Report

20th February 2015

TEMPLE

LEADERS IN ENVIRONMENT, PLANNING & SUSTAINABILITY.

Report for – Bond Bryan Architects Limited
175-185 Gray's Inn Road
Environmental Noise Assessment
FINAL

Document Version Control

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1	20/02/2015	Chris McCollin	John Fisk	Dani Fiumicelli / Mark Furlonger

Report for: **Mark Henderson**

Bond Bryan Architects Limited

Main Contributors:

Chris McCollin
Consultant
Temple Group Limited
Devon House
58-60 St Katharine's Way
London, E1W 1LB

Email: chris.mccollin@templegroup.co.uk

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Appendices

1.0 Introduction

1.1 Project Background

Temple Group Ltd (Temple) has been instructed by Bond Bryan Architects Limited to undertake an environmental noise assessment for the proposed single storey office extension at 175-185 Gray's Inn Road, London WC1X.

The purpose of the noise assessment is to to analyse the noise exposure to the proposed offices and operational noise impact on surrounding sensitive properties to assess the suitability of the proposed development. This has been assessed in line with the London Borough of Camden's (LBC) guidance and relevant national standards.

Details of the assessment methodology used, together with the results of the survey undertaken and the subsequent conclusions and recommendations, are presented within the following report.

2.0 Planning Policies, Standards and Guidance

2.1 National Policy

2.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[1] was introduced by the Department of Communities and Local Government in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied.

The planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to or being put at unacceptable risk from noise, or being adversely affected by unacceptable levels of noise pollution.

Therefore planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on 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 that have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.1.2 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE)[2] seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

The statement sets out the long-term vision of the government's noise policy, which is to *"promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".*

The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvements of health and quality of life.

[1] Department for Communities and Local Government, (March 2012): 'National Planning Policy Framework'.

[2] Department for Environment, Food and Rural Affairs, (March 2010): 'Noise Policy Statement for England'.

The statement adopts established concepts from toxicology that are currently being applied to noise impacts. The concept details noise levels, at which the effects of an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observed Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

No guidance has been issued at the time of writing to identify the SOAEL and LOAEL for typical noise sources and receptors.

2.1.3 Planning Practice Guidance Noise

The Planning Practice Guidance (PPG)[3] expands on the use of SOAEL: *"If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused."*

The PPG also goes on to identify unacceptable noise exposure: *"At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring."*

2.2 Regional Policy

2.2.1 The London Plan – Spatial Development Strategy for Greater London

The Mayor of London has published the London Plan 2011. With specific reference to noise, the London Plan contains Policy 7.15: Reducing Noise and Enhancing Soundscapes:

"Planning Decisions:

> *B) Development proposals should seek to reduce noise by:*
>
> *Minimising the existing and potential adverse impacts of noise on, from, within, or in the vicinity of, development proposals;*
>
> *Separating new noise sensitive development from major noise sources wherever practicable through the use of distance, screening, or internal layout in preference to sole reliance on sound insulation;*

[3] Department for Communities and Local Government, (March 2014): 'Planning Practice Guidance'.

Promoting new technologies and improved practices to reduce noise at source."

2.2.2 Sounder City: The Mayor's London Ambient Noise Strategy

The London Ambient Noise Strategy aims to minimise the adverse impacts of noise on people living, working in and visiting London by using the best available practices and technologies within a sustainable development framework.

The Strategy aims to work towards more compact city development, while minimising noise. This requires careful consideration of the adverse impact of noise on, from, within or in proximity to a development.

2.3 Local Policy

2.3.1 Camden Development Policies 2010

Camden Development Policies DP28: Noise and Vibration[4] seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for developments that exceed Camden's thresholds as shown in **Table 1, 2, 3 and 4**.

Table 1 – Noise levels on residential sites adjoining roads at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Sites adjoining roads
Noise at 1 metre external to a sensitive facade	Day	07.00 – 19.00	72 dB $L_{Aeq\ 12hr}$
Noise at 1 metre external to a sensitive façade	Evening	19.00 – 23.00	72 dB $L_{Aeq\ 4hr}$
Noise at 1 metre external to a sensitive facade	Night	23.00 – 07.00	66 dB $L_{Aeq\ 8hr}$

Table 2 – Noise levels on residential streets adjoining roads at and above which attenuation measures will be required.

