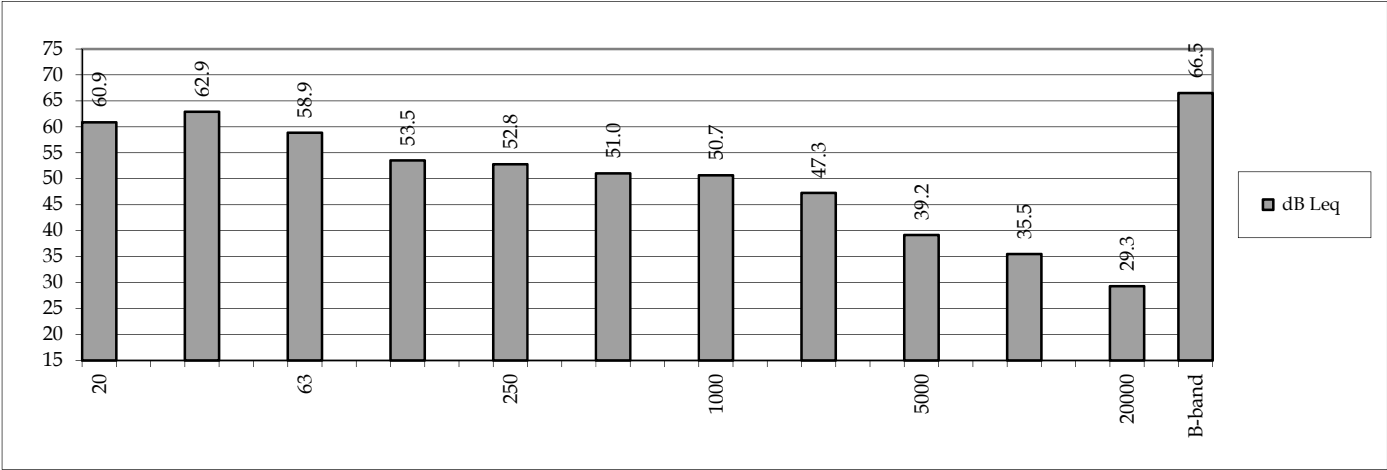
Average spectra for

Monday 12 March 2018

including any façade reflection(s)

Late afternoon and evening 0000

Centre Freq Hz	Averages dB Leq	Averages dB LAeq
20	60.9	7.9
31.5	62.9	24.5
63	58.9	32.0
125	53.5	37.4
250	52.8	44.3
500	51.0	47.8
1000	50.7	50.6
2000	47.3	48.4
5000	39.2	39.8
10000	35.5	33.6
20000	29.3	24.0
B-band	66.5	53.6



Appendix B - Calculations

BRE		Building Envelope Insulation		Switch to Reverberation Time Calculation																										
1) Enter room dimensions or volume ☒ Use dimensions x 4.5 m y 3 m z 2.4 m Volume 32.4 m ³ <u>OR</u> ☐ Use volume m ³		2) Select elements of facade structure, and enter corresponding internal surface area in m ² OR enter number of vents.		HELP																										
		<table border="1"> <thead> <tr> <th></th> <th></th> <th>Surface area OR number of vents</th> </tr> </thead> <tbody> <tr> <td>Wall 1</td> <td>Brick/ block cavity</td> <td> 8.85 m²</td> </tr> <tr> <td>Wall 2</td> <td>None</td> <td> m²</td> </tr> <tr> <td>Window 1</td> <td>6/ 12/ 6 double glazing</td> <td> 1.95 m²</td> </tr> <tr> <td>Window 2</td> <td>None</td> <td> m²</td> </tr> <tr> <td>Door</td> <td>None</td> <td> m²</td> </tr> <tr> <td>Roof/ Ceiling</td> <td>None</td> <td> m²</td> </tr> <tr> <td>Vent 1</td> <td>Whole House Ventilation</td> <td> m²</td> </tr> <tr> <td>Vent 2</td> <td>None</td> <td> m²</td> </tr> </tbody> </table>				Surface area OR number of vents	Wall 1	Brick/ block cavity	8.85 m ²	Wall 2	None	m ²	Window 1	6/ 12/ 6 double glazing	1.95 m ²	Window 2	None	m ²	Door	None	m ²	Roof/ Ceiling	None	m ²	Vent 1	Whole House Ventilation	m ²	Vent 2	None	m ²
		Surface area OR number of vents																												
Wall 1	Brick/ block cavity	8.85 m ²																												
Wall 2	None	m ²																												
Window 1	6/ 12/ 6 double glazing	1.95 m ²																												
Window 2	None	m ²																												
Door	None	m ²																												
Roof/ Ceiling	None	m ²																												
Vent 1	Whole House Ventilation	m ²																												
Vent 2	None	m ²																												
		3) Enter reverberation time of the room.		0.5 seconds																										
				4) Select exterior sound level type Option (A) ☒ User defined spectrum Typical Noise Climate View/ Edit Data Option (B) ☐ Spectrum shape Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz) L_{Aeq} 57 dB ISO 717 - 1 (C) View Data																										
				Internal sound level L_{Aeq} 22.9 dB																										

Bedroom - Typical Internal Condition

BRE

1) Enter room dimensions or volume

☒ Use dimensions

x

4.5

m

y

3

m

z

2.4

m

Volume

32.4

m³

OR

☐ Use volume

m³

Building Envelope Insulation

Switch to Reverberation Time Calculation

HELP

2) Select elements of facade structure, and enter corresponding internal surface area in m² OR enter number of vents.

Surface area OR number of vents

Wall 1	Brick/ block cavity	8.85	m ²
Wall 2	None		m ²
Window 1	6/ 12/ 6 double glazing	1.95	m ²
Window 2	None		m ²
Door	None		m ²
Roof/ Ceiling	None		m ²
Vent 1	Whole House Ventilation		
Vent 2	None		

View/ Edit Data

3) Enter reverberation time of the room.

0.5 seconds

4) Select exterior sound level type

Option (A) ☐ User defined spectrum

Typical Noise Climate

View/ Edit Data

Option (B) ☒ Spectrum shape

Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz)

L_{Aeq}

75

dB

ISO 717 - 1 (C)

View Data

Internal sound level

L_{Aeq}

40.9

dB

Bedroom - Typical LAMax Condition

BRE

1) Enter room dimensions or volume

☒ Use dimensions

x m
y m
z m

Volume m³

OR

☐ Use volume

m³

Building Envelope Insulation

2) Select elements of facade structure, and enter corresponding internal surface area in m² OR enter number of vents.

Switch to Reverberation Time Calculation

HELP

		Surface area OR number of vents	
Wall 1	Brick/ block cavity	31.2	m ²
Wall 2	None		m ²
Window 1	6/ 12/ 6 double glazing	12	m ²
Window 2	None		m ²
Door	None		m ²
Roof/ Ceiling	None		m ²
Vent 1	Air Conditioned		
Vent 2	None		

Check surface area or number of vents

View/ Edit Data

3) Enter reverberation time of the room.

seconds

4) Select exterior sound level type

Option (A) ☐ User defined spectrum

View/ Edit Data

Option (B) ☒ Spectrum shape

Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz)

L_{Aeq} dB

View Data

Internal sound level

L_{Aeq} dB

Open Plan Office - Typical Internal Condition