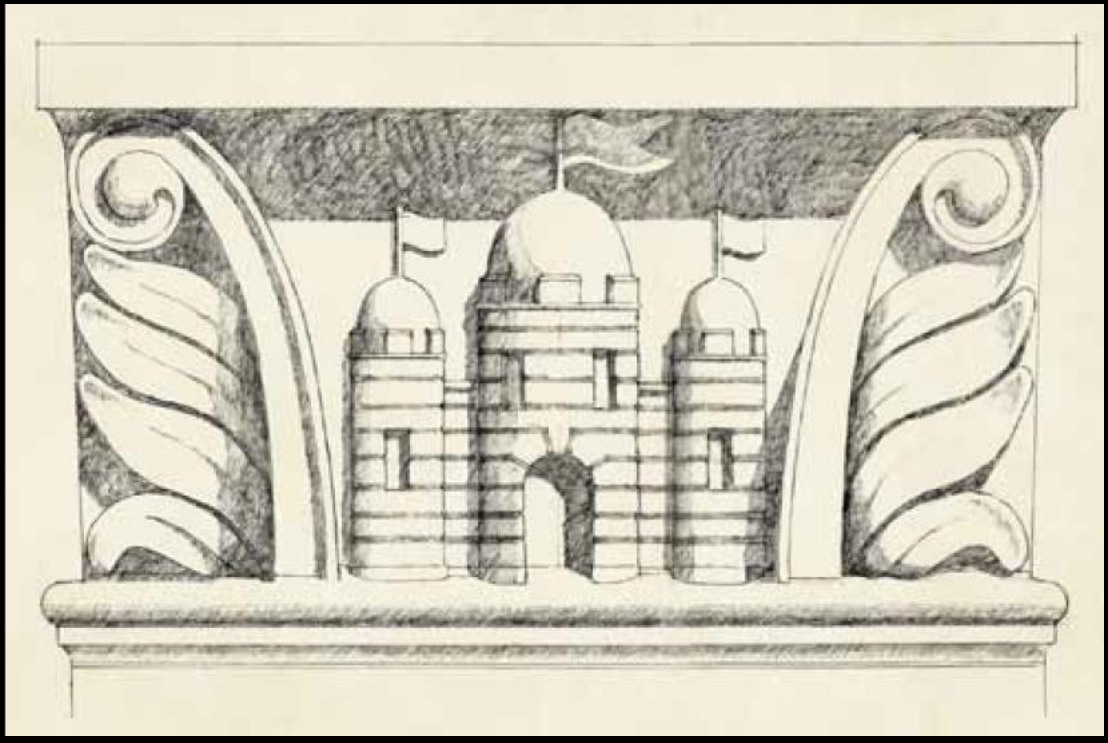

EAGLE QUARTER II
NEWBURY

NOISE ASSESSMENT

September 2023

LOCHAILORT

Noise Assessment

Eagle Quarter, Newbury

Prepared for
Lochailort Newbury Ltd

by

Stuart Michael Associates

September 2023

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APPENDICIES

ACRONYMS AND ABBREVIATIONS

'A' weighted	The weighting that is applied to measured sound pressure levels so that the levels correspond more closely to the subjective response of the human ear - expressed as dB(A)
ABC Method	BS 5228 Method for determining the threshold of significance and associated construction impacts
°C	Degrees Celsius
BRE	Building Research Establishment
BS 5228	Code of practice for noise and vibration control on construction and open sites (2014)
BS 8233	Guidance on sound insulation and noise reduction for buildings (2014)
CIRIA	Construction Industry Research and Information Association
CRN	Calculation of Railway Noise
CRTN	Calculation of Road Traffic Noise
dB	Decibel – unit of measurement of sound
EHO	Environmental Health Officer
$L_{A10, T}$	Noise level exceeded for 10% of the time period (T) expressed in decibels with an A weighting
$L_{Aeq,T}$	A weighted equivalent continuous noise level over a time
L_{Amax}	A weighted maximum noise level
ms^{-1}	Metres per second
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	National Policy Statement for England
PPV	Peak Particle Velocity
SEL	Single Event Noise Exposure Level
SLM	Sound Level Meter
SMA	Stuart Michael Associates Limited
WBC	West Berkshire Council
WHO	The World Health Organisation

1.0 INTRODUCTION

1.1 This Noise Assessment report has been prepared by Stuart Michael Associates Limited (SMA), Consulting Engineers, on behalf of Lochailort Newbury Ltd (the Applicant). The report supports the planning application for a mixed development at Eagle Quarter, Newbury. Refer to **Figure 1.1** for the location of the development.

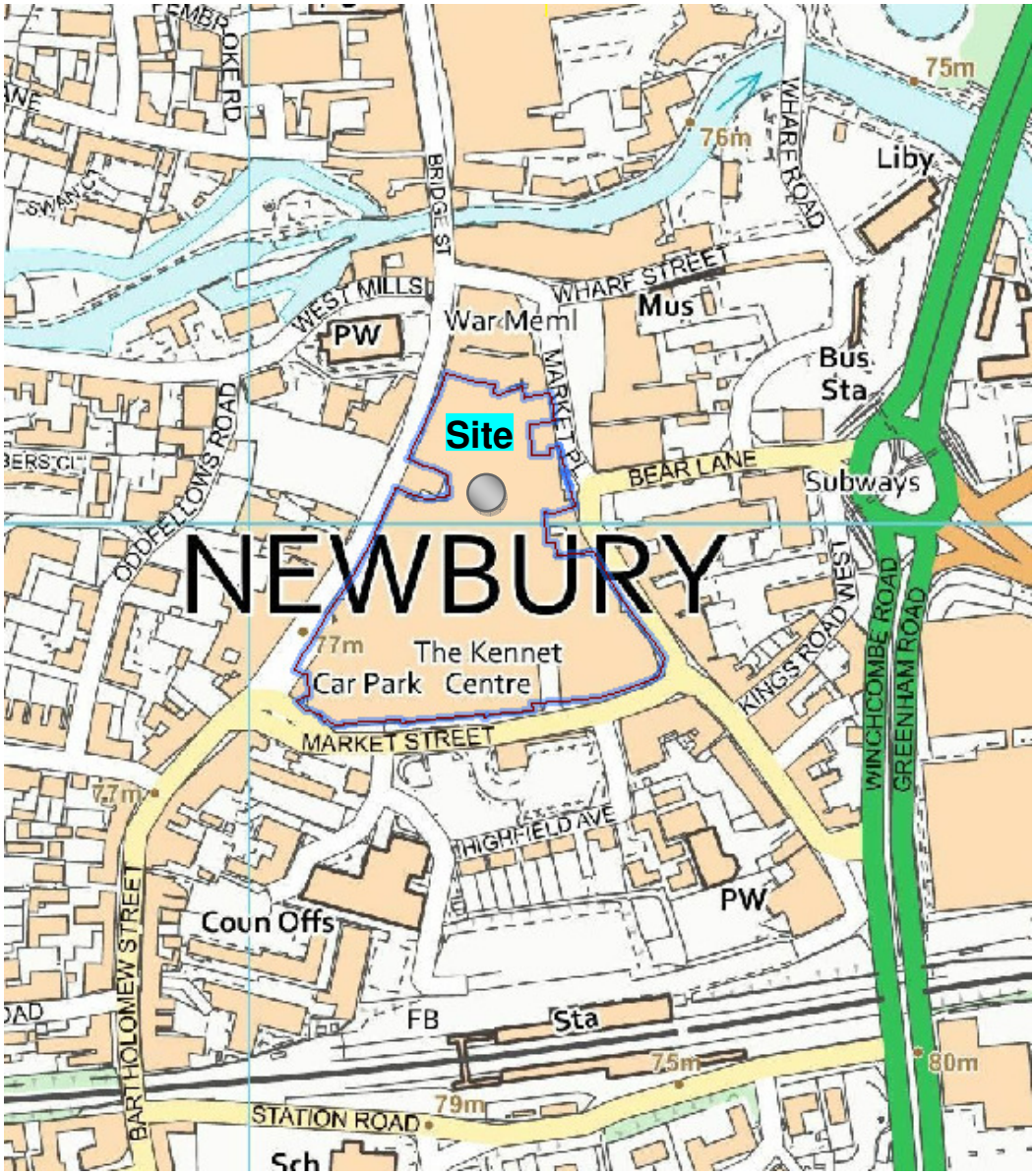


Figure 1.1: Site Location Plan

1.2 This report supports an application for phased redevelopment of the Kennet Centre comprising the partial demolition of existing buildings, flexible-use commercial space, 426 dwellings plus residents' ancillary facilities, access, car parking and cycle parking, landscaping & open

space, sustainable energy installations, and associated works. Refer to **Appendix 1** for a copy of the proposed Site Layout.

Site Description

1.3 The site is located in the centre of Newbury, on land occupied by the Kennet Centre. The site is bound by Cheap Street to the east, Market Street to the south and Bartholomew Street to the west. Between 1000 and 1700 hours, Bartholomew Street (north of Market Street) is pedestrianised and no private vehicles are allowed.

1.4 Surrounding the site there is a mixture of residential and commercial buildings, comprising shops and offices at ground floor level and flats at first floor level and above.

Assessment Methodology

1.5 For this study a noise impact assessment has been carried out in order to determine both the constraints on, and impacts of the development. The constraints are how the existing environment, such as road traffic noise, will impact on the development. The impacts are how the presence of the development will impact on the existing environment. It is important to make the distinction between these two parts of the noise impact assessment as the approach to each will be different.

1.6 Constraints on development with regard to noise levels have been assessed using noise surveys and modelled sound levels at the development site. SoundPLAN noise modelling has been used to determine the existing noise profile throughout the site, which incorporates the topography of the site and surrounding area, and traffic flows for the surrounding road network.

1.7 The future noise profile of the site is determined through SoundPLAN modelling which incorporates future road traffic flows on the surrounding highway network.

1.8 The basic outline methodology employed is detailed below:

- Utilising noise survey data to establish the 'Existing' noise environment at the site through monitoring and SoundPLAN modelling;

- Utilise traffic flow data to establish the 'existing' noise levels at sensitive receptors;
- Determine the impacts from construction activities on local receptors using BS 5228;
- Utilise recorded traffic flow data, LiDAR and topographical surveys, and the illustrative masterplan to establish the noise profile of the site using SoundPLAN;
- Determine the potential constraints of the existing environment for proposed sensitive receptors;
- Determine the changes in noise levels from the "Do Nothing" and "Do Something" scenarios for sensitive receptors in the existing surrounding area;
- Compare the constraints against relevant noise standards and objectives; and
- Where appropriate recommend mitigation measures.

The Nature, Measurement and Effect of Noise

1.9 Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to measure the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

1.10 The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

1.11 When related to changes in noise, a change of ten decibels from, for example, 60 dB(A) to 70 dB(A) would represent a doubling in 'loudness'. Similarly, a decrease in noise from 70 dB(A) to 60 dB(A) would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible. **Table 1.1** details typical noise levels.

Table 1.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In a car
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

2.0 LEGISLATION AND POLICY

2.1 It is important to consider the relevant legislation, policy and associated guidance in relation to noise effects on a proposed development. Following the revocation of Planning Policy Guidance Note 24 'Planning and Noise' (PPG24), the National Planning Policy Framework (NPPF), British and International Standards and local authority guidance have become the relevant national guidance with regard to noise and new residential developments.

National Planning Policy Framework (NPPF)

2.2 The revised National Planning Policy Framework (NPPF, February 2019) supersedes the 2012 and 2018 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

2.3 One of the core planning principles is to contribute to conserving and enhancing the natural environment. Allocations of land for development should prefer land of lesser environmental or amenity value, where consistent with other policies in the Framework (Paragraph 171). 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 (Paragraph 170).

2.4 Paragraph 180 of the NPPF states:

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

a) Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise

giving rise to significant adverse impacts on health and the quality of life (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));

b) *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*"

2.5 Additionally, Paragraph 182 states:

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

Planning Practice Guidance (PPG-N)

2.6 The Planning Practice Guidance for Noise (PPG-N), provides advice on how to determine the noise impact on development:

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

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

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or

would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy." (Paragraph 003).

2.7 The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:

Significant observed adverse effect level: this is the level of noise exposure above which significant adverse effects on health and quality of life occur.

Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.

No observed effect level: this is the level of noise exposure below which no effect at all on health and quality of life can be detected." (Paragraph 005).

2.8 A fourth effect level is also introduced:

Unacceptable Adverse Effect: Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise lead to psychological stress or physical effects.

2.9 It is important to understand that as the PPG-N does not specifically provide any advice with respect to noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment and the PPG-N signposts a number of appropriate guidance documents.

Noise Policy Statement for England (NPSE)

2.10 The National Policy Statement for England (NPSE) aims to "through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*

- *where possible, contribute to the improvement of health and quality of life"* (Paragraph 1.8).

ProPG: Planning & Noise

2.11 The Professional Practice Guidance on Planning and Noise (ProPG) has been produced by the Institute of Acoustics (IOA), the Association of Noise Consultants (ANC), and the Chartered Institute of Environmental Health (CIEH) to provide practitioners with guidance on the management of noise within the planning system in England.

2.12 Amongst other things, ProPG aims to:

- *"Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;*
- *encourages the process of good acoustic design in and around new residential developments;*
- *outline what should be taken into account in deciding planning applications for new noise-sensitive developments;*
- *promote appropriate noise exposure standards;*
- *And assist the delivery of sustainable development."* (Paragraph 1.6).

2.13 The Guidance provides recommended approaches for new residential developments and offers recommendations to the decision maker. For example, ProPG recommends that maximum internal noise levels shout not normally exceed 45 dB $L_{AMAX,F}$ more than 10 times per night.

Calculation of Road Traffic Noise 1988 (CRTN)

2.14 It is common practice in the UK to assess the impacts of road traffic noise in accordance with the method prescribed in The Department for Transport document 'Calculation of Road Traffic Noise 1988 (CRTN)'. Paragraph 1 of the introduction states that:

"These procedures are necessary to enable the entitlement under the Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning"

2.15 Section II and Section III of CRTN outline the procedures to be followed when calculating the prediction method for future road traffic noise.

2.16 All noise levels are expressed in the terms of the index $L_{10,(T)}$ dB(A) where L_{10} is the noise level exceeded for 10% of the time period (T) expressed in decibels with an A weighting, which broadly agree with the range of human hearing.

2.17 Chart 7 in CRTN and the associated formulae can be used to adjust the recorded/calculated sound level from road traffic with a change in distance from the source.

BS 8233:2014 and WHO Guidelines

2.18 Guidance on absolute limits for noise inside buildings is provided in BS 8233:2014 "Sound insulation and noise reduction for buildings – Code of practice". Similar guidance can also be found in the current World Health Organisation (WHO) "Guidelines on Community Noise" and "Night Noise Guidelines for Europe" and the BRE / CIRIA document "Sound control for homes". A summary of the noise criteria can be seen in **Table 2.1.**

Table 2.1: Summary of Internal Noise Criteria: BS 8233 & WHO

Criterion	Activity	Location	0700 to 2300	2300 to 0700
BS 8233:2014	Resting	Living room	35 dB $L_{Aeq,16hr}$	-
	Dining	Dining room / area	40 dB $L_{Aeq,16hr}$	-
	Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$
WHO Onset of sleep disturbance		Bedroom		30 dB $L_{Aeq,8hr}$

2.19 NOTE 4 of Section 7.7.2 in BS 8233:2014 states: 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 $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values.

2.20 Guidelines for external noise levels in public and private open space, such as gardens and parks, is available in the WHO guidelines. According to the WHO guidelines, during the daytime ($L_{eq,16hr}$), moderate annoyance may be

experienced at noise levels between 50 dB(A) and 55 dB(A) and serious annoyance may be experienced above 55 dB(A).

2.21 During the night-time ($L_{eq,8hr}$), an interim target (IT) level of 55 dB(A) is recommended (from WHO Night Noise Guidelines for Europe – 2009). The 55 dB(A) is the lowest observed adverse effect level (LOAEL).

2.22 However, it should be noted that the WHO Guidelines for Community Noise – 1999 recommend an external night-time noise level of 45 dB(A) ($L_{eq,8hr}$) in relation to the reduction in noise level through an open window to achieve an internal noise level in bedrooms of 30 dB.

2.23 With regard to the prediction of noise levels from road traffic noise, the $L_{10,18hr}$ can be converted to $L_{Aeq,16hr}$ by subtracting 2 dB from the $L_{A10,18hr}$ (BS 8233 paragraph 6.2.2) $L_{Aeq.16hr} = L_{A10,18hr} – 2$ dB.

2.24 The night-time noise level, $L_{Aeq,8hr}$, can be calculated from $L_{A10,18hr}$ using the conversion formula in the TRL document "*Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping*".

BS 5228-1: 2009+A1: 2014

2.25 Within BS 5228 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise" a method for predicting noise from construction activity is provided. It is the accepted Standard employed for the assessment of noise and vibration from construction sites.

2.26 The Standard also provides a framework for good working practice and guidance on methods of mitigating noise by employing a number of different techniques.

2.27 Annex E of BS 5228 outline three approaches to the assessment of significance of noise effects which are:

i) Significance based on fixed noise limits. Noise levels should not exceed 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise, or 75 dB(A) in urban areas near main roads in heavy industrial areas;

ii) Significance based on noise change – method 1. Noise levels should not exceed thresholds determined from existing ambient noise levels using the "ABC Method":

A - 65 dB (daytime) when ambient noise levels (when rounded to the nearest 5 dB) are less than this value,

B - 70 dB (daytime) when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A value,

C - 75 dB (daytime) when ambient noise levels (when rounded to the nearest 5 dB) are higher than the category A value.

iii) Significance based on noise change – method 2. Construction noise levels are deemed to be significant if the total noise (ambient + construction) exceeds the pre-construction ambient noise level by 5 dB or more, subject to the lower cut-off value of 65 dB (daytime).

Design Manual for Roads and Bridges (DMRB)

Magnitude of Impacts

2.28 Whilst, DMRB is principally used for the assessment of the environmental impacts of roads it provides a useful method for considering the noise impacts of traffic generation onto the existing highway network from new development. DMRB includes a semantic scale for the classification of the magnitude of noise impacts following the completion of a consented development. This is a useful tool for assessing noise impacts. The scale is shown in **Table 2.2.**

Table 2.2: Classification of Magnitude of Noise Impacts in the Short Term

Noise change, $L_{A10,18hour}$	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

2.29 The changes in noise level and the magnitude of impact presented in Table 2.2 are used to assess the daytime period. At the time of writing this report, DMRB recommends using the 'classification of magnitude of noise impacts in the long term' for the assessment of night time noise levels. The 'long term' scale is shown in **Table 2.3.**

Table 2.3: Classification of Magnitude of Noise Impacts in the Long Term

Noise change, $L_{A10,18hour}$	Magnitude of Impact
0	No change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

2.30 Also recommended in DMRB is the assessment of night time noise levels at sensitive receptors with an $L_{night,outside}$ exceeding 55 dB (until further research is available). The $L_{night,outside}$ 55 dB corresponds to the Interim Target level specified in the WHO Night Noise Guidelines for Europe.