Noise description and location of measurement	Period	Time	Sites adjoining roads
Noise at 1 metre external to a sensitive facade	Day	07.00 – 19.00	62 dB $L_{Aeq\ 12hr}$
Noise at 1 metre external to a sensitive façade	Evening	19.00 – 23.00	57 dB $L_{Aeq\ 4hr}$
Noise at 1 metre external to a sensitive facade	Night	23.00 – 07.00	52 dB $L_{Aeq\ 1hr}$
Individual noise events several times an hour	Night	23.00 – 07.00	> 82 dB $L_{Amax,slow}$

[4] Camden Local Development Framework (LDF), (2010): 'Camden Develop Policies'.

Table 3 – Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive facade	Day,evening and night	00.00 – 24.00	5 dB(A) < L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	Day,evening and night	00.00 – 24.00	10 dB(A) <L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day,evening and night	00.00 – 24.00	10 dB(A) <L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90} > 60 dB	Day,evening and night	00.00 – 24.00	55 dB L_{Aeq}

In addition in terms of operational noise i.e. mechanical noise "…*A condition will be imposed to require that the plant and equipment which may be a source of noise pollution is kept working efficiently and within the required noise limits and time restrictions. Conditions may also be imposed to ensure that attenuation measures are kept in place and effective throughout the life of the development*."

Table 4 –Vibration levels on residential sites adjoiing railways and roads at which planning permission will not be granted

Vibration description and location of measurement	Period	Time	Vibration levels
Vibration inside offices	Day,evening and night	00.00 – 24.00	0.4 VDV $ms^{-1.75}$

2.4 Standards and Guidance

2.4.1 British Standard 8233

British Standard 8233 (BS 8233:2014)[5] provides information on the design of internal acoustics in buildings. **Table 5** provides a design range for the Indoor ambient noise levels for a typical situation.

Table 5 – Indoor ambient noise levels in space when they are unoccupied and privacy is also important

Objective	Typical situations	Design range dB $L_{Aeq,T}$
Typical noise levels for acoustic privacy in shared spaces	Open plan office	45 – 50

[5] British Standards Institute (BSI), (2014):'BS 8233 – Guidance on sound insulation and noise reduction for buildings', BSI, London.

2.4.2 British Standard 4142 – Methods for Rating and Assessing Industrial and Commercial Sound

British Standard 4142 (BS 4142:2014)[6] describes methods to use outdoor sound levels to assess the likely effects of sound of an industrial and/or commercial nature on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

The standard requires determination of the following:

- Rating level - $L_{Aeq,Tr}$ sound level produced by the specific sound source at the assessment location with any adjustment added to the specific sound level if a tone, impulse or other acoustic characteristic occurs, or is expected to be present.
- Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T.

T_r is the reference time interval over which the specific sound level is determined. This is 1-hour for daytime (07:00-23:00 h) and 15-minutes for night-time (23:00-07:00 h).

An estimate of the impact of the specific sound generated can be obtained by subtracting the measured background sound level from the rating level, and the following is considered:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

All pertinent factors should be taken into consideration when assessing the impact, including the following:

- Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor.

[6] British Standard Institute (BSI), (2014): 'BS 4142 – Methods for rating and assessing industrial and commercial sound', BSI, London.

2.4.3 British Standard 7445 – Description and Measurement of Environmental Noise

Part 1: Guide to Quantities and Procedures

British Standard 7445 Part 1 (BS 7455-1:1991)[7] defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site.

Part 2: Guide to the Acquisition of Data Pertinent to Land Use

British Standard 7445 Part 2 (BS 7455-2:1991)[8] describes methods for the acquisition of data which provide descriptors that enable:

a) a description of the environmental noise in a specified area of land to be made in a uniform way;
b) the compatibility of any land use activity or projected activity to be assessed with respect to existing or predicted noise.

Using the data as a basis, authorities may establish a system for selecting the appropriate land use, as far as levels of noise are concerned, for a specified area, or the sources of noise - existing or planned - which are acceptable with respect to land use, existing or planned.

2.4.4 British Council for Offices Guide

The British Council for Offices Guide (BCO)[9] is a document providing guidance in all areas of office design. Ambient noise levels caused by external noise sources in unoccupied offices should ideally be no more than:

- Open plan offices NR 40 (L_{eq})
- Speculative offices NR 38 (L_{eq})
- Cellular offices NR 35 (L_{eq})

BS 8233:20124 describes that a *'Noise rating (NR) is a graphical method for assigning a single-number rating to a noise spectrum'*. *'NR values cannot be converted directly to dBA values, but the following approximate relationship applies:*

NR ≈ dB(A) – 6'

[7] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 1: Guide to Quantities and Procedures'. BSI, London.

