



Eden Green Environmental



Noise Impact Assessment

Site: 40 Church Street, Caversham Reading, RG4 8AU

Client

Dr Lakshmi Kanthan

40 Church Street, Caversham Reading, RG4 8AU

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Prepared by

Eden Green Environmental Limited

169 Regent Farm Road

Newcastle upon Tyne NE3 3HE

info@eden-environ.co.uk

www.eden-environ.co.uk

0330 043 1946

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1. Introduction

1.1 Overview

Dr Lakshmi Kanthan is seeking consent for change of use to residential development of 40 Church Street, Caversham Reading, RG4 8AU (hereafter referred to as the 'proposed development').

Eden Green Environmental (EGE) was instructed by Rahul Taheem (Architectural Consultant) on behalf of Dr Lakshmi Kanthan to produce a Noise Impact Assessment to accompany the planning application to Reading Borough Council (RBC) to secure planning consent. Planning permissions require that noise needs to be considered for new residential developments to assess if they would be sensitive to the prevailing acoustic environment, typically from road, rail, industrial or airplane noise.

This proposal involves the change of use of the upper floors from commercial A1 to Residential C3 to provide 3 residential flats. The proposal would retain the A1 use at ground floor level and provide an additional single flat at the rear of the property. The proposal will not introduce any new parking spaces.

1.2 Objective

Reading Borough Council (RBC) have requested evidence from a noise impact assessment that mitigation measures can ensure that noise can be reduced to acceptable levels within the site. RBC planning guidance and BS:8233 guidance suggest that prior to development a scheme, details of the measures should be provided so that internal sound levels within all habitable rooms do not exceed 35 dB(A) LAeq,16hours (07:00- 23:00); and internal sound levels within all bedrooms that do not exceed 30 dB(A) LAeq, 8hours (23:00-07:00).

The purpose of the noise impact assessment is to ensure that the new residential development is suitable for habitation in relation to the prevailing noise due to site's close proximity with a major road (A4155 - Church Street). The main objective of this study was to establish the prevailing noise environment, and recommend possible mitigation measures to accompany the planning application.

1.3 Site Location and Proposal Information

Figure 1-1 shows the proposed site location. The site for the proposed development is located in an urban setting amidst a mixture residential, commercial and traffic activities.

This proposal involves the change of use of the upper floors from commercial A1 to Residential C3 to provide 3 residential flats. The proposal would retain the A1 use at ground floor level and provide an additional single flat at the rear of the property. The proposal will not introduce any new parking spaces.