Significance of Effects

2.31 Once the magnitude of impact is determined, the next step is to assess the significance of the effect. A commonly used method for the definition of the sensitivity of receptors is reproduced in **Table 2.4.**

Table 2.4: Criteria Used To Define Noise Sensitive Receptors (Watts, 1984*)

Sensitivity	Description	Examples of receptor use
High	Receptors where people or operations are particularly susceptible to noise	- Residential, - Quiet outdoor areas used for recreation, - Conference facilities, - Auditoria/studios, - Schools in the daytime, - Hospitals/residential care homes, - Religious institutions, e.g. churches, mosques.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	- Offices, - Restaurants, - Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary, e.g. tennis, golf.
Low	Receptors where distraction or disturbance from noise is minimal	- Residences and other buildings not occupied during working hours, - Factories and working environments with existing high noise levels, Sports grounds when spectator noise is a normal part of the event.

2.32 Based on the advice provided in HA 205/08 (DMRB) a matrix of 'overall level of significance' has been produced using the magnitude of change (Table 2.2 and Table 2.3), the sensitivity of the receptor (Table 2.4) and the significance of the effect and is presented in **Table 2.5**.

Table 2.5: Significance of Noise Effects

Magnitude of Impact	Sensitivity of receptor/resource		
	Low	***Medium***	***High***
Major	Slight/moderate	Moderate/large	Large/very large
Moderate	Slight	Moderate	Moderate/large
Minor	Neutral/slight	Slight	Slight
Negligible	Neutral/slight	Neutral/slight	Slight
No Change	Neutral	Neutral	Neutral

* Watts, G R, (1984) *Vibration nuisance from road traffic – results of a 50 site survey*, TRL Research Report 1119, Transport Research Laboratory, Department of Transport, Crowthorne.

2.33 The cells within Table 2.5 shaded grey are considered to be significant effects and mitigation may be required. The remainder of the cells in Table 2.5 are an indication of the significance of effects below the significance threshold.

West Berkshire Council

2.34 The relevant local policy document for West Berkshire is presented in the Local Plan, which is part of the Core Strategy Development Plan Document (DPD). The Core Strategy (adopted on 16 July 2012) forms part of the Local Plan for the district.

2.35 The Core Strategy is a development plan document which sets out WBC's overall planning strategy to 2026. It explains its vision for the area, and how it will be delivered. It also provides a framework for more detailed policies which will be contained in future development plan documents prepared as part of the Local Plan.

2.36 Local policy for noise is part of the saved policies from the West Berkshire District Local Plan (1991-2006). Policy OVS.6 states that the Council will require appropriate measures to be taken in the location, design, layout and operation of development proposals in order to minimise any adverse impact as a result of noise generated. Special consideration is required where noisy development is proposed in or near Sites of Special Scientific Interest or which would harm the quiet enjoyment of Areas of Outstanding Natural Beauty. Proposals for noise sensitive developments should have regard to the following:

(a) existing sources of noise e.g. from roads, railways and other forms of transport, industrial and commercial developments, sporting, recreation and leisure facilities; and

(b) the need for appropriate sound insulation measures; and

(c) the noise exposure levels outlined in Annex 1 of PPG24. In the context of this policy noise sensitive uses are housing, schools and hospitals

Target Noise Levels

Constraints on the Proposed Development

2.37 In line with the guidance documents outlined above, the target noise levels for the proposed development are as follows:

- External noise levels within gardens and public spaces be within or below the range 50 dB to 55 dB $L_{Aeq,16hr}$;
- Internal noise levels within habitable rooms (living rooms and bedrooms) should not exceed 35 dB $L_{Aeq,16hr}$ during the daytime and 30 dB $L_{Aeq,8hr}$ during the night-time; and
- Internal noise levels within bedroom should also not normally exceed 45 dB L_{AFmax} more than ten times during the night-time.

3.0 METHODOLOGY

3.1 This section describes the approach to assessing the noise constraints and potential construction and operational impacts in respect of the proposed development. From on-site observations, it is evident that noise from the surrounding highway network is the main concern for noise. Therefore, SoundPLAN which incorporates the method detailed in CRTN has been used to calculate the existing and future noise levels at the development site.

3.2 A noise measurement survey was undertaken at the site to measure the existing noise profile. The recorded noise levels have been used to verify the SoundPLAN noise model.

3.3 The basic outline methodology employed is detailed below:

- Utilise recorded sound levels to verify the SoundPLAN noise model and establish the noise profile of the site;
- Determine the constraints on proposed sensitive receptors with respect to noise standards and objectives discussed in Section 2.0;
- Determine the impacts from construction activities on local receptors using BS 5228;
- Determine the impacts on existing sensitive receptors from development generated traffic; and
- Where necessary, detail a noise mitigation strategy on a Plot by Plot basis.

4.0 EXISTING NOISE PROFILE

Noise Measurement Survey

4.1 Short-term attended noise measurements were carried out on Tuesday 23rd February 2021 and the unattended noise measurements were carried out between the 23rd and 26th and February 2021. Both surveys were undertaken by SMA.

4.2 The short-term attended monitoring was undertaken at six locations at ground floor level within the pedestrianised area of Bartholomew Street (pedestrianised between 1000 and 1700 hours) and in the Market Place. The measurement duration at each location was 15 minutes and a total of 45 minutes was recorded for each of the six locations. Refer to Figure 4.1 for the noise survey locations.

4.3 The unattended monitoring was undertaken on top of the Kennet Centre, at roof level. The first location was at the southern boundary of the Site, adjacent to Market Street, on top of the “Night Club” which is at an equivalent height of fourth floor. The second location was at the eastern boundary of the Site, overlooking the Market Square at an equivalent height of third floor. Refer to Figure 4.1 for the noise survey locations.

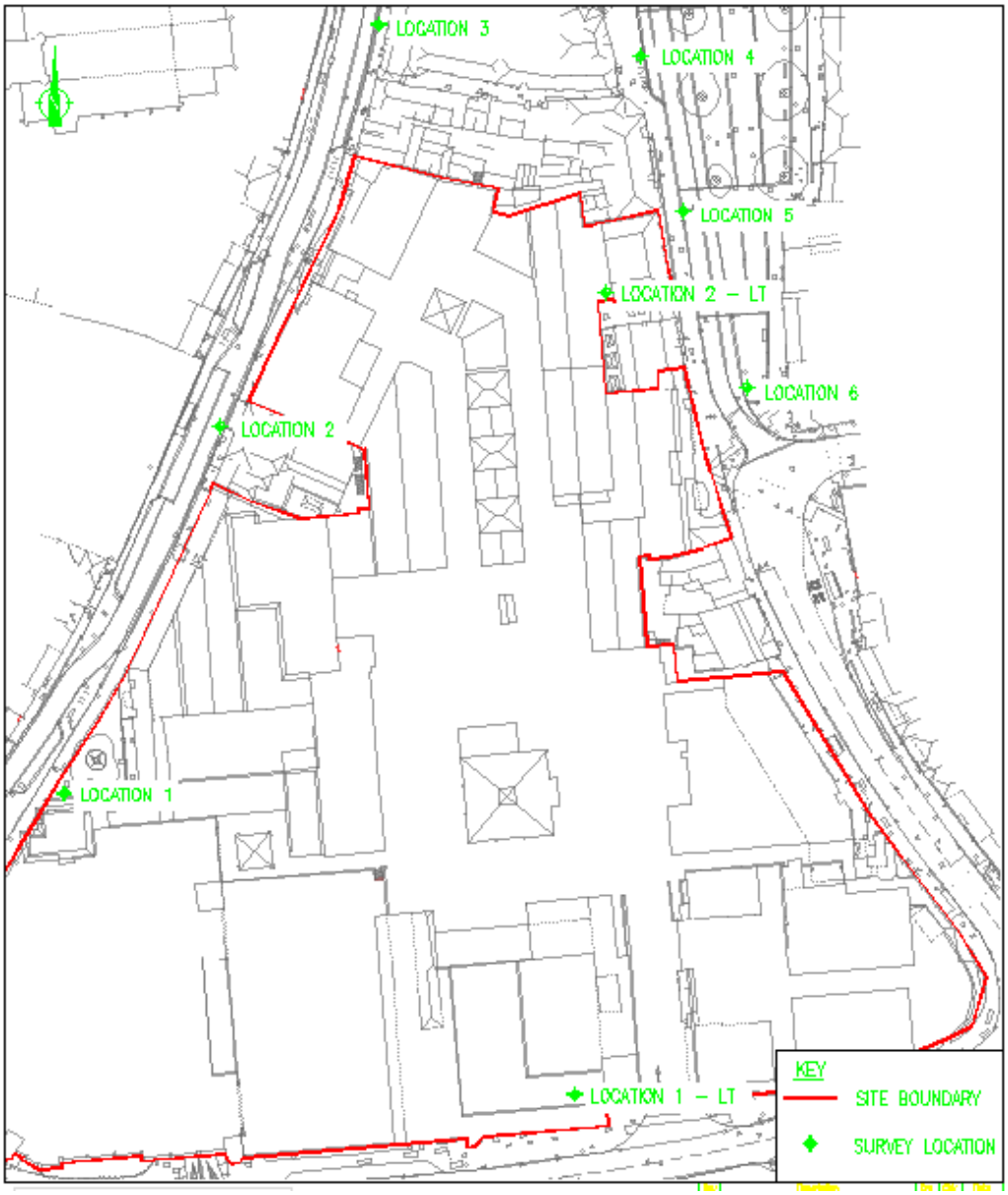


Figure 4.1: Noise Survey Locations

4.4 The existing noise profile of the development site was established by measurements utilising the environmental noise measurement method detailed in British Standard 7445:1991. Sound levels were recorded with an 'A' weighting. Where relevant, the ambient ($L_{eq,T}$), maximum (L_{max}), background ($L_{90,T}$) and 10th percentile ($L_{10,T}$) were recorded.

4.5 The sound level meter's (SLM) microphone was mounted at grazing incidence at an appropriate height above ground level. The SLM was calibrated before and after the measurement periods using an acoustic calibrator. The acoustic calibrator was set to 94 dB at a frequency of 1000 Hertz.

4.6 In accordance with BS 7445, the weather conditions during the noise survey were recorded.

Equipment Used

4.7 The equipment used during the field measurements on site are listed in **Table 4.1**. The SLM and acoustic calibrator have been calibrated at an UKAS accredited centre (certificates available on request).

Table 4.1: Equipment Used During the Field Measurements

Equipment	Type	Serial Number
Sound Level Meter	Brüel and Kjær Type 2250 Light	3004648
Microphone	Brüel and Kjær Type 4950	2913813
Calibrator	Brüel and Kjær Type 4321	2388830
Anemometer/thermometer	Kestrel 2000	449331
Tripod	Mirander – 1.5 metre	

Results from Monitoring

4.8 Presented in **Table 4.2** is a summary of the results from the short-term measurements.

Table 4.2: Summary of Recorded Noise Levels from the Attended Monitoring

Measurement Location	Measurement Duration (3 x 15) (minutes)	Range of Ambient Noise Levels ($L_{Aeq,T}$)	Average Ambient Noise Level ($L_{Aeq,T}$)	Maximum Noise Level (L_{AFmax})
1	45	51 - 55	54	80
2	45	55 - 65	59	79
3	45	53 - 60	57	81
4	45	54 - 56	55	76
5	45	54 - 58	56	74
6	45	58 - 59	59	76

4.9 From Table 4.2 it can be seen that the range of measured Ambient noise levels ($L_{Aeq, T}$) is from 51 dB to 65 dB.

4.10 Presented in **Table 4.4** is a summary of the results from the 24-hour measurements.

Table 4.3: Summary of Recorded Noise Levels from the unattended Monitoring – long-term

Measurement Location	Measurement Period	Ambient Noise Level ($L_{Aeq,T}$)	Maximum Noise Level (L_{AFmax})	10th Percentile Noise Level ($L_{A10,T}$)	Background Noise Level ($L_{A90,T}$)
23rd to 24th February 2021					
7	Daytime	59	83	55	53
	Night time	49	73		47
25th to 26th February 2021					
8	Daytime	54	96	50	49
	Night time	44	72		42

4.11 From Table 4.2 it can be seen that the daytime Ambient noise levels ($L_{Aeq,T}$) were recorded as 59 dB at fourth floor level on the southern boundary and 54 dB at third floor level on the eastern boundary.

4.12 During the night time, the Ambient noise levels were recorded as 49 dB at fourth floor level on the southern boundary and 44 dB at third floor level on the eastern boundary.

Noise Modelling

Development Site

4.13 To determine the noise profile of the development site, noise levels across the site have been calculated using SoundPLAN. The proposed site layout, road traffic flows and LiDAR data have been used to predict the noise levels and produce noise contour plots for the development site. The noise levels are adjusted from $L_{A10,18hr}$ to $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ using the conversion formula detailed in the TRL document "*Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping*".

4.14 The results are presented on **Figure 4.2** (daytime 0700 to 2300) and **Figure 4.3** (night time 2300 to 0700).

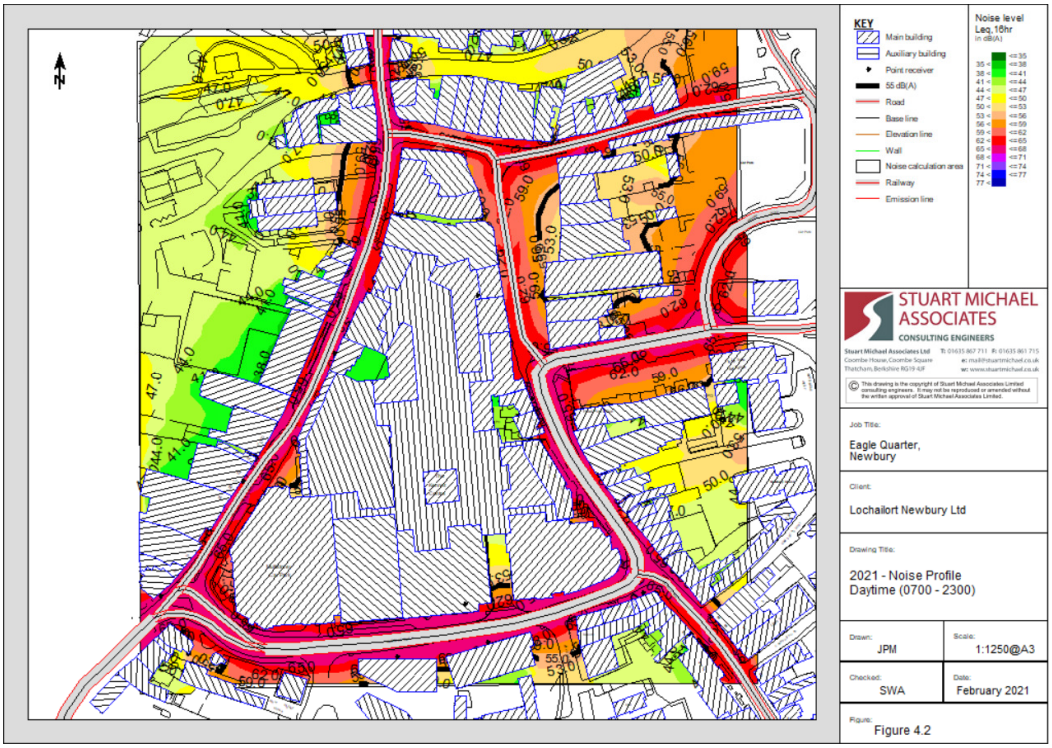


Figure 4.2: Daytime Noise Profile - 2021

4.15 During the daytime, the whole of the site is above 55 dB $L_{Aeq,16hr}$ (refer to Section 2).

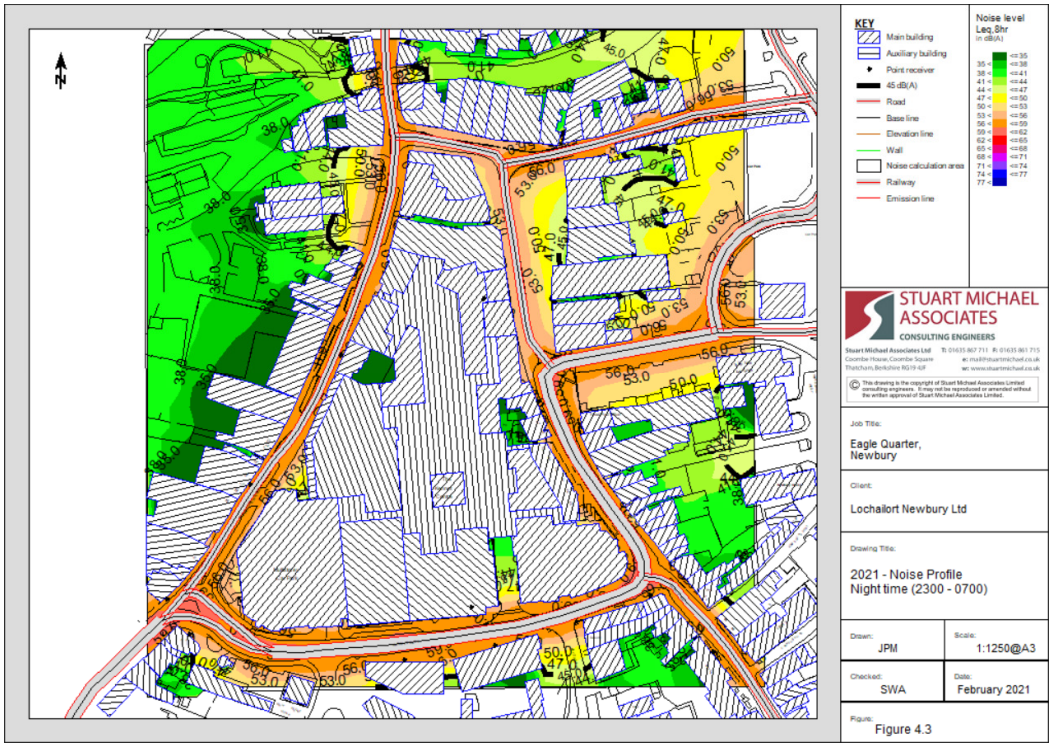


Figure 4.3: Night Time Noise Profile - 2021

4.16 During the night time, the whole of the site is above 45 dB $L_{Aeq,8hr}$ (refer to Section 2).

Sensitive Receptors

4.17 Existing façade noise levels have been calculated using the modelling software SoundPLAN which utilises the method detailed in CRTN. Road traffic data for the local highway network has been obtained from the Transport Consultants SMA. Where traffic data was not available for the 18-hour period used in the traffic noise modelling, locally derived factors have been utilised to convert the available traffic flows to 18-hour flows.

4.18 Receptors sensitive to changes in noise levels have been identified on the east, south and west sides of the development site, adjacent to roads that will experience changes in traffic flows due to the development. The receptor locations are provided on **Figure 4.4**.