[8] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use'. BSI, London.

[9] British Councils for Offices Guide, (BCO), (2009): 'Guide to Specification', BCO, London.

3.0 Site and the Surrounding Area

The proposed site is an existing four storey office building at Gray's Inn Road, London WC1X.

The redevelopment will include a single storey extension for commercial office space.

3.1 Site

Figure 2 shows the measurement positions, the noise sensitive receptors and sources of noise.

Table 6 shows the nearest noise sensitive receptors. It is understood that there are no residential receptors in close proximity to the proposed development.

Table 6 – Noise Sensitive Receptors

ID	Description	Type
R1	Rear of properties on Meckleburgh Street contain bedrooms of a Hotel (see **Figure 4**).	Commercial
R2	Eastman Dental Hospital. (see **Figure 5**)	Hospital

Table 7 – Sources of Noise

ID	Description
S1	Gray's Inn Road (A5200).
S2	External plant on the ground floor at the rear of 175-185 Grays Inn Road (see **Figure 7**)

4.0 Measurement Methodology

The proposed development will be subject to noise generated by:

- Road Traffic – (Gray's Inn Road A5200)
- External plant at the rear of 175-185 Gray's Inn Road (see **Figure 7**)

Noise levels have been measured in order to assess any potential impact the above noise sources will have on future occupants of the proposed development.

4.1 Unattended Measurements

A long-term unattended environmental noise survey was carried out between Tuesday 3rd February and Monday 9th February 2014 to obtain full daytime and night-time background and ambient noise monitoring results during weekdays. The microphone was set up overlooking Gray's Inn Road representative of where the proposed development will be located at 1.2m height above the local roof level and is considered to be a free field measurement.

The $L_{Aeq,T}$, $L_{AFmax,T}$ and $L_{A90,T}$sound pressure levels were measured continuously during the survey. Measurements were logged every 15 minutes. Noise levels during appropriate measurement periods such as 1 hour and 15 minutes have been calculated from the $L_{ps,1sec}$ results.

The unattended measurement location, MP1, is shown in **Figure 2** and **Figure 3** in **Appendix II**.

4.2 Attended Measurements

Additional attended noise measurements were carried out at the rear of the rooftop to assess the difference in noise levels near to the nearest noise sensitive receptor.

The $L_{Aeq,T}$, $L_{AFmax,T}$ and $L_{A90,T}$ sound pressure levels were measured continuously during the survey. Measurements were logged every 15 minutes. Noise levels during appropriate measurement periods such as 1 hour and 15 minutes have been calculated from the $L_{ps,1sec}$ results.

For the attended measurement location the microphone was positioned at 1.2m height above the local ground level and is considered to be a free field measurement.

The attended measurement location, MP2, is shown in **Figure 2** and **Figure 6** in **Appendix II**.

4.3 Vibration Measurements

A short attended vibration measurement was carried out during the attended noise survey. The vibration monitor stored maximum PPV and VDV values over 20 second intervals.

4.4 Instrumentation

The equipment used is detailed in **Table 8** below. The sound level meter was fitted with a windshield. Measurement systems were calibrated before and after the measurements and no variation occurred. Calibration certificates showing that the equipment has undergone periodic verification to international and British standards within the last 2 years are available upon request.

Table 8 – Survey Equipment

Manufacturer	Item	Type	Serial Number
Rion	Sound Level Meter	NL 52	510141
Vibrock	Vibration Monitor	V901	1309
Rion	NC 74	NC-74	34773047

4.5 Meteorological Conditions

The weather conditions during the surveys were predominately dry with light winds. There was occasional light precipitation but not of any noticeable impact on the results. Average wind speeds were below the recommended maximum limits of 5m/s as specified in BS 4142:2014. However, occasionally, the maximum wind speeds were higher than this, but scrutiny of the measurements show no significant impact on the levels recorded[10]. See **Appendix III** for a more comprehensive overview of the meteorological conditions.

[10] NB: the RION NL 52 outdoor microphone kit includes a large double skinned wind protector that provides substantially more protection against wind induced microphone noise than standard e.g. < 90 mm diameter single layer microphone protection units.