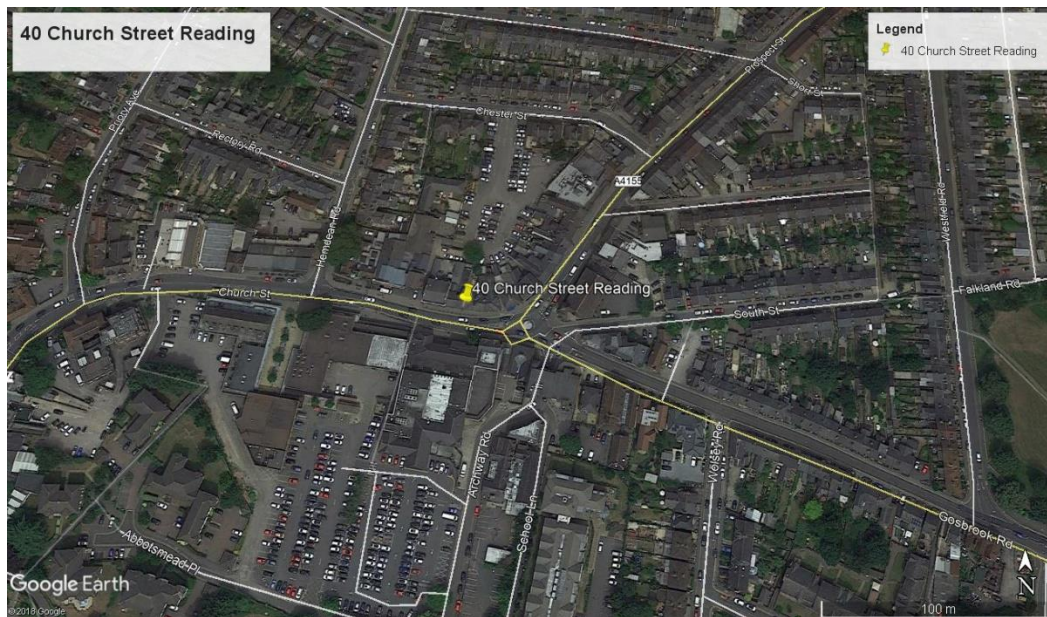


Figure 1-1 Proposed site location

2. Noise Legislation and Policy or Railway Noise Assessment

This section summarises all legislation, policy, statutory and non-statutory guidelines relevant to the proposed development. Furthermore, the latest regional and local planning policy guidance specifically applicable to the proposed development has been reviewed.

New residential developments are typically assessed in accordance with BS8233:2014, World Health Organisation (WHO) Guidelines and PPG24. In this case, the assessment will also focus on

2.1 The ‘National Planning Policy Framework (NPPF)’

The ‘National Planning Policy Framework (NPPF)’¹ contains information and general guidance to Local Authorities in relation to considering and taking into account noise. The National Planning Policy Framework (NPPF) guidance reinforces that noise should be taken into account considering planning policies and decisions. Some of the guidance contained within the ‘National Planning Policy Framework (NPPF)’ includes the following:

- *“109. 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 ‘noise pollution’; and*
- *123. Planning policies and decisions should aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new*

¹ The National Planning Policy Framework (2012) <https://www.gov.uk/guidance/national-planning-policy-framework>

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

In conjunction with the 'National Planning Policy Framework (NPPF)', 'The Noise Policy Statement for England (NPSE)'², dated March 2010, states the following regarding a long term vision of government noise policy:

"Noise Policy Statement for England Aims:

The first aim of the NPSE:

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

The second aim of the NPSE:

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

The third aim of the NPSE:

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

In terms of the NPSE, the impact of noise can be categorised by the following terms:

- NOEL – No Observed Effect Level – The level where no effect can be detected
- LOAEL – Lowest Observed Adverse Effect Level – The level where adverse effects on health and quality of life can be detected
- SOAEL – Significant Observed Adverse Effect Level – The level where significant adverse effects on health and quality of life may occur.

The NPSE further states that:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is

² Noise Policy Statement for England (NSPE) <https://www.gov.uk/government/publications/noise-policy-statement-for-england>

likely to be different for different noise sources, for different receptors and at different times.”

No specific guidance is detailed or given in the ‘National Planning Policy Framework (NPPF)’, or ‘The Noise Policy Statement For England (NPSE)’ in terms of acceptable acoustic criteria/noise criteria in order to achieve the ‘NOEL, LOAEL or SOAEL’. Therefore, it is considered necessary to refer to alternate national guidance, preferably standardised or regulated such as an appropriate British Standard (BS), or in the absence of this, alternate World Health Organisation (WHO) guidelines etc.

2.2 WHO ‘Guidelines for Community Noise’

Where noise is assessed against the ‘Absolute Level’, then this can be split into separate daytime and night-time legislation. The WHO ‘Guidelines for Community Noise’ state in 4.2.7 “Annoyance Responses” that:

“During the daytime, few people are seriously annoyed by activities with L_{Aeq} levels below 55 dB; or moderately annoyed with L_{Aeq} levels below 50dB. Sound pressure levels during the evening and night should be 5-10 dB lower than during the day....”

The guidance goes on to provide a daytime internal acoustic criteria relative to critical health effect(s) that of 35 dB $L_{Aeq,16 \text{ hour}}$, and a night-time level of 30 dB $L_{Aeq,8 \text{ hour}}$ / 45 dB L_{AFmax} linked with dwelling indoors. Therefore, assuming a maximum external noise level of 50 dB $L_{Aeq,t}$ during the daytime, (considering a 15 dB reduction in noise via a partially open window) an internal noise level of 35 dB $L_{Aeq,t}$ should be achieved.