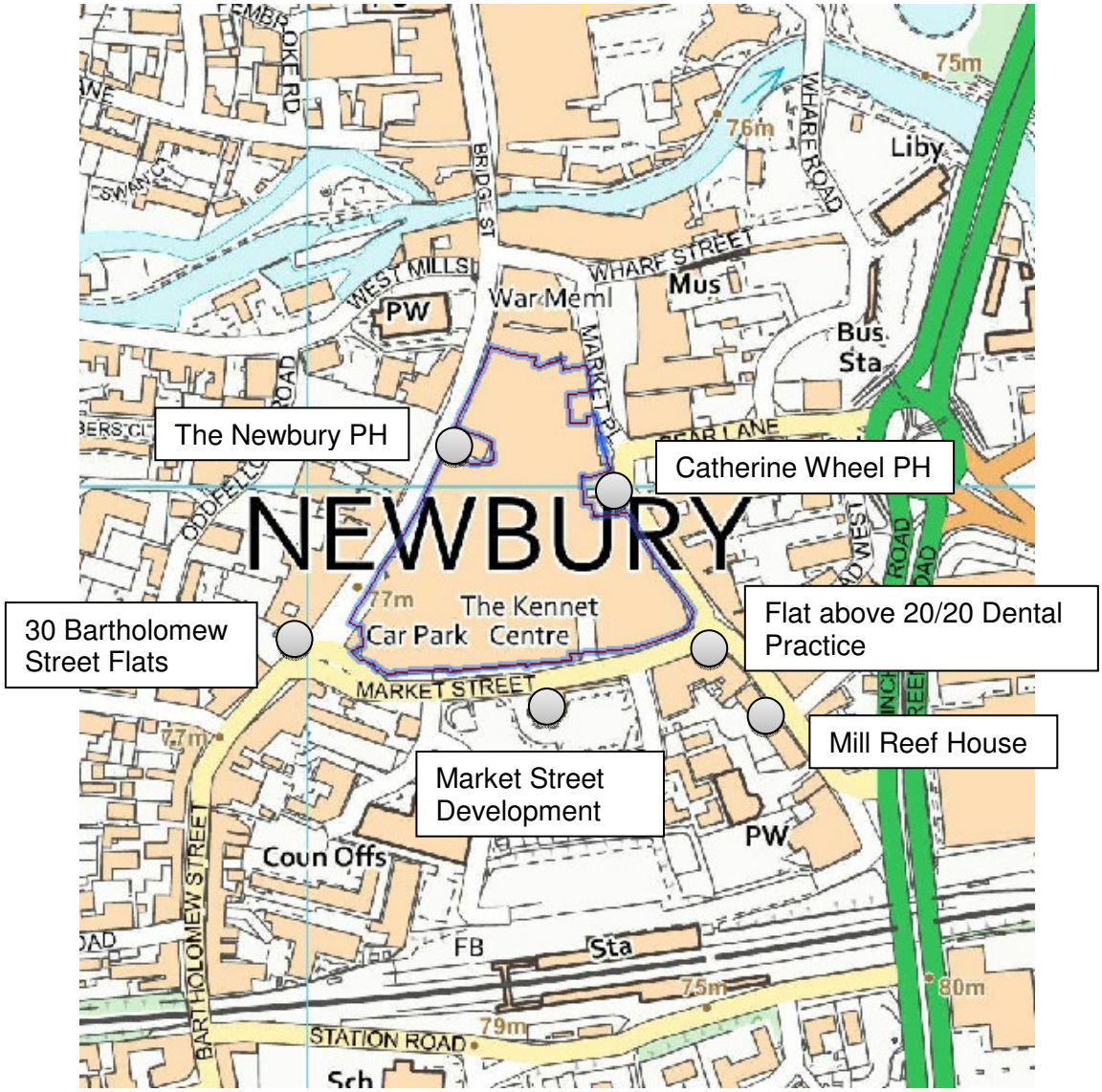


Figure 4.4: Sensitive Receptor Location

4.19 The results from the noise modelling of the 'Existing' situation are presented in **Table 4.4.**

Table 4.4: Façade Noise Levels outside the Development for the 'Existing' Situation

Receptor Location	Floor Level	Façade Direction	'Existing' situation	
			Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq\ 8hr}$ dB(A)
Market Street Development - A	GF	N	68	60
Market Street Development - A	F 1	N	68	60
Market Street Development - A	F 2	N	67	59
Market Street Development - B	GF	N	68	60
Market Street Development - B	F 1	N	68	60
Market Street Development - B	F 2	N	68	59
9 to 14 Cheap Street - Mill Reef House	GF	NE	66	58
9 to 14 Cheap Street - Mill Reef House	F 1	NE	66	58
9 to 14 Cheap Street - Mill Reef House	F 2	NE	65	57
9 to 14 Cheap Street - Mill Reef House	F 3	NE	65	57
20 Cheap Street - 20/20 Dental Practice	GF	N	68	60
20 Cheap Street - 20/20 Dental Practice	F 1	N	68	60
22 to 24 Bartholomew Street	GF	SE	68	59
22 to 24 Bartholomew Street	F 1	SE	68	60
22 to 24 Bartholomew Street	F 2	SE	66	58
119 Bartholomew Street - Jones Robinson Estate Agents	GF	NE	65	57
119 Bartholomew Street - Jones Robinson Estate Agents	F 1	NE	66	58
Catherine wheel Pub	GF	E	68	59
Catherine wheel Pub	F 1	E	69	60
The Newbury PH	GF	NW	68	59
The Newbury PH	F 1	NW	68	60

4.20 From Table 4.4 it can be seen that buildings outside of the development experience noise levels between 65 dB and 68 dB at ground floor, between 66 dB and 69 dB at first floor and between 65 dB and 68 dB at second floor level during the daytime and between 58 dB and 60 dB at first floor and between 57 dB and 59 dB at second floor level during the night time.

Constraints

4.21 Using the results of the SoundPLAN noise modelling, the future noise levels across the site are assessed against the WHO and BS 8233 for internal noise levels and local noise policy.

4.22 From analysing the “Existing” noise profile of the site, it can be seen that the levels across site from traffic traveling on Bartholomew Street, Market Street and Cheap Street are above 55 dB during the daytime and above 45 dB during the night time and will cause acoustic issues to the development once complete. Therefore, a commensurate level of mitigation is required.

5.0 NOISE ASSESSMENT

5.1 From Figures 4.1 and 4.2 it can be seen that during the daytime and night time, the whole of the site is above 55 dB and 45 dB respectively.

5.2 As noise levels are predicted to be above 55 dB $L_{Aeq,16hrs}$ during the daytime, and above 45 dB $L_{Aeq,8hrs}$ during the night-time, a commensurate level of mitigation will be required to achieve internal noise levels that comply with local policy, British Standards and WHO guidelines.

5.3 Noise can enter a building, whether commercial or residential, through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path for noise. Section 8.4.5 and Table G.1 of BS 8233:2014 ("Windows") details the noise reduction and sound insulation properties of a window. Typically, a "6-12-6 insulated glass unit" provides a 33 dB reduction (e.g. a closed window).

5.4 As detailed in Table 2.1 of this report, BS 8233 recommends that internal **daytime** ($L_{eq,16hr}$) noise levels of 40 dB(A) and 35 dB(A) are design targets for dining rooms, and living rooms and bedrooms respectively. During the **night time** ($L_{eq,8hr}$), internal noise levels in bedrooms should be 30 dB(A) and noise due to individual events ($L_{MAX,F}$) should not exceed the 45 dB(A) threshold more than 10 times a night. To achieve an internal noise level of 30 dB(A) with an open window, night-time façade noise levels must be no greater than 45 dB(A) (45 – 15 = 30 dB(A)).

5.5 Section 8 of BS 8233:2014 "Sound insulation in a building" gives examples of how sound can be enclosed or obstructed by a solid barrier such as a fence between the noise source and receiver. Approximate attenuation levels of around 10 dB from a fence are common.

5.6 Outside amenity space within the development will be shielded from road traffic noise by the proposed residential buildings. The construction of the buildings will help shield the amenity area from road traffic noise and a reduction of up to 10 dB is possible.

5.7 The Buildings Research Establishment (BRE) and Construction Industry Research and Information Association (CIRIA) publication 'Sound Control for Homes' 1993 presents practical advice on the control within dwellings of noise

from outside sources and noise transmitted within and between dwellings. Part B: Scheme Design – Planning to control external noise, amongst other things, gives advice on the potential noise reduction from low-rise dwellings acting as a barrier block between the noise source and noise sensitive areas.

5.8 The first paragraph on page 24 of BRE and CIRIA publication Sound Control for Homes states that "On an estate of low-rise dwellings, those closest to a noise source can give some protection to the remainder of the site". The order of reduction in noise levels behind these buildings can be in the order of 10 dB for the whole site, where the gaps between the dwellings do not exceed 30% of the site frontage.

5.9 Table 13 of the BRE and CIRIA publication Sound Control for Homes gives guidance on the 'design background noise levels arising from external sources' and suggests that an internal noise level of <50 dB for less sensitive areas such as the kitchen, bathroom utility room, WC and internal and communal circulation areas is acceptable.

5.10 The World Health Organisation (WHO): Guidelines for Community Noise report covers, amongst other things, recommended internal and external noise levels for residential dwellings. From "Table 6.1: Guideline values for community noise in specific environments", it can be seen that for outdoor living areas a guideline for serious and moderate annoyance for both daytime and evenings is 55 dB(A) and 50 dB(A) respectively.

6.0 EFFECTS OF THE PROPOSALS DURING CONSTRUCTION

Effect of Construction Noise on Nearby Sensitive Receptors

6.1 The magnitude of construction noise impacts can be predicted by considering noise emissions data for typical construction equipment based on the expected methods of construction for each phase of work on each worksite. The prediction method follows that recommended in BS 5228 Noise and Vibration Control on Construction and Open Sites, Part 1:2009.

6.2 The guidance contained in BS 5228 does not extend to provide criteria against which to assess construction noise. However, the Department of Environment (DoE) Advisory Leaflet (AL) 72 (1976) "Noise Control on Building Sites" gives advice on the maximum levels of construction site noise at residential locations during daytime hours based on levels associated with speech interference. This publication states that during daytime hours (07:00 to 19:00 hours) the L_{Aeq} noise level at the building façade should not exceed:

- 75 dB in urban areas, near main roads or in heavy industrial areas: and
- 70 dB in rural, suburban and urban areas away from main road traffic and industrial noise.

6.3 During construction the potential impact from activities within the site has been assessed using the "Fixed" limit method described in BS 5228. Construction will start on site early 2022 at a rate of 50-60dpa and finish by mid 2026. The site predicted to be operational by the end of 2026. An approximation has been made as to what type of plant will be used for each phase. The closest existing residential properties are essentially adjacent to the site (The Catherine Wheel PH and the Newbury PH). The potential impacts have been assessed at distances of 10 metres up to 50 metres, then at a distance of 100 metres from the noise source to the sensitive receptors.

6.4 At present, the exact program of works is not known. However, the following scope of works have been assessed:

- Demolition;
- Site preparation;
- Groundwork;

- Construction and highway works; and
- Landscaping.

6.5 An assessment has been undertaken using generic construction machinery and operation at distances from 0 to 100 metres from the noise source. The construction noise assessment is presented in **Appendix 2** and the results are summarised below.

6.6 Two "Sensitive Receptors" near to the site have been assessed:

- R1: The Catherine Wheel PH (residential);
- R2: Flats above 20/20 Dental Practice (residential).

6.7 The closest part of the proposed development site is approximately 1m from The Catherine Wheel PH and 50m from Flats above 20/20 Dental Practice. Refer to Figure 4.4 for the receptor locations. According to the BS 5228 'Fixed Method', the daytime ($L_{Aeq,16hr}$) façade threshold of significance at the two receptors is 75 dB(A).

6.8 The results from the "Construction" noise calculations and the BS 5228 threshold of significance at the nearest location (worst-case scenario) for each receptor are summarised in **Table 6.1.**

Table 6.1: Construction Noise Levels at Sensitive Receptors (No Mitigation)

Receptor Location (distance from site in metres)	Existing Ambient dB(A)	Predicted Noise level, dB(A)				BS 5228 Threshold of Significance dB(A)
		Site Prep.	*Earthworks*	*Construction*	*Landscaping*	
R1 (1m)	69	98	99	104	76	**75**
R2 (50m)	68	70	72	72	69	**75**

6.9 Noise from some construction activities will be audible at the nearest sensitive receptor locations and the calculations indicate that construction noise impacts may be significant for a short period of time. However, if Best Practical Means (BPM) is implemented then noise impacts can be minimised.

6.10 A list of common mitigation strategies and how BPM can be implemented is given in paragraph 8.18. It should be noted that construction impacts are temporary and people are generally more tolerant of higher noise levels if they know they are only going to be of a temporary duration.

7.0 EFFECTS OF THE PROPOSALS POST-CONSTRUCION

Introduction

7.1 In order to consider the effects of the proposals during the operational phase it is necessary to split the assessment into constraints and impacts. As mentioned previously constraints deal with the effect of the existing environment on the development and impacts deal with the effect of the development on the existing environment.

7.2 The internal noise levels of the proposed residential development have been assessed by using calculated façade noise levels with the mitigation from both a closed window and also an open window in the façade. The resultant internal noise levels have been assessed against British Standards and WHO guidelines.

7.3 External noise levels in the amenity areas have been calculated including the mitigation provided by the proposed residential buildings. The resultant external noise levels have also been assessed against British Standards and WHO guidelines.

Constraints

7.4 The constraints of the proposal post-construction on sensitive receptors within the development have been examined. The constraints are assessed at sensitive receptors at the approximate location of proposed dwellings within the development site (refer to Appendix 1 – Site Layout).

7.5 The SoundPLAN model has been used to predict the daytime and night time noise levels with the development in place. From the results, noise levels across the site are determined and assessed against current guidelines and British Standards. The noise levels for road traffic are adjusted from an $L_{A10,18hr}$ to $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ using the conversion formula in the TRL document "*Converting the UK traffic noise index $L_{A10,\ 18hr}$ to EU noise indices for noise mapping*".

7.6 The “Site Layout” as submitted with the planning application has been used to establish the approximate location of the proposed buildings and the daytime and night time noise profiles of the development area are provided on **Figure 7.1** and **Figure 7.2** respectively. As with Figure 4.2 and Figure 4.3, the contour plots are displayed as 3 dB coloured bands with a key in the top right-hand corner.

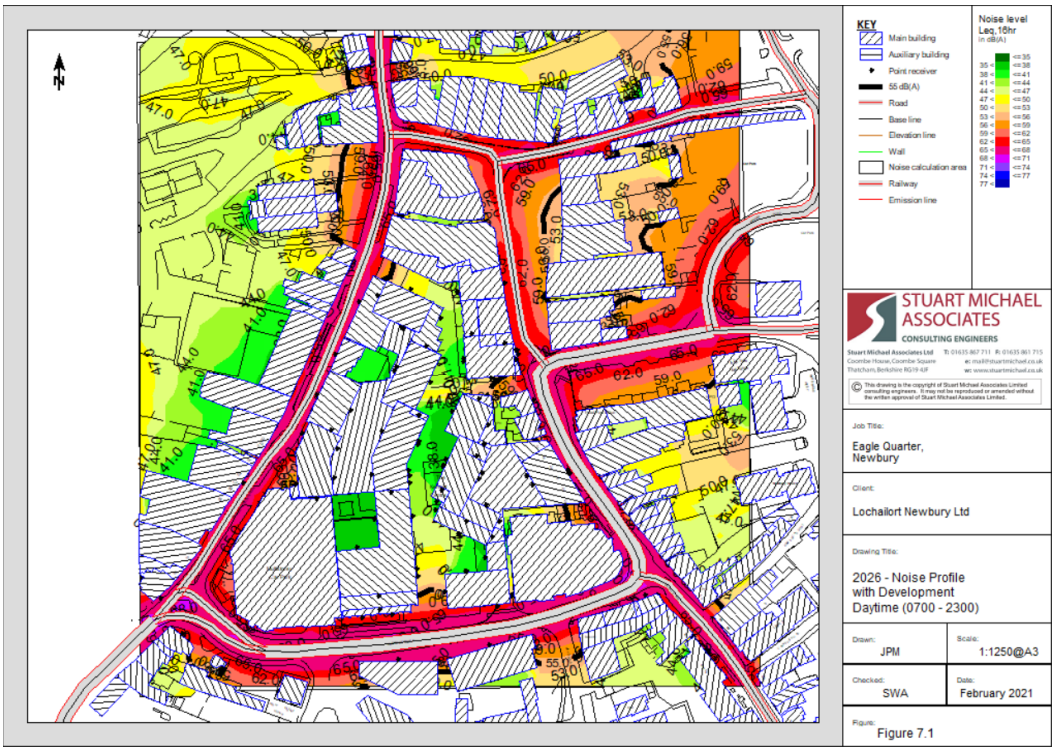


Figure 7.1: Daytime Noise Profile + Development - 2026

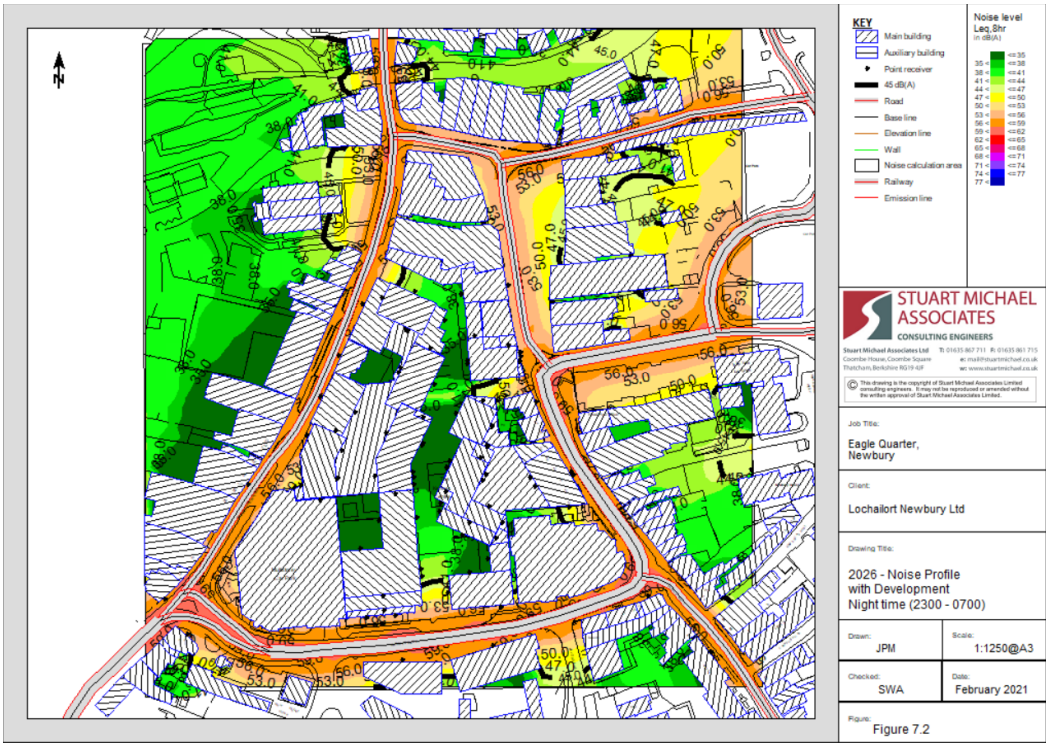


Figure 7.2: Night Time Noise Profile + Development – 2026

7.7 This section of the report has been split into two sections. The first section addresses the predicted façade noise levels at the proposed dwellings and the second section addresses the predicted free field noise levels in gardens and public open space with the proposed buildings in place.