5.0 Noise Survey Results

5.1 Unattended measurement results

Presented within **Table 9**, are the results of the long-term noise measurements at the unattended location. A graph showing the time history of the measured results at the unattended monitoring location is given in **Appendix I**.

In order to derive typical values for ambient sound levels that reliably and suitably represent the particular circumstances and periods of interest in this case, the night-time $L_{Aeq,1hr}$ was derived by taking an arithmetic average of the maximum 1 hour values measured during each night.

Similarly, as per the advice of BS 4142:2014, the typical L_{A90} has been derived by taking the mode of the $L_{A90,15minute}$ levels measured during each time period. The values from each day have then been arithmetically averaged to find the typical background level.

By the same token, the typical L_{AFmax} has been derived by taking the 90th percentile of the 15 minute values measured.

Table 9 – Summary of Noise Monitoring Results – MP1

Time Period	T (Hours)	dB $L_{Aeq,T}$	Typical $L_{A90,15mins}$ dB	Highest L_{AFmax}	Typical L_{AFmax}
Day 07.00 – 19.00	16	64.3	56.1	96.0	83.3
Evening 19.00 – 23.00	4	63.9	54.7	93.3	84.7
Night-time 23.00 – 07.00	8	61.3	49.9	93.1	76.7
Night-time 23.00 – 07.00	1	61.0	-	-	-

5.2 Attended measurement results

Presented within **Table 10** are the results of the short term measurement at position 2. The noise levels presented are considered to represent free field conditions, well away from any existing buildings. It was noted that during the survey none of the existing plant on the rooftop was operational and are therefore likely to represent the “worst case” least noisy existing conditions.

Table 10 – Summary of Noise Monitoring Results – MP2

Date	Time	dB $L_{Aeq,T}$	$L_{A90,T}$ dB	$L_{AFmax,T}$
09/02/2015	14:35 – 14:49	55.8	53.3	66.2
	14:50 – 15:04	56.1	52.9	70.2
	15:05 – 15:19	55.6	53.4	83.8*
	15:20 – 15:34	55.8	53.1	65.7
	14:35 – 15:34	55.9	53.1	N/A

** The highest L_{AFmax} was attributed to a police siren. The meter was paused for the duration of the pass-by but the initial transient of the siren was measured.*

5.3 Vibration measurement results

The monitoring equipment was assessed for the maximum values when heavy goods vehicles and buses passed by the site. There was no noticeable increase in levels during these activities.

6.0 Assessment

6.1 Noise Exposure to Proposed Offices

The data has been analysed in accordance with the requirements of LBC. A +3 dB façade correction has been applied so the sound levels are representative of a position 1 metre external to the location of the proposed facade. **Table 11** below summarises the external noise level at the proposed development.

Table 11 – Noise Exposure of Site

Façade	Period	T (Hours)	Sound level at 1 metre external to façade dB $L_{Aeq,T}$		
			Measured Noise Level	LBC Criteria where planning permission not granted	LBC Criteria where attenuation measures required
Front	07.00 – 19.00	12	67.3	72	62
	19.00 – 23.00	4	66.9	72	57
	23.00 – 07.00	1	64.3	n/a	52
	23.00 – 07.00	8	64.0	66	n/a

Please note as the use of the proposed development is for commercial office primarily in day time use the evening and night-time periods have been omitted from further assessment.

The front of the façade is below the daytime LBC criteria where planning permission would not be granted but falls within the criteria where attenuation measures are required.

6.1.1 Internal noise levels assessment

Guidance on acceptable noise design levels inside rooms for this proposed development is set out in BS 8233:2014 and the British Council for Offices 2009 guidance.

It is proposed that internal noise levels in the development is controlled using appropriate attenuation measures with a design range of 40 – 50 dB $L_{Aeq,T}$.

Table 12 shows the external façade noise levels against the relevant internal noise level criteria.

Table 12 – Summary of Internal Noise Levels

Description	External Noise Levels, dB	BS 8233 Design Range, dB	British Council for Offices 2009
	$L_{Aeq,\ 12hr}$	$L_{Aeq,\ T}$	$L_{Aeq,\ T}$
Front facade	64	45 – 50	41 – 46 (depending on office room type)

To achieve these levels the minimum sound insulation provided by the front façade will need to reduce the external noise levels by approximately $R_W + C_{tr}$ 14 to 23 dB during the daytime, depending on the office room type and the conditions required.