During the night-time periods, a further publication; WHO Night Noise Guidelines For Europe’ published in 2009 states that:

“Below the level of 30 dB $L_{night,outside}$, no effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise. There is no sufficient evidence that the biological effects observed at the level below 40 dB $L_{night,outside}$ are harmful to health. However, adverse health effects are observed at the level above 40 dB $L_{night,outside}$, such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs and sedatives. Therefore, 40 dB $L_{night,outside}$ is equivalent to the LOAEL for night noise..... The LOAEL of night noise, 40 dB $L_{night,outside}$, can be considered a health-based limit value of the night noise guidelines (NNG) necessary to protect the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise.”

Therefore, where absolute levels need be referenced, a maximum daytime noise limit of 50 dB $L_{Aeq,t}$ can be considered, with the LOAEL for night of 40 dB $L_{night,outside}$ being considered.

2.3 The British Standard 8233: Guidance on sound insulation and noise reduction for buildings

BS 8233: Guidance on sound insulation and noise reduction for buildings provides the acceptable noise levels. Table 4 of British Standard BS 8233 reproduced below

(Table 2-1) provides. The architects of the proposed development are expected to provide the details of the design to meet this standard.

Table 2-1 British Standard recommended indoor noise levels for dwellings

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

(Source: British Standard BS: 8223)

For gardens or external areas, BS:8233 recommends an upper limit of $L_{Aeq,16hour}$ at 55 dB(A)

3. Noise Surveys

3.1 Overview

This section provides the details of the methodological approach taken to assess the prevailing acoustic environment at the site where new noise sensitive receptors (residential units) will be introduced. Establishing the current acoustic environment requires the monitoring of noise levels at the site and establish the key noise indicators namely $LA_{eq,T}$, $LA_{10,T}$, $LA_{90,T}$ and $LA_{max,T}$ as described in Appendix A.

3.2 Noise Monitoring

Noise monitoring was carried out from 14th to 15th January 2019. The noise levels at 15 minute interval were recorded using a Class 1 noise monitor- Make: Castle Sonus GA607, which was calibrated before and after the surveys (Calibration certificate number 044680/74123 – dated 7.12.2018).

The microphone of the sound level meter was located at a height of approximately 1.5m above ground level and in free-field conditions. This measurement position was adopted as it was considered to be representative of the existing background noise climate. Noise sources at this location consisted of background traffic noise from roadway A4155 Church Road. There are no industrial noise sources in the vicinity of the site.

3.3 Weather Conditions

The following climate conditions were recorded for the site:

Wind: Less than 3 m/s.

Humidity: The weather was clear.

Temperature: 2-7 Degrees C.

Precipitation: nil

The above weather conditions are suitable for the measurement of environmental noise in accordance with BS7445: Description and Measurement of Environmental Noise.

4. Noise Survey Results

4.1 Façade free field correction

Taking into consideration the microphone location, all measurements at the Location 1 are assumed to be free-field measurements and therefore do not require and façade free field correction. All measurement and predicted values will be free-field unless stated otherwise.

4.2 Ambient noise results

The noise monitoring was carried out for a 24h period from 13th to 14th January 2019. period of seven days. The results are presented for the whole duration, for a typical 24 hour period, and day (16 hours from 07:00h to 23:00h) and for night (8 hours from 23:00h to 07:00h).

Figure 4-1 shows a snap-shot of the time series of LAeq at 15-minute interval for the survey period. This clearly shows absence of any dominant noise source, and mainly indicates background noise emanating from Church Street.