Residential Development Façade Noise Levels - 2026

7.8 For this assessment, façade noise levels at the approximate locations of the proposed dwellings have been calculated using the modelling software SoundPLAN which utilises the methods detailed in CRTN.

7.9 The receptors for each floor level are based on the "Development Zones" which are presented on **Figure 7.3**.

7.10 The façade receptors for each floor level are presented on **Figures 7.4 to 7.14**.

7.11 All façades indicated in Figures 7.4 to 7.14 have been modelled within SoundPLAN and the results from the modelling are presented in **Appendix 3**.

7.12 Presented in the following tables are predicted façade noise levels at all floor levels above ground floor within the development site. The numbers in **bold** in Tables 7.1 to 7.10 are the highest predicted façade noise levels.

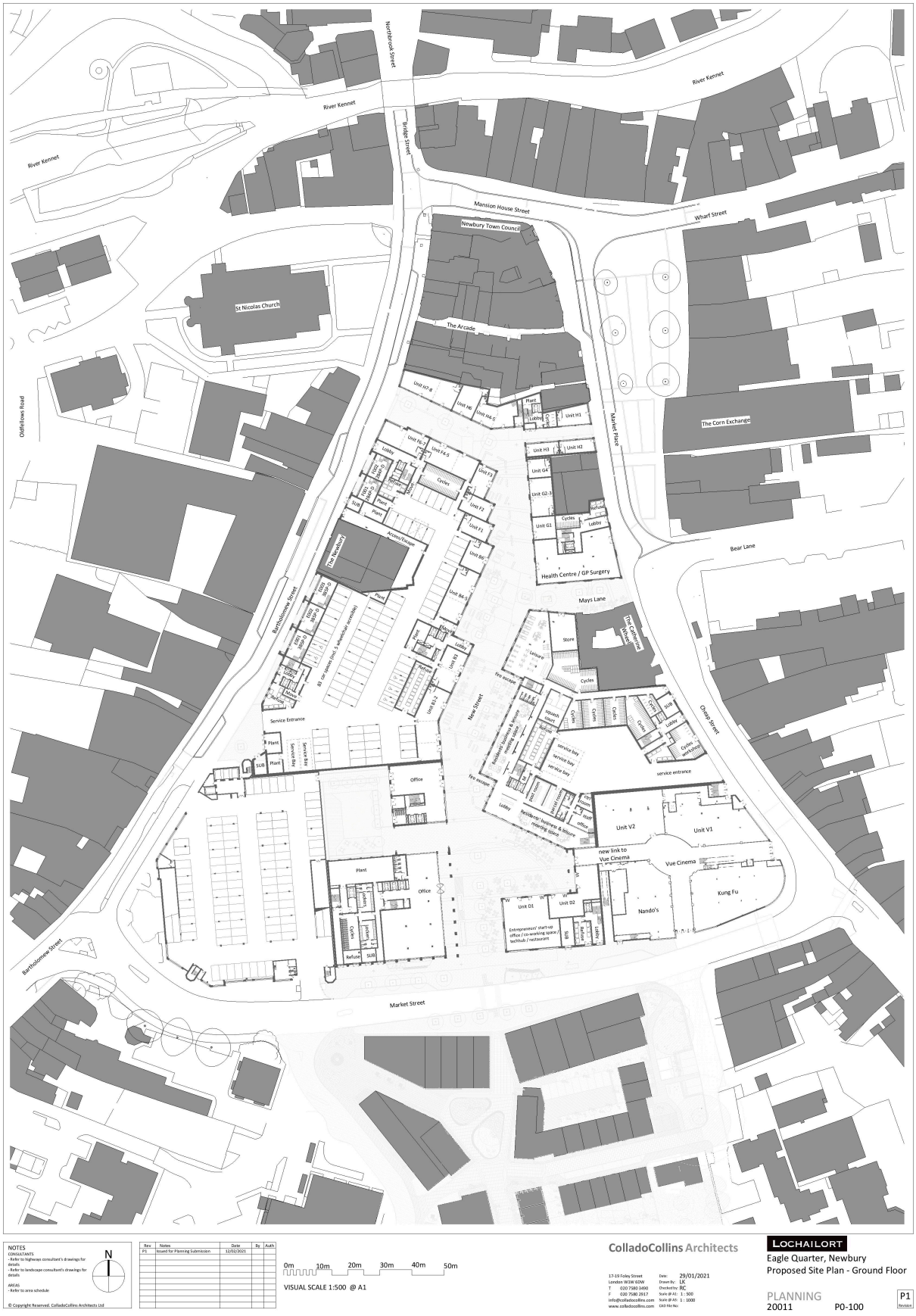


Figure 7.3: Development proposed - ground floor

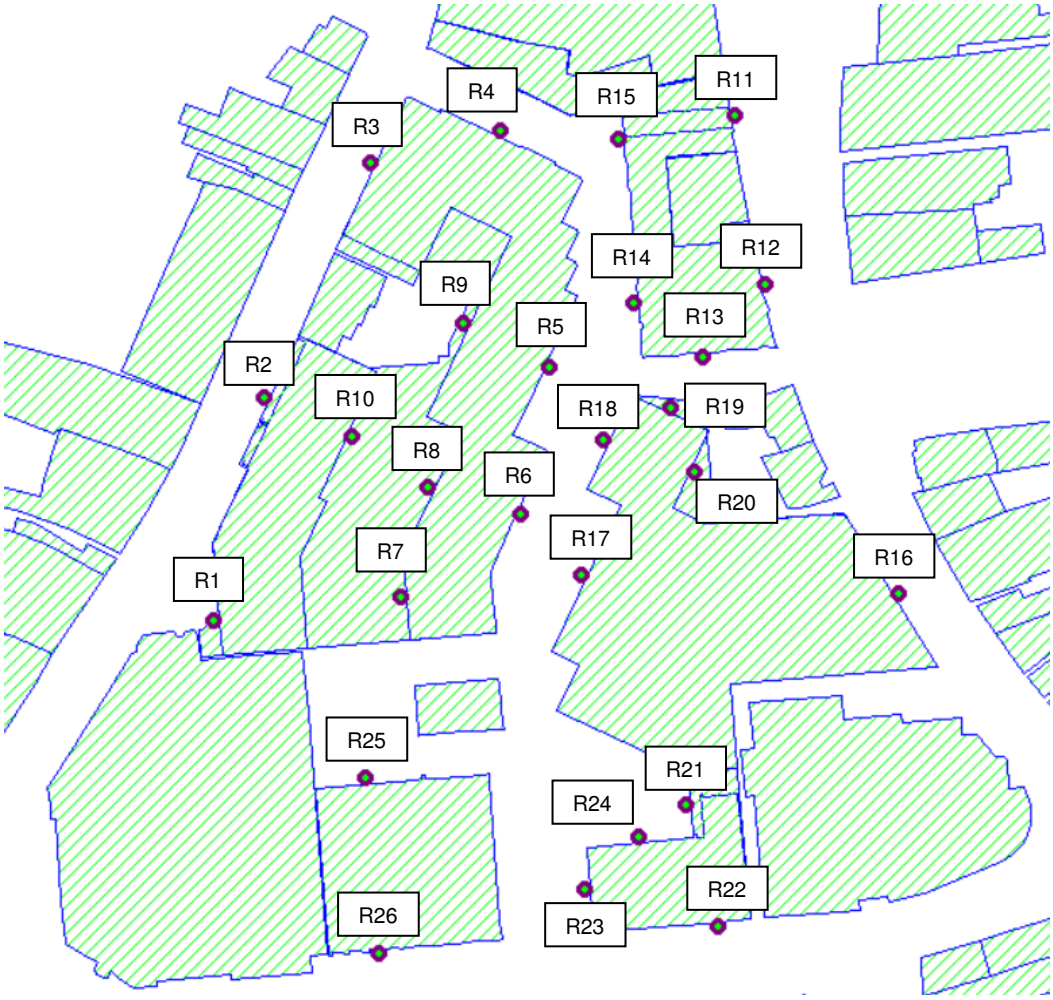


Figure 7.4: First Floor Receptor Locations

7.13 Predicted First Floor (FF) façade noise levels are presented in **Table 7.1.**

Table 7.1: Predicted First Floor (FF) Façade Noise Levels

Development Zone	Predicted First Floor (FF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R1	W	60	52
	R2	NW	66	61
	R3	NW	65	60
	R4	NE	53	46
	R5	SE	48	41
	R6	SE	44	37
	R7	W	40	33
	R8	NW	40	33
	R9	NW	41	34
	R10	SE	41	34
3	R11	E	62	57
	R12	E	66	58
	R13	S	55	47
	R14	W	43	36
	R15	W	48	41
1	R16	NE	69	61
	R17	NW	38	31
	R18	NW	39	32
	R19	NE	58	50
	R20	SE	48	41
	R21	W	42	35
	R22	S	67	59
	R23	W	60	52
	R24	N	42	35
2	R25	N	39	32
	R26	S	66	58

7.14 From Table 7.1 it can be seen that façade noise at FF level are predicted to be between 38 dB (R17 - facing into the site) and 69 dB (R16 - fronting Cheap Street) during the daytime. During the night time, façade noise levels are predicted to be between 31 dB (R17 - facing into the site) and 61 dB (R16 - fronting Cheap Street).

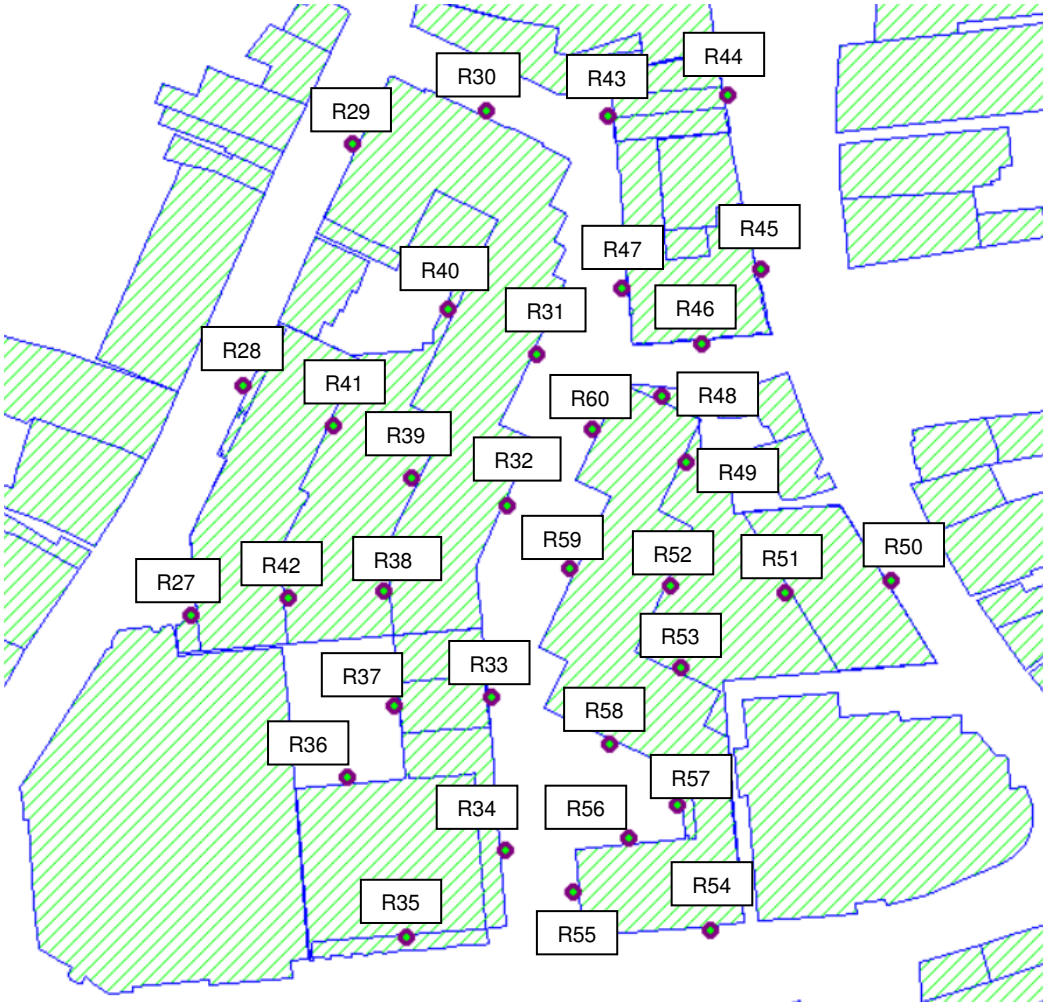


Figure 7.5: Second Floor Receptor Locations

7.15 Predicted façade noise levels at Second Floor (SF) level are presented in **Tables 7.2**.

Table 7.2: Predicted Second Floor (SF) Façade Noise Levels

Development Zone	Façade noise levels at Second Floor (SF) level			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R27	W	58	53
	R28	NW	65	59
	R29	NW	64	59
	R30	NE	55	47
	R31	SE	50	42
	R32	SE	45	38
2	R33	E	49	42
	R34	E	56	49
	R35	S	64	56
	R36	N	40	33
	R37	W	40	33
1	R38	W	40	34
	R39	NW	40	34
	R40	NW	42	35
	R41	SE	43	36
	R42	E	41	34
	R43	W	51	44
3	R44	E	61	56
	R45	E	66	58
	R46	S	56	49
	R47	W	45	38
1	R48	NE	58	51
	R49	SE	51	43
	R50	NE	68	59
	R51	SW	48	41
	R52	SE	49	42
	R53	NE	48	41
	R54	S	67	59
	R55	W	61	53
	R56	N	44	37
	R57	W	43	36
	R58	SW	49	42
	R59	NW	38	31
	R60	NW	40	33

7.16 From Table 7.2 it can be seen that SF façade noise levels are predicted to be between 38 dB (R59 - facing into the site) and 68 dB (R50 - fronting Cheap

Street) during the daytime. During the night time, façade noise levels are predicted to be between 31 dB (R59 - facing into the site) and 59 dB (R50 - fronting Cheap Street).

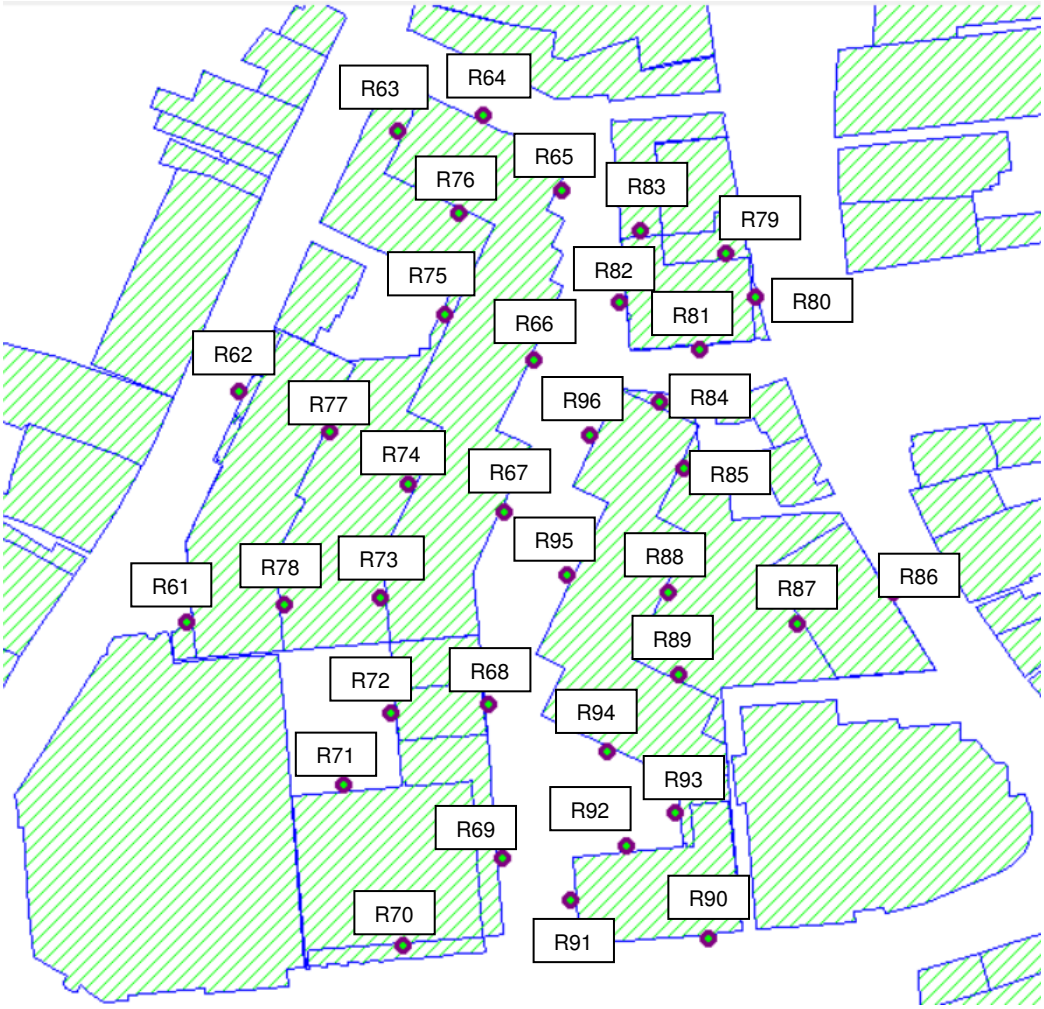


Figure 7.6: Third Floor Receptor Locations

7.17 Predicted Façade noise levels at Third Floor (TF) level are presented in **Table 7.3**.

Table 7.3: Predicted Third Floor (TF) Façade Noise Levels

Development Zone	Predicted Third Floor (TF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R61	W	58	52
	R62	NW	63	58
	R63	NW	52	47
	R64	NE	56	49
	R65	SE	52	45
	R66	SE	52	44
	R67	SE	46	39
2	R68	E	50	43
	R69	E	57	49
	R70	S	65	57
	R71	N	41	34
	R72	W	41	34
1	R73	W	41	35
	R74	NW	41	34
	R75	NW	43	36
	R76	SW	46	39
	R77	SE	45	38
	R78	E	42	35
3	R79	N	54	46
	R80	E	65	57
	R81	S	57	49
	R82	W	49	42
	R83	N	53	45
1	R84	NE	59	51
	R85	SE	54	47
	R86	NE	67	59
	R87	SW	51	44
	R88	SE	51	44
	R89	NE	50	43
	R90	S	66	58
	R91	W	61	53
	R92	N	46	39
	R93	W	45	38
	R94	SW	50	43
	R95	NW	39	32
	R96	NW	41	34
GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east				

7.18 From Table 7.3 it can be seen that façade noise levels at TF level are predicted to be between 39 dB (R95 - facing into the site) and 67 dB (R86 - fronting Cheap Street) during the daytime. During the night time, façade noise levels are predicted to be between 32 dB (R95 - facing into the site) and 59 dB (R86 - fronting Cheap Street).