The required performance cannot be achieved with open windows which would normally provide between 10 – 15dB sound reduction. The sound insulation performance of building facades is

typically controlled by the glazing and ventilation systems selected. The required performance described above is typically achieved using standard acoustic double glazing (in conjunction with acoustic passive ventilation).

On the rear facing and more sheltered facades of the development, where lower noise levels are encountered, a more standard natural ventilation system may be appropriate using attenuated ventilation openings.

Please note that the detailed prediction of noise ingress is dependent upon the precise façade make up (glazed area etc.) and the acoustic characteristics of the proposed internal spaces. This information is not currently available; as such the above advice has been provided to demonstrate the feasibility of the mitigation. A more detailed assessment may be required once the design progresses.

6.2 Mechanical Plant Noise

Noise levels from the proposed mechanical services plant for the commercial unit must be controlled to protect the surrounding noise sensitive receptors.

Details of the proposed mechanical services plant associated with the development and the operating times were not available at the time of assessment. Therefore, at this stage noise limits have been proposed at the nearest sensitive receptors for the total combined mechanical services noise from the proposed development. Typically, the plant will only be operational during working hours between Monday to Friday 07:00 – 19:00.

6.2.1 Background Noise Levels

The background noise levels measured during the noise survey are all free field. The measurement position is considered representative of the hotel receptors at the rear of the property which are exposed to the same noise sources as the measurement position.

The background noise levels during the daytime used for assessment at the nearest noise sensitive receptors are shown in **Table 13**. The levels have been derived from the attended measurement at the rear of the rooftop at the point closest to the nearest noise sensitive receptor.

Table 13 – Typical Background Noise Levels for Assessment

Location	Typical Background Noise Level L_{A90}, dB
	Daytime 07.00 – 19.00
Rear of rooftop	53

6.2.2 Assessment and Mitigation

The corresponding external limits for the plant noise level are proposed in **Table 14** below based on LBC criteria. The limit applies to the measured or calculated total combined rating noise level from the plant or equipment, associated with the retail units, at 1m from the closest window of the relevant sensitive property during that stated time period without the influence of reflections from the façade of the building.

Table 14 – Recommended Mechanical Plant Noise Limits

Mechanical Plant Description	Mechanical Plant Noise Level at 1m from the nearest noise sensitive receptor, dB
	Daytime 07.00 – 19.00
Mechanical Plant	48
Mechanical Plant that has a distinguishable discrete continuous note (whine, hiss, screech, hum)	43
Mechanical Plant that has distinct impulses (bangs, clicks, clatters, thumps)	43

The proposed limits are 5 dB below the lowest background noise levels determined in this assessment at the identified sensitive receptors. This results in a level which complies with the LB Camden Development Policy 28 and is 10 dB below (i.e. subjectively half as loud) as the limit which BS 4142:2014 rates as likely to be an indication of an adverse impact. If the plant is tonal or features any distinct impulses then the requirement will be 10 dB below the background.

All plant to be installed on, or as part of, the development, should be subject to the above criteria. The collective sum of all plant operating under worst case conditions should achieve the above limits.

An assessment of the proposed mechanical services plant should be undertaken, to demonstrate that the limits proposed in **Table 14** will be achieved, during the detailed design stage.

The maximum allowable noise levels from equipment can be achieved by applying one, or a combination, of the following recommended mitigation measures, if it is necessary:

- quieter equipment to be used if it is possible;
- carefully designed location of equipment;
- maximise the distance from the sensitive receptors;

If required, additional mitigation strategy can be considered, for example use of a silencer or an acoustic barrier or partial enclosure with sufficient height. Such mitigation assessments can be carried out in regard to the detail of equipment likely to be chosen at the detailed design stage.

7.0 Conclusion

Temple Group Ltd (Temple) has been instructed by Bond Bryan Architects Limited to undertake an environmental noise assessment for the proposed single storey office extension at 175-185 Gray's Inn Road, London WC1X.

Consequently, Temple undertook unattended and attended noise surveys which have been used to assess noise exposure to the development and establish operational limits for plant noise affecting the nearest noise sensitive receptor. This has been assessed in line with the London Borough of Camden's (LBC) policy and relevant national standards and guidance.

The existing sound levels at the location of the front façade of the proposed scheme are below the daytime LBC criteria where planning permission would not be granted, but fall within the criteria where attenuation measures are required.