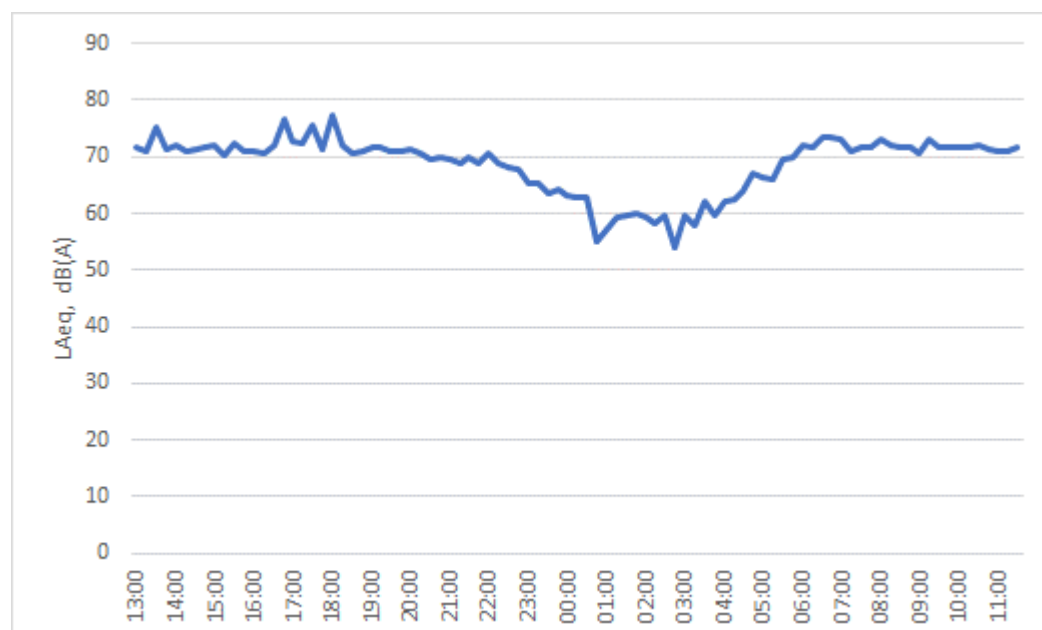


Figure 4-1 Time series of noise levels (t=15min)

A summary of measured noise indicators for the whole duration from 14th to 15th January 2019 is presented in Table 4-1 .

Table 4-1 Summary of noise indicators

Indicator	All values	Day	Night
All values in dB(A)			
LAeq	71	72	66
LA ₁₀	73	73	72
LA ₉₀	60	70	58
L _A max	78	78	74
L _A min	54	68	54

5. Noise Impact Assessment

5.1 Sound Insulation of Building Envelope and Internal Noise Levels

Required Noise Reduction of Façade/Window Levels

The observed external noise levels have been compared with the WHO and BS:8223 target internal noise levels to derive the required noise reduction of façade/window.

The target internal levels are based on guidelines laid out by BS:8223 and the World Health Organisation (WHO) and are as follows:

Living rooms: 35 dB(A) day-time only

Bedrooms: 30 dB(A) night-time only

The LA_{eq} during the day is observed to be 72 dB(A) and the LA_{eq} during the night is 66 dB(A). These values are 37 dB(A) higher than the recommended day-time standard of 35 dB(A) and 36 dB(A) higher than the recommended night-time standards of 30 dB(A).

Therefore, the highest noise reduction that the façade/window will have to achieve will be:

Day Time = 72-35 = 37 dB(A)

Night Time = 66-30 = 36 dB(A)

This indicates that a minimum noise attenuation of 37 dB(A) is required at the south-facing window of the residential units.

Predictions for the Noise Reduction of Generic Façade/Window

National Planning Framework, PPG24 (Annex 6, Para. 4) states the following with respect to outside-to-inside attenuation of various transportation noise sources:

"Because the sound insulation of a window (and other components of the building envelope) varies with the frequency (or pitch) of the sound, the overall noise reduction provided by a window will depend, among other factors, on the spectrum of the

external noise. Table 1 shows typical reductions in noise levels from common sources which would be expected from various types of window installations fitted in brick/block walls in a dwelling".

PPG24 Table 1: Typical noise reduction of a dwelling facade with windows set in a brick/block wall in dB(A)

Noise source	Single glazing	Thermal Double glazing	Secondary Glazing
Road Traffic	28	33	34
Civil Aircraft	27	32	35
Military Aircraft	29	35	39
Diesel Train	28	32	35
Electric Train	30	36	41

Noise Reduction of Development's Façade/Window

Taking into account the information in the table above the façade/window (Thermal double glazed or standard double glazed windows) for the proposed development will not be able to provide the required noise reduction of 37 dB(A) for road traffic.

Hence , it is recommended that acoustic glazing units should be considered in the design which are able to deliver a noise reduction of up to 40-54 dB(A) in their triple glazing units.