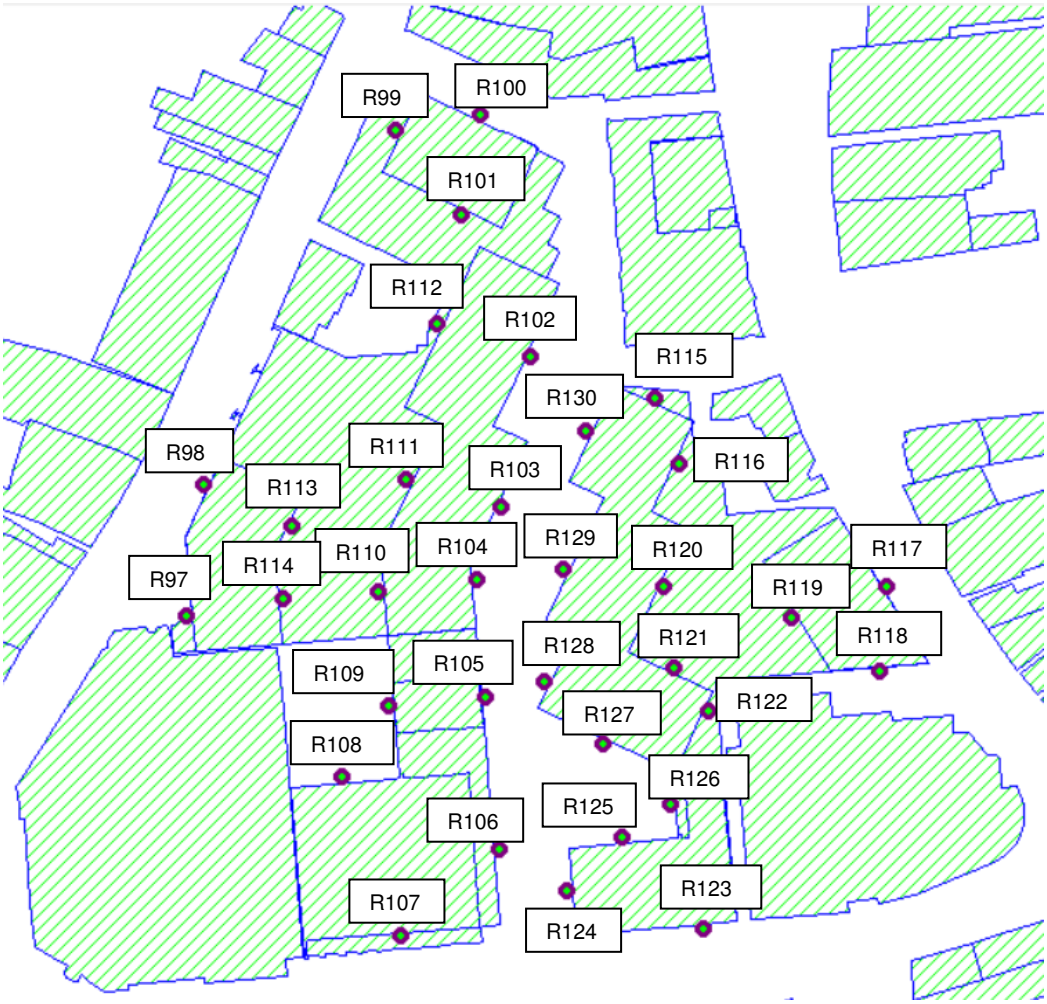


Figure 7.7: Fourth Floor Receptor Locations

7.19 Predicted Façade noise levels at Fourth Floor (ForF) level are presented in **Table 7.4**.

Table 7.4: Predicted Fourth Floor (ForF) Façade Noise Levels

Development Zone	Predicted Fourth Floor (ForF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R97	W	57	52
	R98	NW	62	56
	R99	NW	56	50
	R100	NE	57	49
	R101	SW	49	42
	R102	SE	54	47
	R103	SE	48	41
	R104	E	47	40
2	R105	E	51	44
	R106	E	57	49
	R107	S	64	56
	R108	N	42	35
	R109	W	42	35
1	R110	W	42	36
	R111	NW	42	35
	R112	NW	45	38
	R113	SE	44	37
	R114	E	44	37
	R115	NE	59	51
	R116	SE	57	50
	R117	NE	67	59
	R118	S	60	52
	R119	SW	51	44
	R120	SE	55	47
	R121	NE	53	45
	R122	SE	52	45
	R123	S	66	58
	R124	W	61	53
	R125	N	49	41
	R126	W	49	42
	R127	SW	51	44
	R128	NW	40	33
	R129	NW	39	32

GF: ground floor, F 1: first floor, W: west, S: south, N: north, E: east

7.20 From Table 7.4 it can be seen that façade noise levels at ForF level are predicted to be between 39 dB (R129 - facing into the site) and 67 dB (R117 -

fronting Cheap Street) during the daytime. During the night time, façade noise levels are predicted to be between 32 dB (R129 - facing into the site) and 59 dB (R117 - fronting Cheap Street).

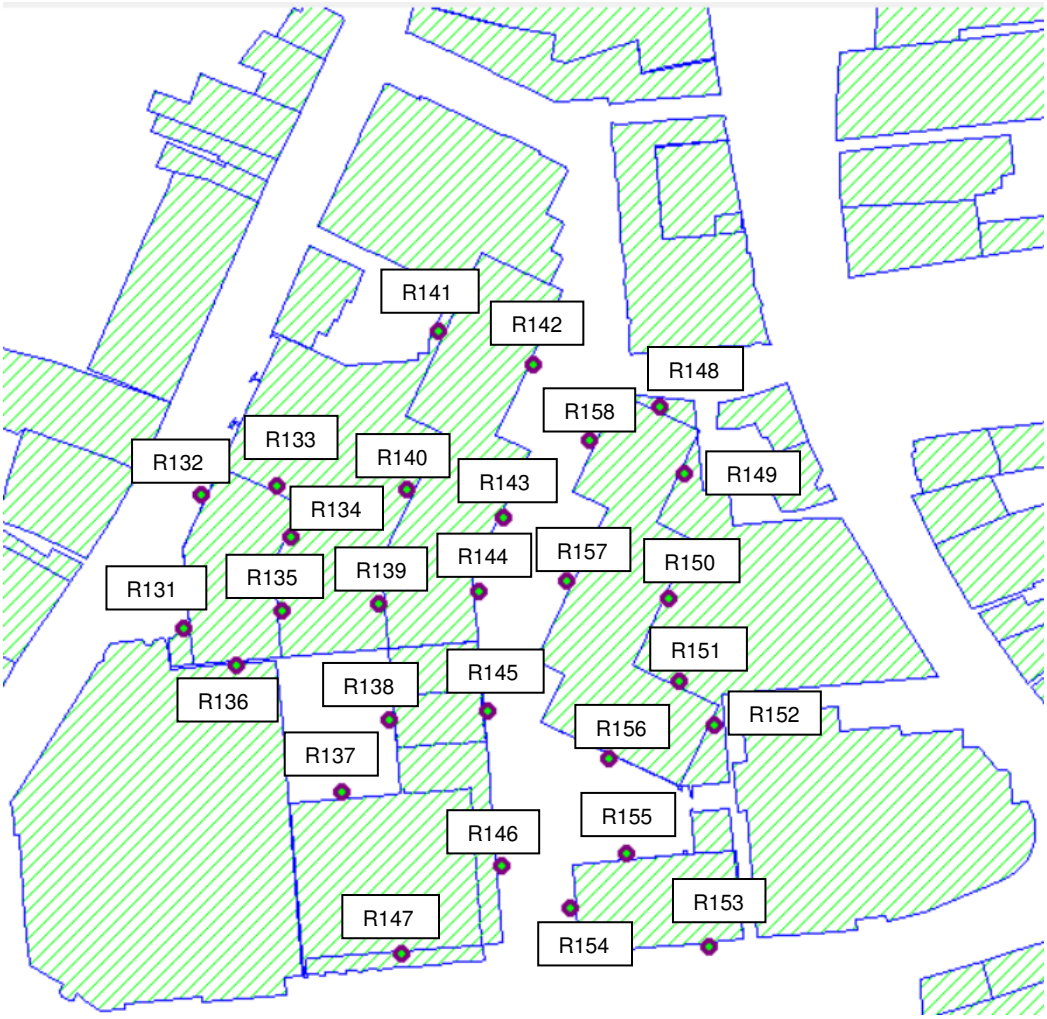


Figure 7.8: Fifth Floor Receptor Locations

7.21 Predicted façade noise levels at Fifth Floor (FfthF) level are presented in **Table 7.5.**

Table 7.5: Predicted Fifth Floor (FfthF) Façade Noise Levels

Development Zone	Predicted Fifth Floor (FfthF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R131	W	57	52
	R132	NW	61	56
	R133	NE	50	43
	R134	SE	47	40
	R135	E	46	39
	R136	S	48	41
2	R137	N	44	37
	R138	W	44	37
1	R139	W	44	37
	R140	NW	44	37
	R141	NW	47	40
	R142	SE	57	49
	R143	SE	50	43
	R144	E	48	41
2	R145	E	52	44
	R146	E	57	50
	R147	S	64	56
1	R148	NE	60	52
	R149	SE	59	51
	R150	SE	56	49
	R151	NE	55	47
	R152	SE	55	47
	R153	S	66	57
	R154	W	61	53
	R155	N	52	45
	R156	SW	52	44
	R157	NW	40	33
	R158	NW	44	37

7.22 From Table 7.5 it can be seen that façade noise levels at FfthF level are predicted to be between 40 dB (R157 - facing into the site) and 66 dB (R153 - fronting Market Street) during the daytime. During the night time, façade noise levels are predicted to be between 33 dB (R157 - facing into the site) and 57 dB (R153 - fronting Market Street).

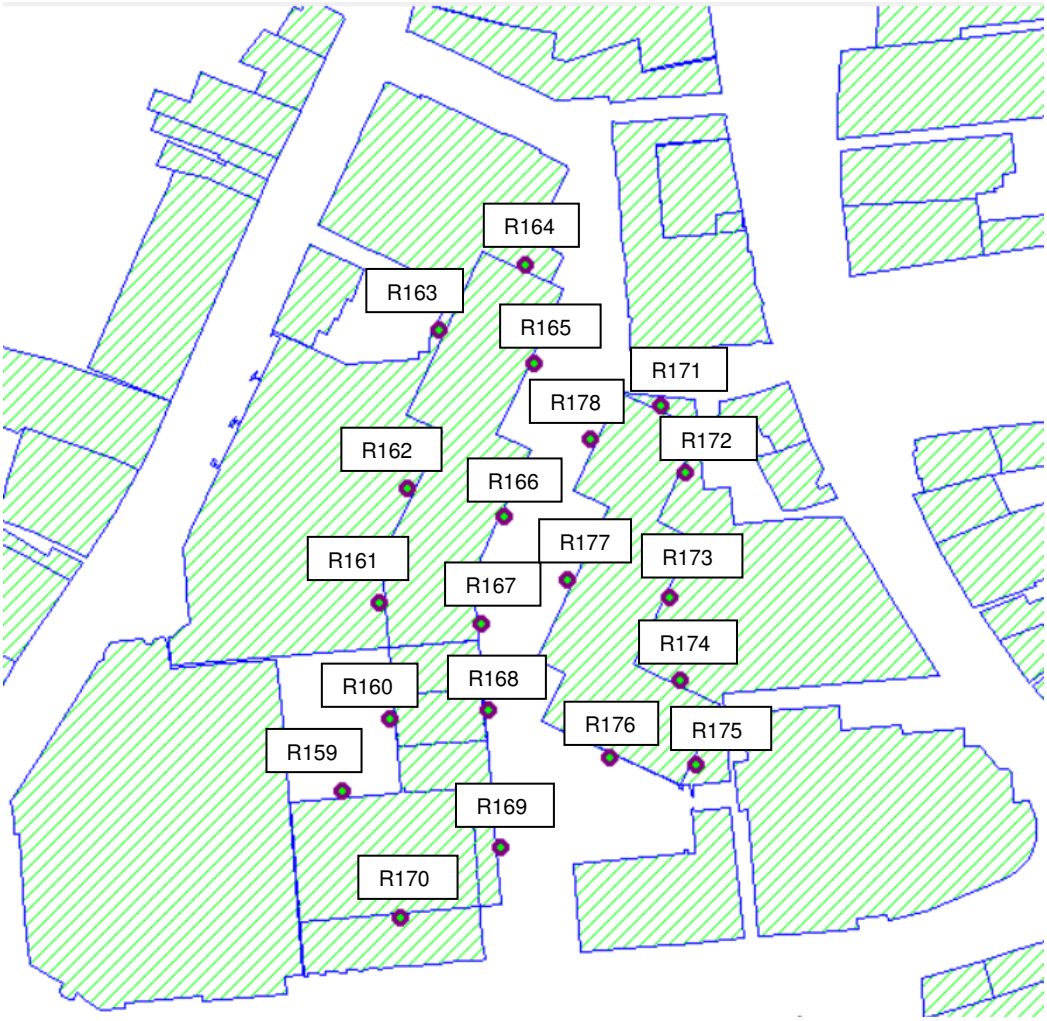


Figure 7.9: Sixth Floor Receptor Locations

7.23 Predicted façade noise levels at Sixth Floor (SxthF) level are presented in **Table 7.6.**

Table 7.6: Predicted Sixth Floor (SxthF) Façade Noise Levels

Development Zone	Predicted Sixth Floor (SxthF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
2	R159	N	46	39
	R160	W	45	38
1	R161	W	45	38
	R162	NW	45	38
	R163	NW	51	44
	R164	NE	57	49
	R165	SE	58	50
	R166	SE	51	44
	R167	E	50	43
2	R168	E	53	45
	R169	E	57	49
	R170	S	54	46
1	R171	NE	60	53
	R172	SE	60	52
	R173	SE	58	50
	R174	NE	57	49
	R175	SE	57	49
	R176	SW	53	46
	R177	NW	42	35
	R178	NW	46	39

7.24 From Table 7.6 it can be seen that façade noise levels at SxthF level are predicted to be between 42 dB (R177 - facing into the site) and 60 dB (R171 & R172 - facing east towards Cheap Street and Bear Lane) during the daytime. During the night time, façade noise levels are predicted to be between 35 dB (R177 - facing into the site) and 53 dB (R171 - facing east towards Cheap Street and Bear Lane).

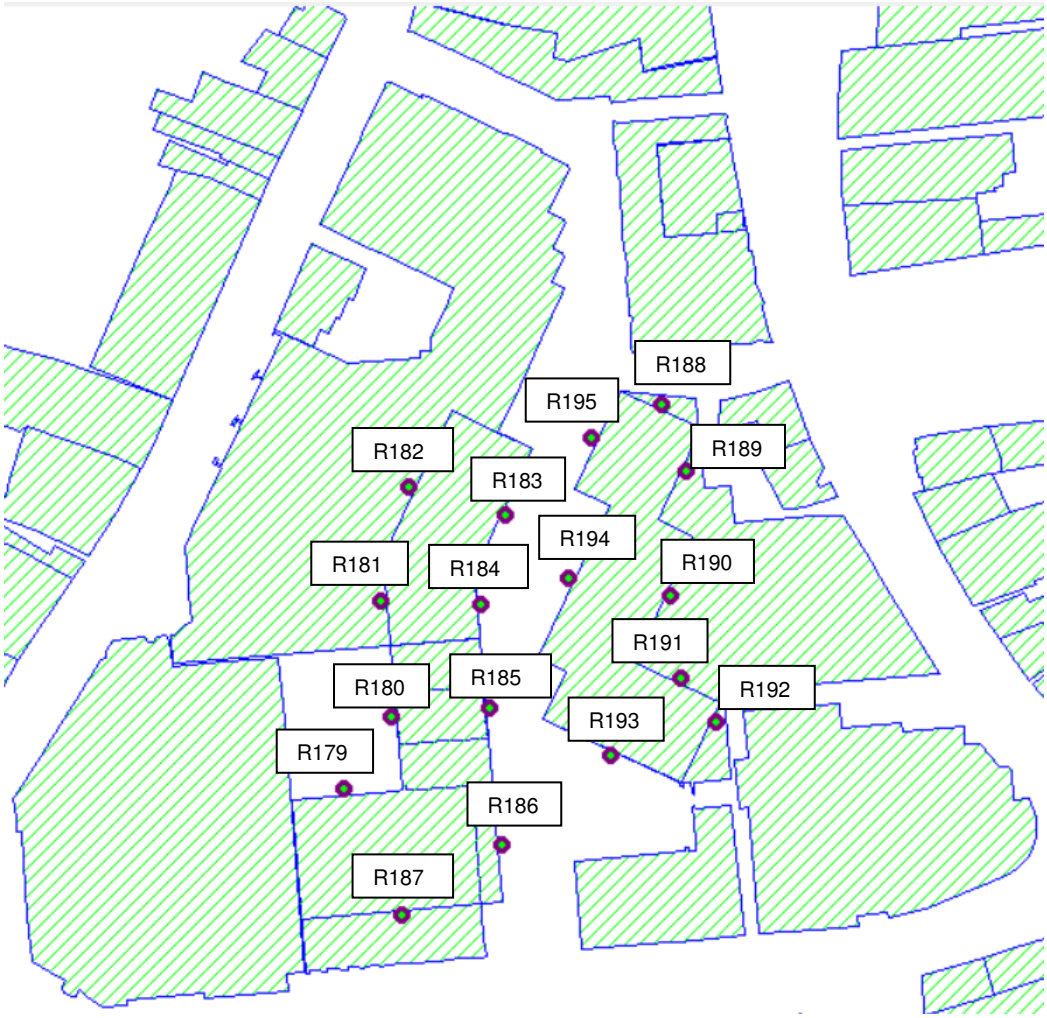


Figure 7.10: Seventh Floor Receptor Locations

7.25 Predicted façade noise levels at Seventh Floor (SvnF) level are presented in **Table 7.7.**

Table 7.7: Predicted Seventh Floor (SvnF) Façade Noise Levels

Development Zone	Predicted Seventh Floor (SvnF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
2	R179	N	49	41
	R180	W	48	41
1	R181	W	47	40
	R182	NW	48	41
	R183	SE	52	45
	R184	E	51	43
2	R185	E	54	46
	R186	E	57	50
	R187	S	57	49
1	R188	NE	61	53
	R189	SE	61	53
	R190	SE	59	51
	R191	NE	58	50
	R192	SE	58	50
	R193	SW	54	47
	R194	NW	44	37
	R195	NW	50	43

7.26 From Table 7.7 it can be seen that façade noise levels at SvnF level are predicted to be between 44 dB (R194 - facing into the site) and 61 dB (R188 & R189 - facing north east and south east towards Cheap Street and Bear Lane) during the daytime. During the night time, façade noise levels are predicted to be between 37 dB (R194 - facing into the site) and 53 dB (R188 & R189 - facing north east and south east towards Cheap Street and Bear Lane).

Figure 7.11: Eighth Floor Receptor Locations

7.27 Predicted façade noise levels at Eight Floor (EF) level are presented in **Table 7.8.**

Table 7.8: Predicted Eight Floor (EF) Façade Noise Levels

Development Zone	Predicted Eight Floor (EF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R196	W	50	42
	R197	NW	50	43
	R198	SE	54	47
	R199	E	53	46
	R200	NE	60	52
	R201	SE	59	52
	R202	NE	58	51
	R203	SW	54	46
	R204	NW	46	39

7.28 From Table 7.8 it can be seen that façade noise levels at EF level are predicted to be between 46 dB (R204 - facing into the site) and 60 dB (R200 - facing north east towards Bear Lane and Market Place) during the daytime. During the night time, façade noise levels are predicted to be between 39 dB (R204 - facing into the site) and 52 dB (R200 facing north east towards Bear Lane and Market Place and R201 facing south east towards Cheap Street).

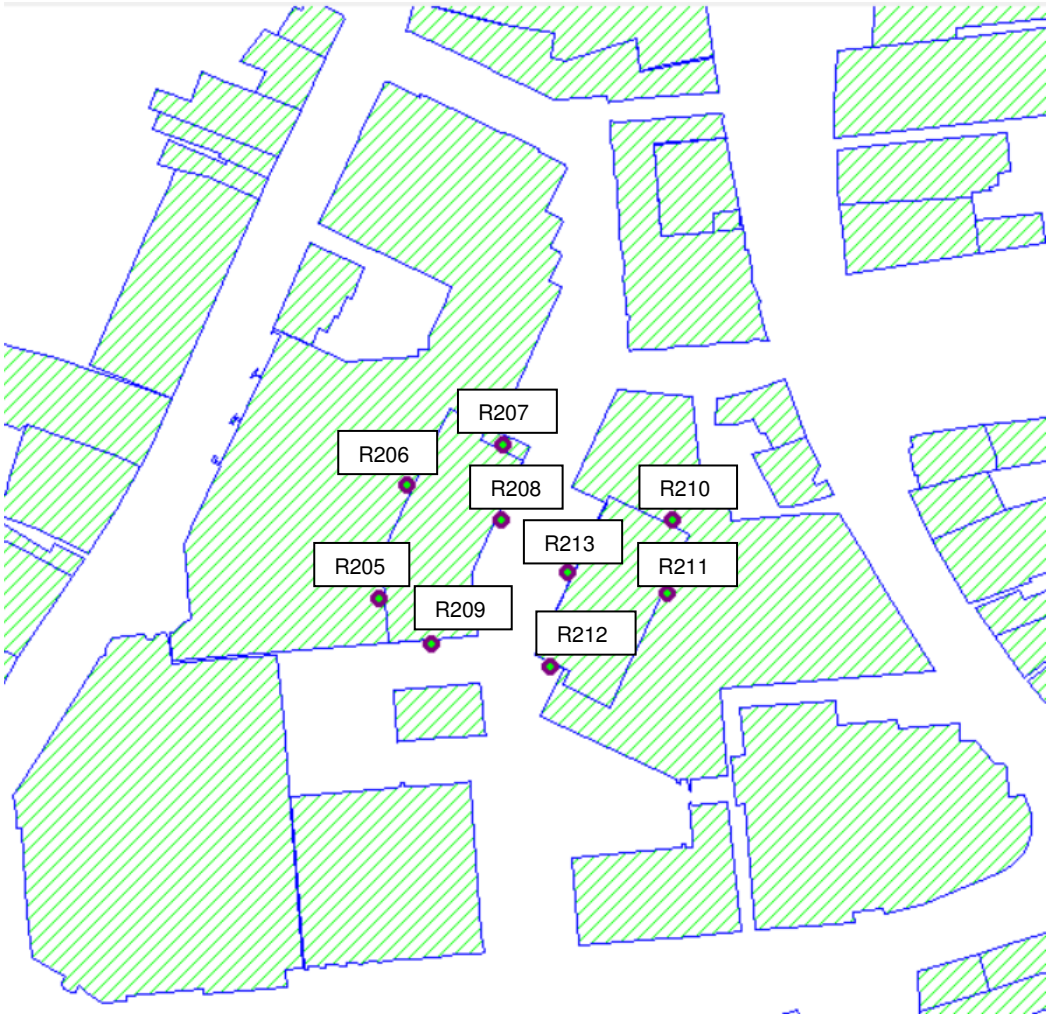


Figure 7.12: Ninth Floor Receptor Locations

7.29 Predicted façade noise levels at Ninth Floor (NF) level are presented in **Table 7.9.**

Table 7.9: Predicted Ninth Floor (NF) Façade Noise Levels

Development Zone	Predicted Ninth Floor (NF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R205	W	52	45
	R206	NW	53	45
	R207	NE	58	50
	R208	SE	57	49
	R209	S	53	46
	R210	NE	60	52
	R211	SE	60	52
	R212	SW	52	45
	R213	NW	49	42

7.30 From Table 7.9 it can be seen that façade noise levels at NF level are predicted to be between 49 dB (R213 - facing into the site) and 60 dB (R210 - facing north east towards Bear Lane and Market Place and R211 facing south east towards Cheap Street) during the daytime. During the night time, façade noise levels are predicted to be between 42 dB (R213 - facing into the site) and 52 dB (R210 - facing north east towards Bear Lane and Market Place and R211 facing south east towards Cheap Street).

Figure 7.13: Tenth Floor Receptor Locations

7.31 Predicted façade noise levels at Tenth Floor (TenF) level are presented in **Table 7.10.**

Table 7.10: Predicted Tenth Floor (TenF) Façade Noise Levels

Development Zone	Predicted Tenth Floor (TF) Façade Noise Levels			
	Receptor Number and Façade Direction		Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,\ 8hr}$ dB(A)
1	R214	NW	52	45
	R215	NE	59	51
	R216	SE	60	52
	R217	SW	52	44

7.32 From Table 7.10 it can be seen that façade noise levels at TF level are predicted to be between 52 dB (R217) and 60 dB (R216 - facing south east towards Cheap Street) during the daytime. During the night time, façade noise levels are predicted to be between 44 dB (R217) and 52 dB (R216 - facing south east towards Cheap Street).

7.33 In summary, the highest daytime and night time façade noise levels are predicted to be adjacent to Cheap Street, Market Street and Bartholomew Street (one way).

Free Field Noise Levels in Amenity Space

7.34 From Figure 4.2 it can be seen that existing daytime noise levels within the development site are above 55 dB at Ground Floor level. However, other than public circulation spaces there are no proposals for private amenity space at Ground Floor level.

7.35 The WHO guidance recommends free field noise levels in gardens and public open space should not be above 55 dB(A) during the daytime to limit the potential for serious annoyance. The positioning of buildings within the site between the noise source (local highway network) and private/public open space help reduce noise levels within these areas (Refer to Section 5).

7.36 With the proposed buildings in place, free field noise levels in the roof terrace gardens will be reduced.

Impacts – operation (development generated traffic)

7.37 The effects of the development on the existing environment are considered in terms of modelled traffic data using SoundPLAN which incorporates the CRTN method. In line with the Transport Assessment, additional development

generated traffic has been added to the predicted SCR road traffic and the impacts from the change has been assessed.

7.38 Façade noise levels have been predicted at existing sensitive receptors as a result of additional traffic movements that will be generated by the proposed Development. The traffic flow data has been used to calculate the future scenario “Future” (Do Nothing) for 2026 and the future scenario “Future + Proposed Development” (Do Something) scenario for 2026 at representative existing receptor locations. The receptor locations are identified on Figure 7.3 and the results from the calculations are presented in **Table 7.11**.

Table 7.11: Predicted Façade Noise Levels for the 'Do Nothing' and 'Do Something' Scenarios – 2026

Receptor Location	Floor Level	Façade Direction	'Do Nothing' (2036)		'Do Something' (2036 + Proposed Development)	
			Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,8hr}$ dB(A)	Daytime $L_{eq,16hr}$ dB(A)	Night Time $L_{eq,8hr}$ dB(A)
Market Street Development - A	GF	N	68.7	60.5	68.9	60.7
Market Street Development - A	F 1	N	68.3	60.1	68.6	60.3
Market Street Development - A	F 2	N	67.7	59.6	68.0	59.8
Market Street Development - B	GF	N	68.7	60.5	68.8	60.6
Market Street Development - B	F 1	N	68.5	60.3	68.7	60.5
Market Street Development - B	F 2	N	67.9	59.7	68.0	59.9
9 to 14 Cheap Street - Mill Reef House	GF	NE	66.5	58.4	66.6	58.5
9 to 14 Cheap Street - Mill Reef House	F 1	NE	66.1	58.0	66.2	58.1
9 to 14 Cheap Street - Mill Reef House	F 2	NE	65.5	57.4	65.5	57.5
9 to 14 Cheap Street - Mill Reef House	F 3	NE	64.9	56.9	65.0	57.0
20 Cheap Street - 20/20 Dental Practice	GF	N	68.0	59.8	68.0	59.8
20 Cheap Street - 20/20 Dental Practice	F 1	N	68.5	60.3	68.6	60.4
22 to 24 Bartholomew Street	GF	SE	67.9	59.7	68.1	59.9
22 to 24 Bartholomew Street	F 1	SE	68.0	59.8	68.2	60.0
22 to 24 Bartholomew Street	F 2	SE	66.5	58.4	66.7	58.6
30 Bartholomew Street	GF	SE	69.1	60.9	69.2	60.9
30 Bartholomew Street	F 1	SE	69.2	61.0	69.3	61.0
30 Bartholomew Street	F 2	SE	68.6	60.4	68.6	60.4
119 Bartholomew Street - Jones Robinson Estate Agents	GF	NE	65.6	57.5	65.6	57.6
119 Bartholomew Street - Jones Robinson Estate Agents	F 1	NE	66.5	58.4	66.6	58.5
Catherine wheel Pub	GF	E	67.9	59.8	67.9	59.7
Catherine wheel Pub	F 1	E	69.0	60.8	69.0	60.7
The Newbury PH	GF	NW	67.8	59.6	67.8	59.7
The Newbury PH	F 1	NW	68.6	60.4	68.6	60.4

7.39 From Table 7.11 it can be seen that noise levels are predicted to change by 0.3 dB or less at all the sensitive receptors that would be affected by the additional development generated traffic.

Impact and Significance

7.40 To assess the impact, it is necessary to use the criteria outlines in Section 2. The impact from the development is determined by calculating the noise level

difference between the 'Do nothing' (without development) and 'Do something' (Future + Proposed Development) Scenarios to identify the change in noise level at each receptor location. Outlined in the following tables is the impact assessment for the receptors outside the development for the 'Do Something' scenario.

7.41 To assess the significance of noise effects it is necessary to use the criteria outlined in Table 2.5. All the receptors are residential and therefore considered of "High" sensitivity. Where the 'impact' of changes in noise level is considered 'Moderate' or 'Major', the cells in the tables have been shaded dark grey to indicate where mitigation may be required. Presented in **Table 7.12** are the results from the impact assessment.

Table 7.12: Impact Assessment for Development Generated Traffic at Sensitive Receptor Locations

Receptor Location	Daytime		Night Time	
	Change in Noise Level, dB(A)	Magnitude of Impact	Change in Noise Level, dB(A)	Magnitude of Impact
"Do nothing" to "Do Something"				
Market Street Development - A	0.2	Negligible	0.2	Negligible
Market Street Development - A	0.3	Negligible	0.2	Negligible
Market Street Development - A	0.3	Negligible	0.2	Negligible
Market Street Development - B	0.1	Negligible	0.1	Negligible
Market Street Development - B	0.2	Negligible	0.2	Negligible
Market Street Development - B	0.1	Negligible	0.2	Negligible
9 to 14 Cheap Street - Mill Reef House	0.1	Negligible	0.1	Negligible
9 to 14 Cheap Street - Mill Reef House	0.1	Negligible	0.1	Negligible
9 to 14 Cheap Street - Mill Reef House	0.0		0.1	Negligible
9 to 14 Cheap Street - Mill Reef House	0.1	Negligible	0.1	Negligible
20 Cheap Street - 20/20 Dental Practice	0.0	No Change	0.0	No Change
20 Cheap Street - 20/20 Dental Practice	0.1	Negligible	0.1	Negligible
22 to 24 Bartholomew Street	0.2	Negligible	0.2	Negligible
22 to 24 Bartholomew Street	0.2	Negligible	0.2	Negligible
22 to 24 Bartholomew Street	0.2	Negligible	0.2	Negligible
30 Bartholomew Street	0.1	Negligible	0.0	No Change
30 Bartholomew Street	0.1	Negligible	0.0	No Change
30 Bartholomew Street	0.0	No Change	0.0	No Change
119 Bartholomew Street - Jones Robinson Estate Agents	0.0	No Change	0.1	Negligible
119 Bartholomew Street - Jones Robinson Estate Agents	0.1	Negligible	0.1	Negligible
Catherine wheel Pub	0.0	No Change	-0.1	Negligible
Catherine wheel Pub	0.0	No Change	-0.1	Negligible
The Newbbury PH	0.0	No Change	0.1	Negligible
The Newbbury PH	0.0	No Change	0.0	No Change

7.42 As can be seen in Table 7.12, there is predicted to be "No Change" or a "Negligible" (0.1 to 0.3 dB – daytime) change and a "No Change" or "Negligible"

(0.1 to 0.2 dB – night time) change noise impact at all the receptors during the daytime and the night time.

7.43 All receptors are residential dwellings which considered “high” sensitivity to noise (refer to Table 2.4). The magnitude of impact is predicted to be “No Change” or “Negligible”, therefore significance of considered “No Change” or “Slight” (refer to Table 2.5).

8.0 MITIGATION MEASURES

8.1 In order to consider the effects of the proposals once constructed it is necessary to split the assessment into constraints and impacts. As mentioned previously, constraints deal with the effect of the existing environment on the development and impacts deal with the effect of the development on the existing environment.

Constraints on Development

8.2 From Table 7.1 to Table 7.10, it can be seen that daytime façade noise levels across the site are predicted to be 69 dB (R16 – fronting Cheap Street) or less. Night time façade noise levels are predicted to be less than 61 dB (R16 – fronting Cheap Street) or less.

8.3 To comply with BS 8233:2014 and WHO guidelines internal noise levels of living rooms and bedrooms should not exceed 35 dB and internal noise levels of dining rooms should not exceed 40 dB during the daytime period. Internal noise levels of bedrooms should not exceed 30 dB during the night-time period.

8.4 Dwellings with façade noise levels greater than 50 dB during the daytime and above 45 dB during the night time will require a commensurate level of mitigation to adhere to daytime and night-time BS 8233:2014 guidelines for living rooms and bedrooms (35 dB $L_{Aeq,16hrs}$ and 30 dB $L_{Aeq,8hrs}$).

8.5 With reference to Table 7.1 to Table 7.10, there are façades with habitable rooms with levels above 50 dB during the daytime and 45 dB during the night-time and therefore mitigation will be required.

8.6 There are many ways for sound to enter a building. The routes are through the roof, the doors and the main route is through the windows. If the roof is built to current Building Regulations and is of sufficient mass it will provide an adequate barrier to the passage of sound. For example, tiles on felt, pitched roof with 100mm mineral wool on plasterboard ceiling have a weighted sound reduction of approximately 43 dB. Doors with adequate mass and minimal gaps between the door and door frame can provide sound reduction of approximately 35 dB when fitted to manufacturers' specification.

8.7 With regard to windows, thermal double-glazed units should be fitted in accordance with Building Regulations as a minimum standard. Units are

normally of the configuration 6 – 12 – 6 (glass, air gap and glass) with a weighted sound reduction of approximately 33 dB. Presented in **Table 8.1** are sound reduction values for window systems utilising various air gap and window thickness.

Table 8.1: Details of Window Systems

Material	Configuration glass/air gap/glass (mm)	Total Thickness (mm)	Sound Reduction (dB)
Sealed Unit	4/12/4	20	27
Sealed Unit	6/12/6	24	33
Sealed Unit	4/12/12	28	36
Sealed Unit	6/12/10	28	37
Laminated glass	6/12/11	29	40
Laminated glass	10/12/16	38	42
Laminated glass	13/12/13	38	45
Sealed Unit	6/20/12	38	41

8.8 It should be noted that the sound reduction presented in Table 8.1 does not consider the adjusted factor for road traffic noise (C, C_{tr}). Usually 1 to 2 dB is subtracted for highway road traffic > 80 kph (C) and between 3 and 6 dB for urban road traffic (C_{tr})† depending on window configuration.

8.9 If the doors and windows are manufactured to a high standard and installed to the manufacturers' specification, the above sound reduction should be achieved.

8.10 **Table 8.2** details examples of windows systems and the expected internal noise level achieved when doors and windows are manufactured to a high standard and installed to the manufacturers' specification.

Table 8.2: Window Systems Example

Façade Level (dB)	Sound Reduction (dB) R_w (C_{tr})	Internal Level (dB)
≤ 70	37 (35)	35
≤ 65	33 (31)	34
≤ 60	27 (25)	35

† BS EN ISO 717-1:1997, Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation, Annex A, Table A.1 – Relevant spectrum adaptation term for different types of noise source

8.11 Where façade noise is equal to or above 65 dB at first floor level during the daytime it is recommended to use a window with a sound reduction of 37 dB (37 – 2 = 35 dB). The corresponding façades are FF and SF level fronting Cheap Street (R16 and R50) and Market Street (R22 and R54) and TF and ForF level fronting Cheap Street (R86 and R117). Refer to **Figure 8.1** for the FF, SF, TF and ForF façade locations which is indicated by a red line.