Internal Noise Level

The external noise level predictions and the information above (a noise reducing window of 40 dB(A)) can be used to predict the internal noise level for the day and night time period:

Predicted day-time level at façade/window= $61 - 40 = 21$ dB(A)

Predicted day-time level at façade/window= $66 - 40 = 26$ dB(A)

The above shows that the BS:8223 and WHO internal noise criteria requirements will be easily achieved if with the provision of double glazed window and by providing a whole house ventilation system with through wall acoustic tickle vents. This will provide the expected noise attenuation to meet the standards for indoor environment.

6. Proposed Mitigation Measures

6.1 Mitigation Measures for Residential Units

Mitigation measures need to be in place to minimise the potential negative impacts

In order to ensure that the internal noise limits are achieved, we would recommend the following scheme of mitigation measures as outlined below:

Bedrooms, Living Rooms & Dining Rooms

For all living room and dining room windows on the south facing elevations of the new dwellings, acoustic double or triple glazed window which are able to provide a minimum noise reduction of 40 dB(A) will be adequate to achieve the adopted internal noise limits.

It will be important to ensure that all glazing is well sealed when closed so there are no air gaps present. This could be overcome by providing a whole house vent with boost for purge and trickle ventilation, through wall acoustic vents and then a ventilation system for the bedrooms for night time cooling.

This set of mitigation measures should provide approximately 40 dB(A) attenuation in levels of external noise when closed.

6.2 Construction Phase Mitigation Measures

Mitigation measures need to be in place to minimise the potential negative impacts of noise during the construction activities.

It is recommended that during the construction phase, no audible works take place other than within the hours Monday to Friday 08:00 to 18:00 hours, Saturday 08:00 to 13:00 and not at all on Sundays or Public, Bank Holidays.

During the construction phase, it is recommended that proper screening is employed to prevent construction noise propagating to the nearest sensitive (residential) receptors.

7. Conclusions

- The proposed development is in an area where there is not much fluctuation in background noise during day and night.
- The purpose of the noise impact assessment was to ensure that the new residential development is suitable for habitation in relation to the prevailing background noise due to site's close proximity with A4155 Church Road.
- Reading Borough Council (RBC) planning guidance and BS:8233 guidance suggest that prior to development a scheme, details of the measures should be provided so that internal sound levels within all habitable rooms do not exceed 35 dB(A) LAeq,16hours (07:00- 23:00); and internal sound levels within all bedrooms do not exceed 30 dB(A) LAeq, 8hours (23:00-07:00).
- Noise monitoring was carried out on from 14th to 15th January 2019. The noise levels at 15-minute interval were recorded using a Class 1 noise monitor, which was calibrated before and after the surveys.
- Taking into consideration the microphone location, all measurements at the Location 1 were assumed to be free-field measurements and therefore did not require a façade free field correction.

- The LAeq during the day is observed to be 72 dB(A) and the LAeq during the night is 66 dB(A). These values are 37 dB(A) higher than the recommended day-time standard of 35 dB(A) and 36 dB(A) higher than the recommended night-time standards of 30 dB(A).
- Noise levels were predicted at the building façade and windows of residential units. The highest noise reduction that the façade/window needed to achieve were calculate for day as 37 dB(A) and for night as 36 dB(A).
- Acoustic double or triple glazing is recommended for all south-facing windows which should be able to provide noise attenuation of 40 dB(A). It is estimated that with this attenuation, the BS:8233 and WHO internal noise criteria requirements will be achieved.
- To maintain a good level of ventilation, it is recommended to provide a whole house vent with boost for purge and trickle ventilation, through wall acoustic vents and then a ventilation system for the bedrooms for night time cooling.
- Construction phase mitigation measures also have been recommended.

It can therefore be concluded that the proposed development with recommended mitigation measures, is not considered to conflict with any national, regional, or local planning policy.

Appendix A: Noise Indicators

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Reference Time Interval, T

The specified time interval over which an equivalent continuous A-weighted sound pressure level is determined.

$LA_{eq,T}$

The A-weighted equivalent continuous sound level. This is the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$LA_{10,T}$

The A-weighted sound level exceeded for 10% of the specified measurement period, T.

LA_{max}

The highest short duration A-weighted sound level recorded during a noise event.

LA_{90} , or Background Noise Level,

The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.