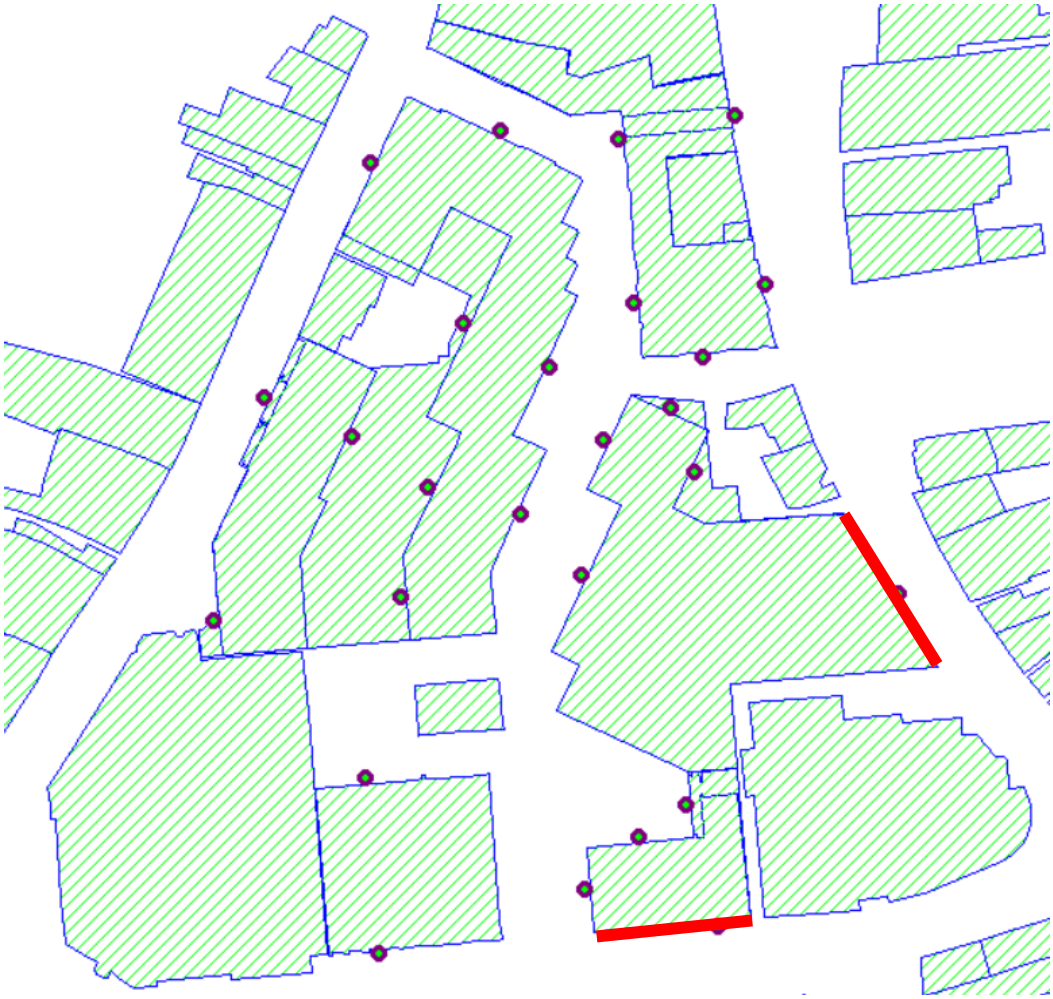


Figure 8.1: Façades requiring a Sound Reduction (R_w) of 35 dB (C_{tr}) at FF, SF, TF and ForF Levels

8.12 Where façade noise is between 59 dB and 65 dB during the daytime it is recommended to use a window with a sound reduction of 33 dB (33 – 2 = 31 dB). The corresponding façades are: FF level fronting Bartholomew Street (R2 and R3), Market Place (R11), Market Place/Cheap Street/Bear Lane junction (R12) and Market Street (R26); SF level fronting Bartholomew Street (R28 and R29), Market Street (R35), Market Place (R44), Market Place/Cheap Street/Bear Lane junction (R45) and Market Street (R55); and refer to **Figure 8.2** for the FF and SF façade locations which is indicated by a yellow line.

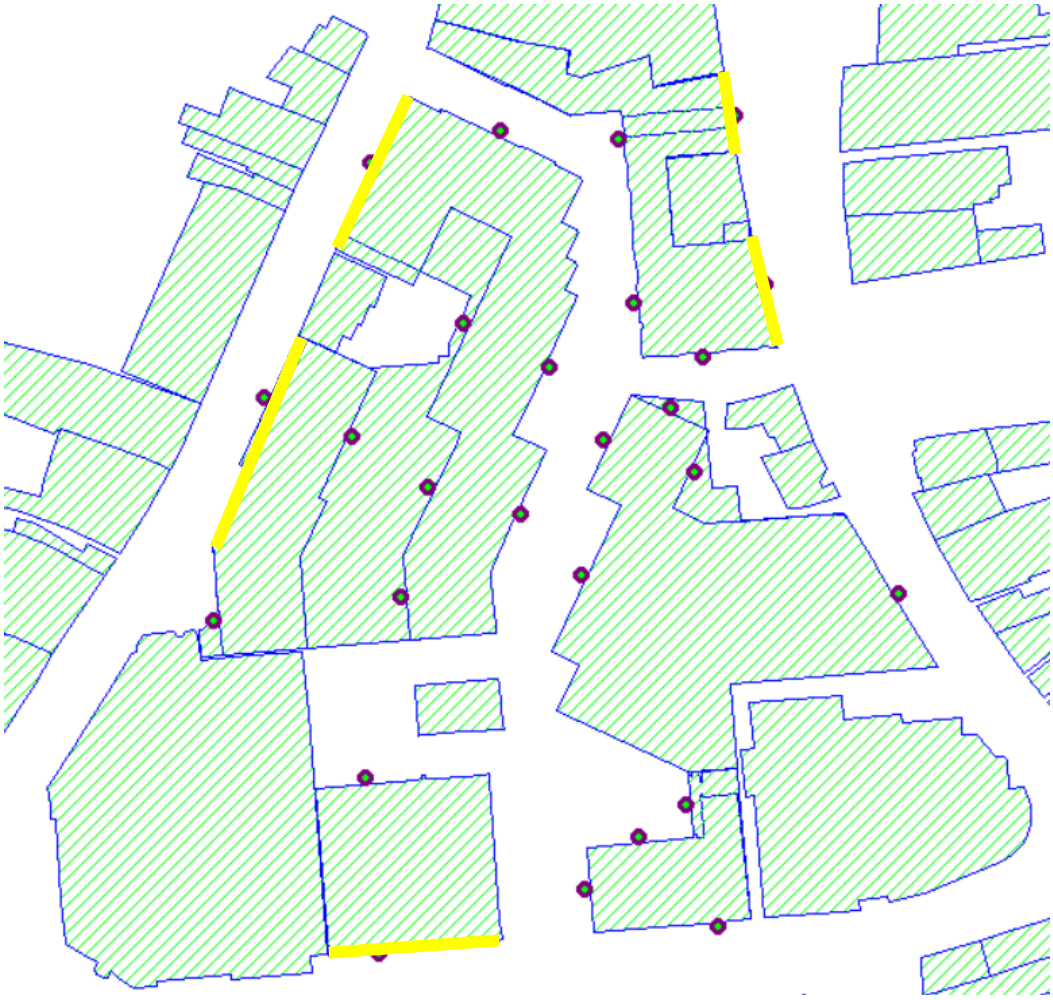


Figure 8.2: Façades requiring a Sound Reduction (R_w) of 31 dB (C_{tr}) at FF and SF Levels

TF level fronting Bartholomew Street (R62), Market Street (R70), Market Place/Cheap Street/Bear Lane junction (R80) and Market Street (R90 and R91) and refer to **Figure 8.3** for the TF façade locations which is indicated by a yellow line;

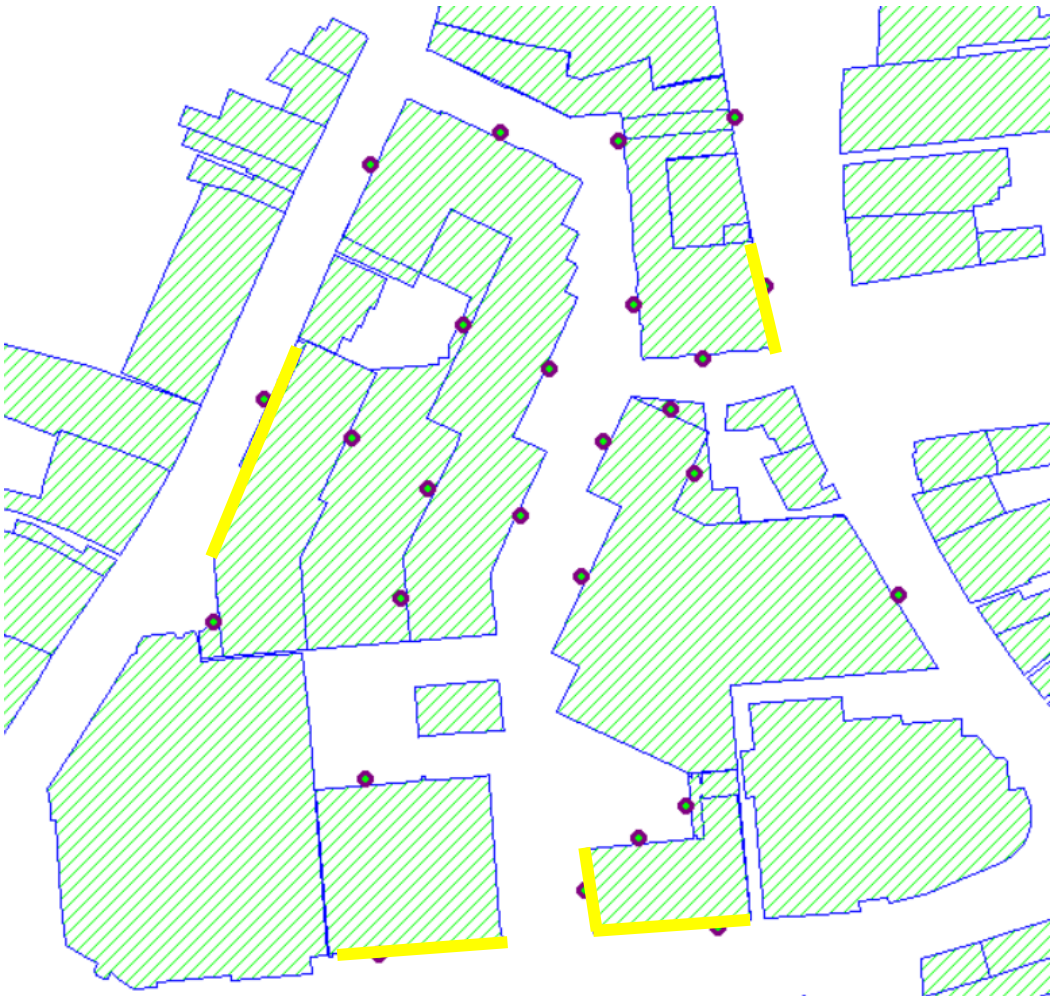


Figure 8.3: Façades requiring a Sound Reduction (R_w) of 31 dB (C_{tr}) at TF Level

ForF level fronting Bartholomew Street (R98), Market Street (R107, R123 and R124) and refer to **Figure 8.4** for the ForF façade locations which is indicated by a yellow line;

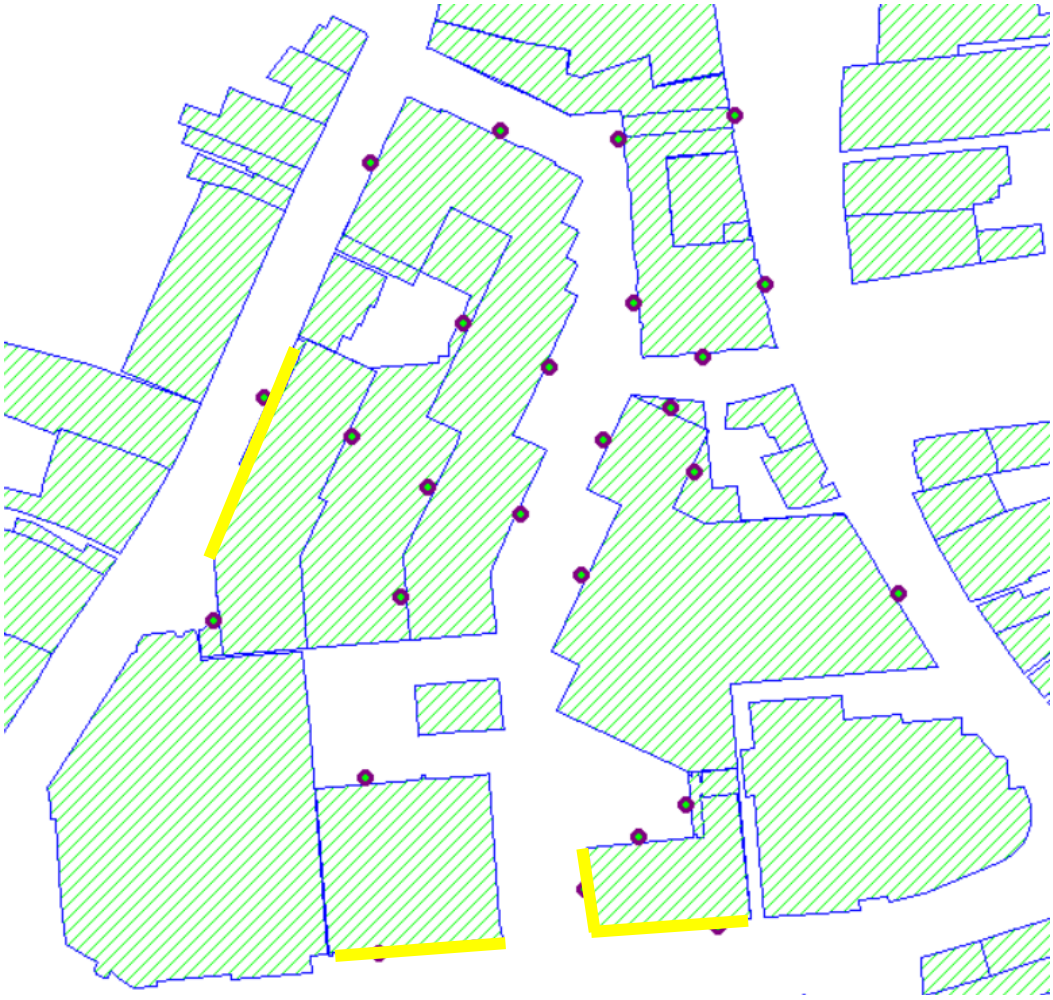


Figure 8.4: Façades requiring a Sound Reduction (R_w) of 31 dB (C_{tr}) at ForF Level

FfthF level fronting Bartholomew Street (R132), Market Street (R147), facing north east towards Market Place/Bear Lane (R148), Market Street (R153 and R154) and refer to **Figure 8.5** for the FfthF façade locations which is indicated by a yellow line;

Figure 8.5: Façades requiring a Sound Reduction (R_w) of 31 dB (C_{tr}) at FfthF Level

SxthF, SvnF, EF, NF and TenF levels facing north east towards Market Place/Bear Lane (R171, R188, R200 and R210) and south east towards Cheap Street (R172, R189, R211, R216) and refer to **Figure 8.6** for the SxthF, SvnF, EF, NF and TenF façade locations which is indicated by a yellow line;

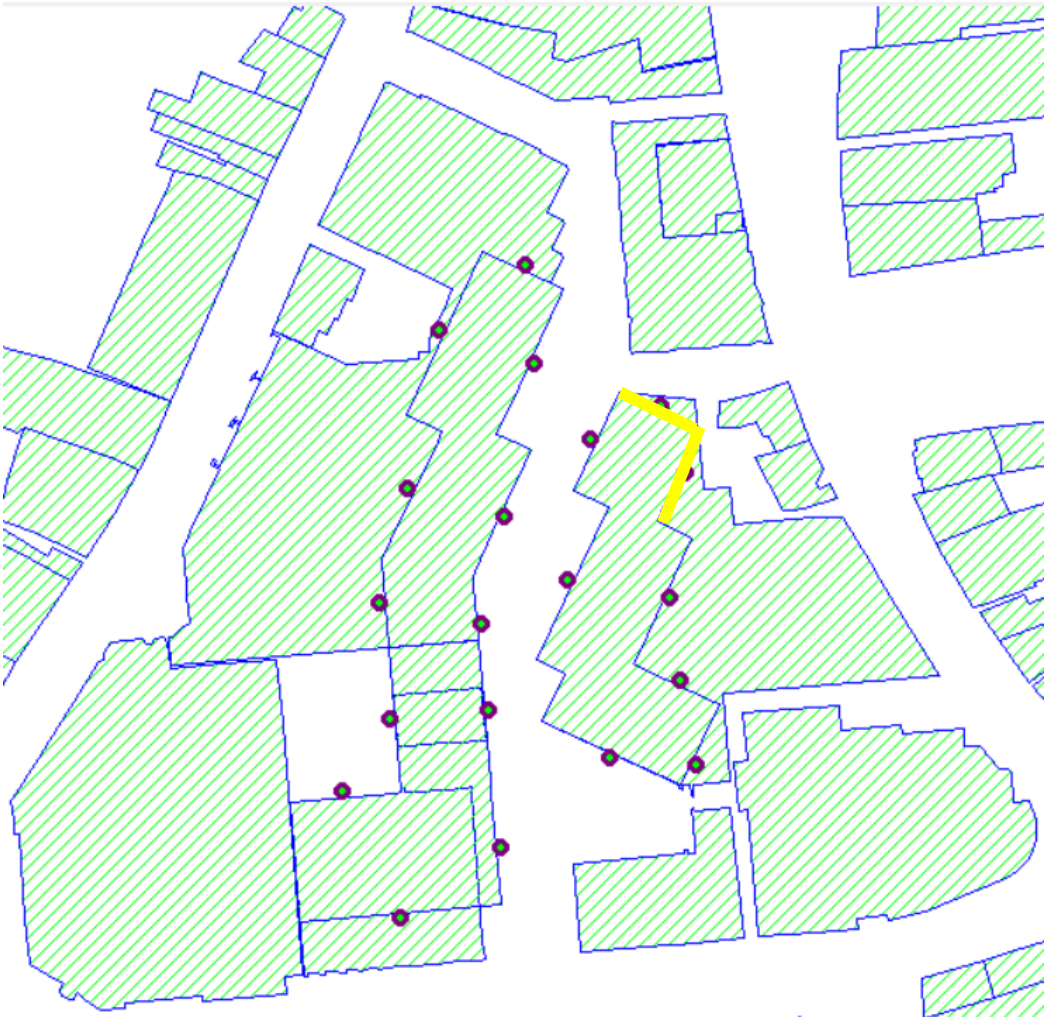


Figure 8.6: Façades requiring a Sound Reduction (R_w) of 31 dB (C_{tr}) at SxthF, SvnF, EF, NF and TenF Levels

8.13 At all other façades it is recommended to use a standard thermal double-glazed unit with a sound reduction of 27 dB (27 – 2 = 25 dB).

8.14 With the windows and doors closed, the internal **night time** noise level of 30 dB (61 – 35 = 26 dB) will be achieved at all the proposed dwellings across the development site. Also achieved are internal **daytime** noise levels for living rooms of 35 dB (69 – 35 = 34 dB) and bedrooms (resting) (69 – 35 = 34 dB) as recommended in BS8233 and WHO guidelines.

8.15 Taking the above into account, internal noise levels can meet or be better than the guideline level of 30 dB (bedrooms) and 35 dB (living rooms) can be achieved with the use of double glazing (as detailed above) and continuous mechanical extract and background ventilation.

8.16 With regard to mitigation for noise levels in roof gardens or outside amenity areas, the construction of the proposed buildings, and boundary treatments such as brick walls or screens will help reduce noise levels in these areas. For example, in the shadow zone of a building or brick wall noise levels could be reduced by up to 10 dB.

8.17 Within the proposed residential development, there are no areas that require purpose built acoustic barriers to achieve external noise levels below 55 dB(A) during the daytime.

Impacts – Construction

8.18 Best practicable means will be used to minimise construction noise through the implementation of the recommendations set out in BS 5228. In particular, the following noise mitigation measures would be implemented:

- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required. All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order;
- The use of inherently quiet plant where appropriate – all major compressors and generators will be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines in intermittent use will be shut down in the intervening periods between work or throttled down to a minimum;
- All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance, and where necessary, acoustic enclosures will be provided;
- Where practicable the use of noisy plant will be limited to core daytime periods;
- Channels of communication will be established between the contractor / developer, Local Authority and residents;
- A site representative will be appointed responsible for matters relating to noise;

- Typical levels of noise will be monitored during critical periods and at sensitive locations;
- A 2m high solid site hoarding along the site boundaries will be erected where practical and feasible;
- Localised noise barriers can be erected as necessary around items such as generators or heavy-duty compressors;
- Construction compounds will be laid out so as to minimise noise impacts to neighbouring noise sensitive receptors, by locating noisy operations well away from receptors and using on-site structures and materials to screen noise where practicable and necessary.

Impacts – Operation

8.19 During the operation of the development there is predicted to be “No Change” or a “Negligible” change in noise levels due to development generated traffic at sensitive receptors.

8.20 Overall the additional traffic movements have slight significant impact on sensitive receptor locations. It is therefore not necessary to include any additional mitigation measures associated with the additional traffic movements.

9.0 SUMMARY AND CONCLUSIONS

9.1 Stuart Michael Associates has been engaged by Lochailort Newbury Ltd to undertake a noise assessment for an application for the phased redevelopment of the Kennet Centre comprising the partial demolition of existing buildings, flexible-use commercial space, 426 dwellings plus residents' ancillary facilities, access, car parking and cycle parking, landscaping & open space, sustainable energy installations, and associated works.

9.2 The constraints on the development and the impacts from development generated traffic have been assessed using the computer model SoundPLAN which incorporates the CRTN method. Also considered are the potential impacts from construction activities and these have been assessed using the method detailed in BS 5228.

9.3 From on-site observations, the dominant noise source in the local area is from road traffic on the local highway network.

9.4 From analysing the "Existing" noise profile of the site, it can be seen that the levels across site from traffic traveling on the local highway network are above 55 dB during the daytime and above 45 dB during the night time and will cause acoustic issues to the development once complete. It is therefore suggested that a commensurate level of mitigation be incorporated into the development.

9.5 The calculation method detailed in CRTN has been used to assess the changes in noise levels due to development generated traffic. Resultant noise levels within the development site have been assessed against WHO guidelines, British Standard 8233 and local planning policy. The base year for the assessment is 2021 and the future year is 2026.

9.6 From the results of the modelling it is evident that during the daytime and night time, noise levels in the development site are above 55 dB and 45 dB respectively.

9.7 Within the development site, an assessment has been undertaken of the predicted noise levels at all of the façades and at all floor levels.

9.8 Where façade noise levels are above 50 dB during the daytime and 45 dB during the night time, mitigation measures are proposed to ensure internal noise levels meet BS 8233:2014, WHO guidelines and local planning policy.

9.9 The use of appropriate glazed windows with an SRI of between 27 dB (4/12/4 sealed unit) and 37 dB (6/12/12 sealed unit) in a wall with an SRI of 55 dB results in appropriate façade sound reduction.

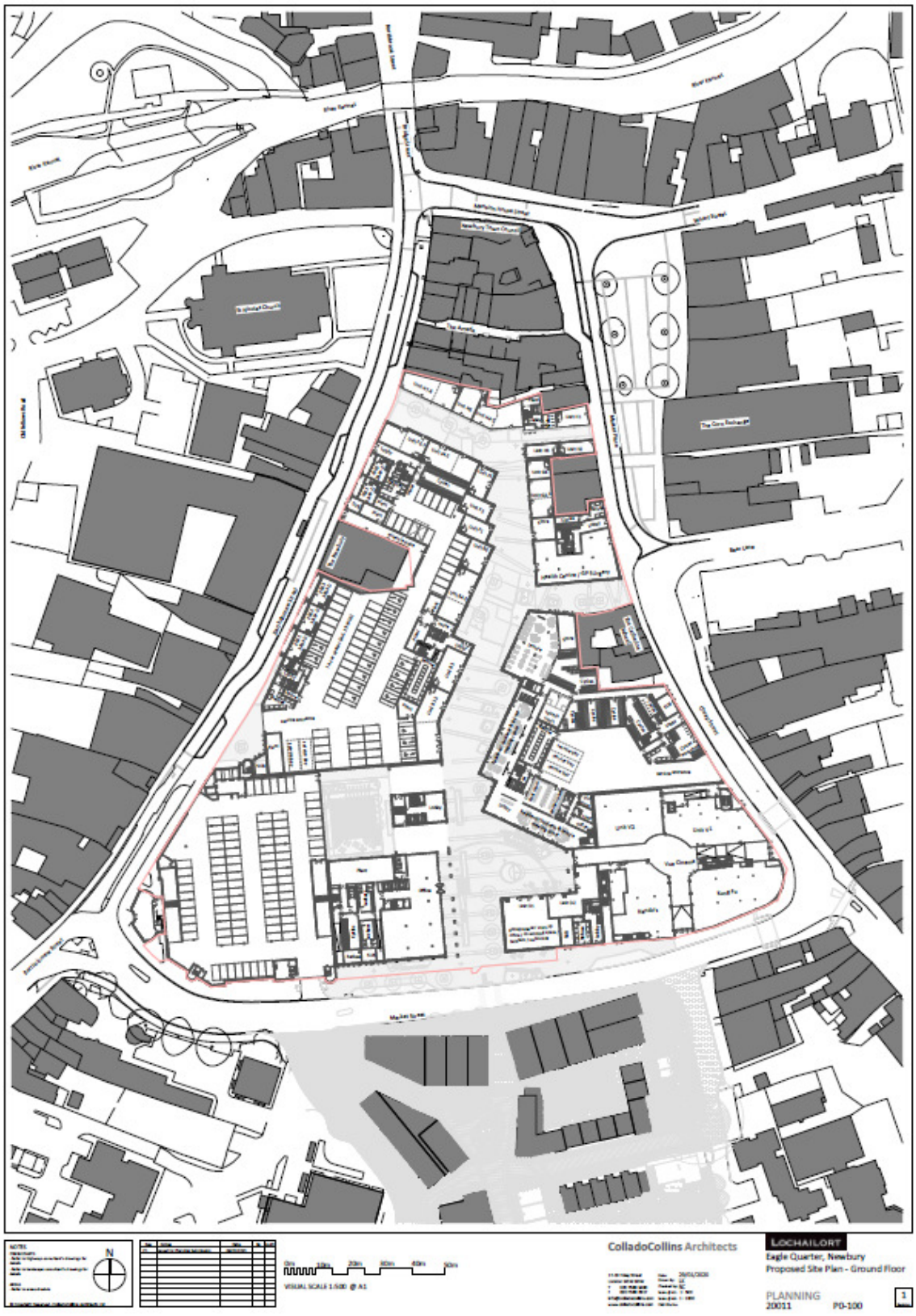
9.10 Outside of the site, potential impacts from development generated traffic on local sensitive receptors have been assessed and the results indicate that the impacts will have “No Change” or of Slight significance. Therefore, no mitigation is proposed.

9.11 The report has also calculated the potential worst-case impacts of construction noise at nearby sensitive receptors. Best practical means should be adopted to minimise construction noise insofar as possible.

9.12 Taking all of the above into account, the proposed development is in accordance with WHO Guidelines, British Standards, and WBC local policy. Thus, noise should not be an overriding reason for withholding the granting of planning permission for this site.

10.0 APPENDICES

Appendix 1 Illustrative Masterplan



Appendix 2 Construction Noise Assessment

No Mitigation

Demolition

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	98	79	73	69	67	65	59
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	98	80	75	72	71	70	69
R2: Flats above 20/20 Dental Practice (r	68		98	80	75	72	71	70	69

Earthworks

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	99	84	78	74	72	70	64
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	99	84	78	75	73	72	70
R2: Flats above 20/20 Dental Practice (r	68		99	84	78	75	73	72	69

Construction

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	104	84	78	74	72	70	64
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	104	84	79	75	74	73	70
R2: Flats above 20/20 Dental Practice (r	68		104	84	79	75	74	72	70

Landscaping

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	75	75	69	65	63	61	55
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	76	76	72	70	70	69	69
R2: Flats above 20/20 Dental Practice (r	68		76	76	72	70	69	69	68

With Mitigation

Demolition

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	88	69	63	59	57	55	49
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	88	72	70	69	69	69	69
R2: Flats above 20/20 Dental Practice (r	68		88	72	69	69	69	68	68

Earthworks

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	89	74	68	64	62	60	54
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	89	75	71	70	69	69	69
R2: Flats above 20/20 Dental Practice (r	68		89	75	71	69	69	69	68

Construction

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	94	74	68	64	62	60	54
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	94	75	72	70	70	69	69
R2: Flats above 20/20 Dental Practice (r	68		94	75	71	70	69	69	68

Landscaping

Receptors adjacent to the site	Ambient Noise Level (dB(A))	Distance from source to receptor (metres)	1	10	20	30	40	50	100
		Specific construction noise level	65	65	59	55	53	51	45
R1: The Catheribe wheel PH (residential	69	Total noise level (dB(A))	70	70	69	69	69	69	69
R2: Flats above 20/20 Dental Practice (r	68		70	70	69	68	68	68	68

Appendix 3 Predicted Development Façade Noise Levels

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
FF	R1	W	60	52	25	22
	R2	NW	66	61	31	31
	R3	NW	65	60	30	30
	R4	NE	53	46	18	16
	R5	SE	48	41	13	11
	R6	SE	44	37	9	7
	R7	W	40	33	5	3
	R8	NW	40	33	5	3
	R9	NW	41	34	6	4
	R10	SE	41	34	6	4
	R11	E	62	57	27	27
	R12	E	66	58	31	28
	R13	S	55	47	20	17
	R14	W	43	36	8	6
	R15	W	48	41	13	11
	R16	NE	69	61	34	31
	R17	NW	38	31	3	1
	R18	NW	39	32	4	2
	R19	NE	58	50	23	20
	R20	SE	48	41	13	11
	R21	W	42	35	7	5
	R22	S	67	59	32	29
	R23	W	60	52	25	22
	R24	N	42	35	7	5
	R25	N	39	32	4	2
	R26	S	66	58	31	28
Key: LrD = daytime; LrN = night time; FF = first floor; R = receptors; N = north; S = south; E = east and W = west						

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
SF	R27	W	58	53	23	23
	R28	NW	65	59	30	29
	R29	NW	64	59	29	29
	R30	NE	55	47	20	17
	R31	SE	50	42	15	12
	R32	SE	45	38	10	8
	R33	E	49	42	14	12
	R34	E	56	49	21	19
	R35	S	64	56	29	26
	R36	N	40	33	5	3
	R37	W	40	33	5	3
	R38	W	40	34	5	4
	R39	NW	40	34	5	4
	R40	NW	42	35	7	5
	R41	SE	43	36	8	6
	R42	E	41	34	6	4
	R43	W	51	44	16	14
	R44	E	61	56	26	26
	R45	E	66	58	31	28
	R46	S	56	49	21	19

Key: LrD = daytime; LrN = night time; SF = second floor; R = receptors; N = north; S = south; E = east and W = west

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
TF	R61	W	58	52	23	22
	R62	NW	63	58	28	28
	R63	NW	52	47	17	17
	R64	NE	56	49	21	19
	R65	SE	52	45	17	15
	R66	SE	52	44	17	14
	R67	SE	46	39	11	9
	R68	E	50	43	15	13
	R69	E	57	49	22	19
	R70	S	65	57	30	27
	R71	N	41	34	6	4
	R72	W	41	34	6	4
	R73	W	41	35	6	5
	R74	NW	41	34	6	4
	R75	NW	43	36	8	6
	R76	SW	46	39	11	9
	R77	SE	45	38	10	8
	R78	E	42	35	7	5
	R79	N	54	46	19	16
	R80	E	65	57	30	27
	R81	S	57	49	22	19
	R82	W	49	42	14	12
	R83	N	53	45	18	15
	R84	NE	59	51	24	21
	R85	SE	54	47	19	17
	R86	NE	67	59	32	29
	R87	SW	51	44	16	14
	R88	SE	51	44	16	14
	R89	NE	50	43	15	13
	R90	S	66	58	31	28
	R91	W	61	53	26	23
	R92	N	46	39	11	9
	R93	W	45	38	10	8
	R94	SW	50	43	15	13
	R95	NW	39	32	4	2
	R96	NW	41	34	6	4

Key: LrD = daytime; LrN = night time; TF = third floor; R = receptors; N = north; S = south; E = east and W = west

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
ForF	R97	W	57	52	22	22
	R98	NW	62	56	27	26
	R99	NW	56	50	21	20
	R100	NE	57	49	22	19
	R101	SW	49	42	14	12
	R102	SE	54	47	19	17
	R103	SE	48	41	13	11
	R104	E	47	40	12	10
	R105	E	51	44	16	14
	R106	E	57	49	22	19
	R107	S	64	56	29	26
	R108	N	42	35	7	5
	R109	W	42	35	7	5
	R110	W	42	36	7	6
	R111	NW	42	35	7	5
	R112	NW	45	38	10	8
	R113	SE	44	37	9	7
	R114	E	44	37	9	7
	R115	NE	59	51	24	21
	R116	SE	57	50	22	20
	R117	NE	67	59	32	29
	R118	S	60	52	25	22
	R119	SW	51	44	16	14
	R120	SE	55	47	20	17
	R121	NE	53	45	18	15
	R122	SE	52	45	17	15
	R123	S	66	58	31	28
	R124	W	61	53	26	23
	R125	N	49	41	14	11
	R126	W	49	42	14	12
	R127	SW	51	44	16	14
	R128	NW	40	33	5	3
	R129	NW	39	32	4	2
	R130	NW	42	35	7	5

Key: LrD = daytime; LrN = night time; ForF = Fourth floor; R = receptors; N = north; S = south; E = east and W = west

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
FfthF	R131	W	57	52	22	22
	R132	NW	61	56	26	26
	R133	NE	50	43	15	13
	R134	SE	47	40	12	10
	R135	E	46	39	11	9
	R136	S	48	41	13	11
	R137	N	44	37	9	7
	R138	W	44	37	9	7
	R139	W	44	37	9	7
	R140	NW	44	37	9	7
	R141	NW	47	40	12	10
	R142	SE	57	49	22	19
	R143	SE	50	43	15	13
	R144	E	48	41	13	11
	R145	E	52	44	17	14
	R146	E	57	50	22	20
	R147	S	64	56	29	26
	R148	NE	60	52	25	22
	R149	SE	59	51	24	21
	R150	SE	56	49	21	19
	R151	NE	55	47	20	17
	R152	SE	55	47	20	17
	R153	S	66	57	31	27
	R154	W	61	53	26	23
	R155	N	52	45	17	15
	R156	SW	52	44	17	14
	R157	NW	40	33	5	3
	R158	NW	44	37	9	7

Key: LrD = daytime; LrN = night time; FfthF = Fifth floor; R = receptors; N = north; S = south; E = east and W = west

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
SxthF	R159	N	46	39	11	9
	R160	W	45	38	10	8
	R161	W	45	38	10	8
	R162	NW	45	38	10	8
	R163	NW	51	44	16	14
	R164	NE	57	49	22	19
	R165	SE	58	50	23	20
	R166	SE	51	44	16	14
	R167	E	50	43	15	13
	R168	E	53	45	18	15
	R169	E	57	49	22	19
	R170	S	54	46	19	16
	R171	NE	60	53	25	23
	R172	SE	60	52	25	22
	R173	SE	58	50	23	20
	R174	NE	57	49	22	19
	R175	SE	57	49	22	19
	R176	SW	53	46	18	16
	R177	NW	42	35	7	5
	R178	NW	46	39	11	9
SvnF	R179	N	49	41	14	11
	R180	W	48	41	13	11
	R181	W	47	40	12	10
	R182	NW	48	41	13	11
	R183	SE	52	45	17	15
	R184	E	51	43	16	13
	R185	E	54	46	19	16
	R186	E	57	50	22	20
	R187	S	57	49	22	19
	R188	NE	61	53	26	23
	R189	SE	61	53	26	23
	R190	SE	59	51	24	21
	R191	NE	58	50	23	20
	R192	SE	58	50	23	20
	R193	SW	54	47	19	17
	R194	NW	44	37	9	7
	R195	NW	50	43	15	13

Key: LrD = daytime; LrN = night time; SxthF = sixth floor; SvnF = seventh floor; R = receptors; N = north; S = south; E = east and W = west

Floor Level	Receptor Number	Façade Direction	LrD	LrN	Required Façade Sound Reduction (Rw) to achieve BS and WHO internal noise levels in Living rooms and Bedrooms (daytime) and Bedrooms (night time)	
			[dB(A)]		Day	Night
EF	R196	W	50	42	15	12
	R197	NW	50	43	15	13
	R198	SE	54	47	19	17
	R199	E	53	46	18	16
	R200	NE	60	52	25	22
	R201	SE	59	52	24	22
	R202	NE	58	51	23	21
	R203	SW	54	46	19	16
	R204	NW	46	39	11	9
NF	R205	W	52	45	17	15
	R206	NW	53	45	18	15
	R207	NE	58	50	23	20
	R208	SE	57	49	22	19
	R209	S	53	46	18	16
	R210	NE	60	52	25	22
	R211	SE	60	52	25	22
	R212	SW	52	45	17	15
	R213	NW	49	42	14	12
TenF	R214	NW	52	45	17	15
	R215	NE	59	51	24	21
	R216	SE	60	52	25	22
	R217	SW	52	44	17	14
Key: LrD = daytime; LrN = night time; EF = eighth floor; NF = ninth floor; TenF = tenth floor; R = receptors; N = north; S = south; E = east and W = west						