It is likely to be feasible to achieve the internal noise levels recommended by BS 8233:2014 and BCO 2009 during the daytime using standard acoustic double glazing (in conjunction with acoustic passive ventilation).

Noise limits based on the existing background noise levels at nearby sensitive receptors, that also comply with LBC policy and national standards, have been proposed for noise generating plant which may be included as part of the development.

Appendix I – Noise Survey Results

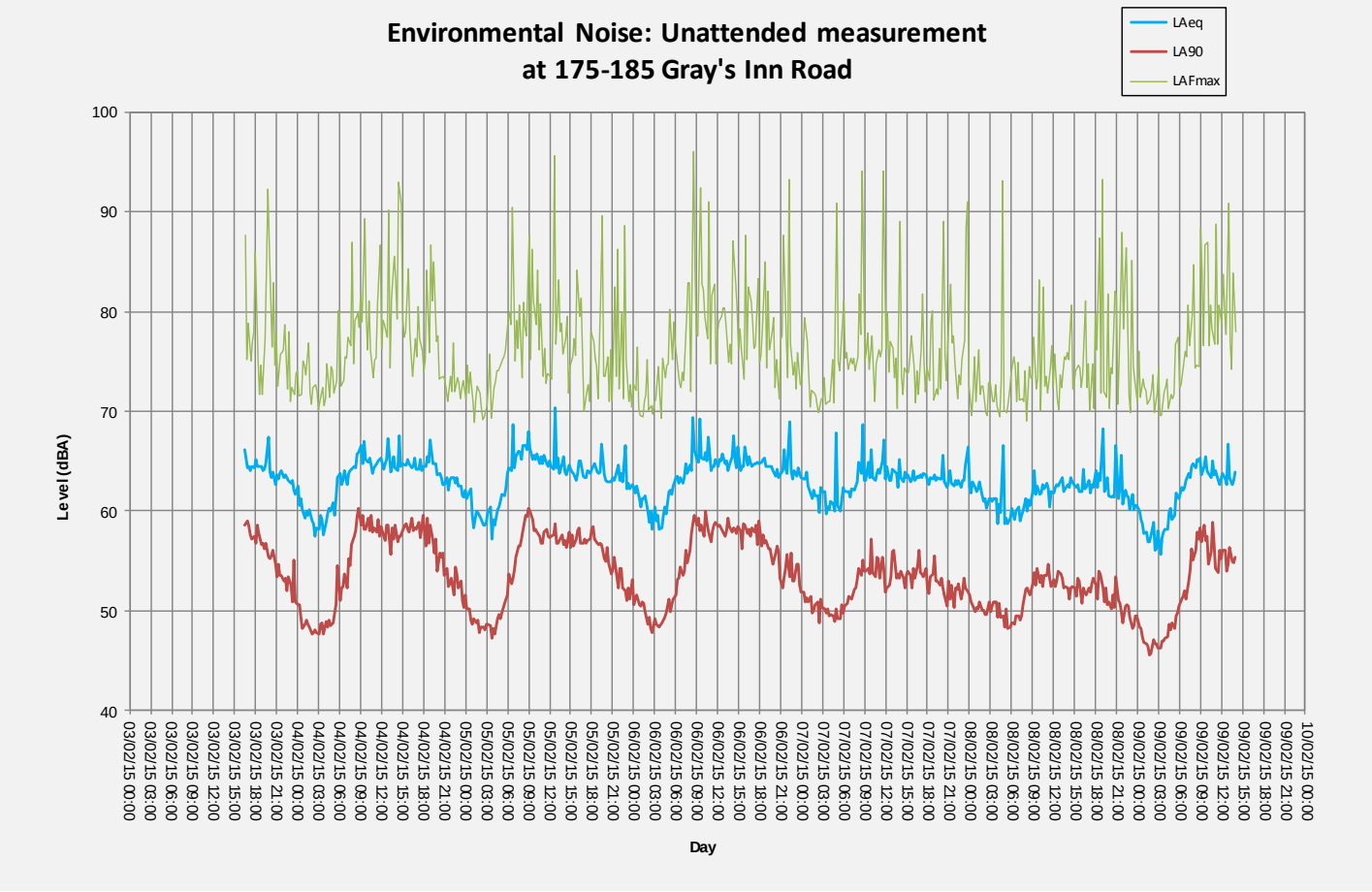

Figure 1 – Unattended measurement survey results at location MP1

Appendix II – Site Photos

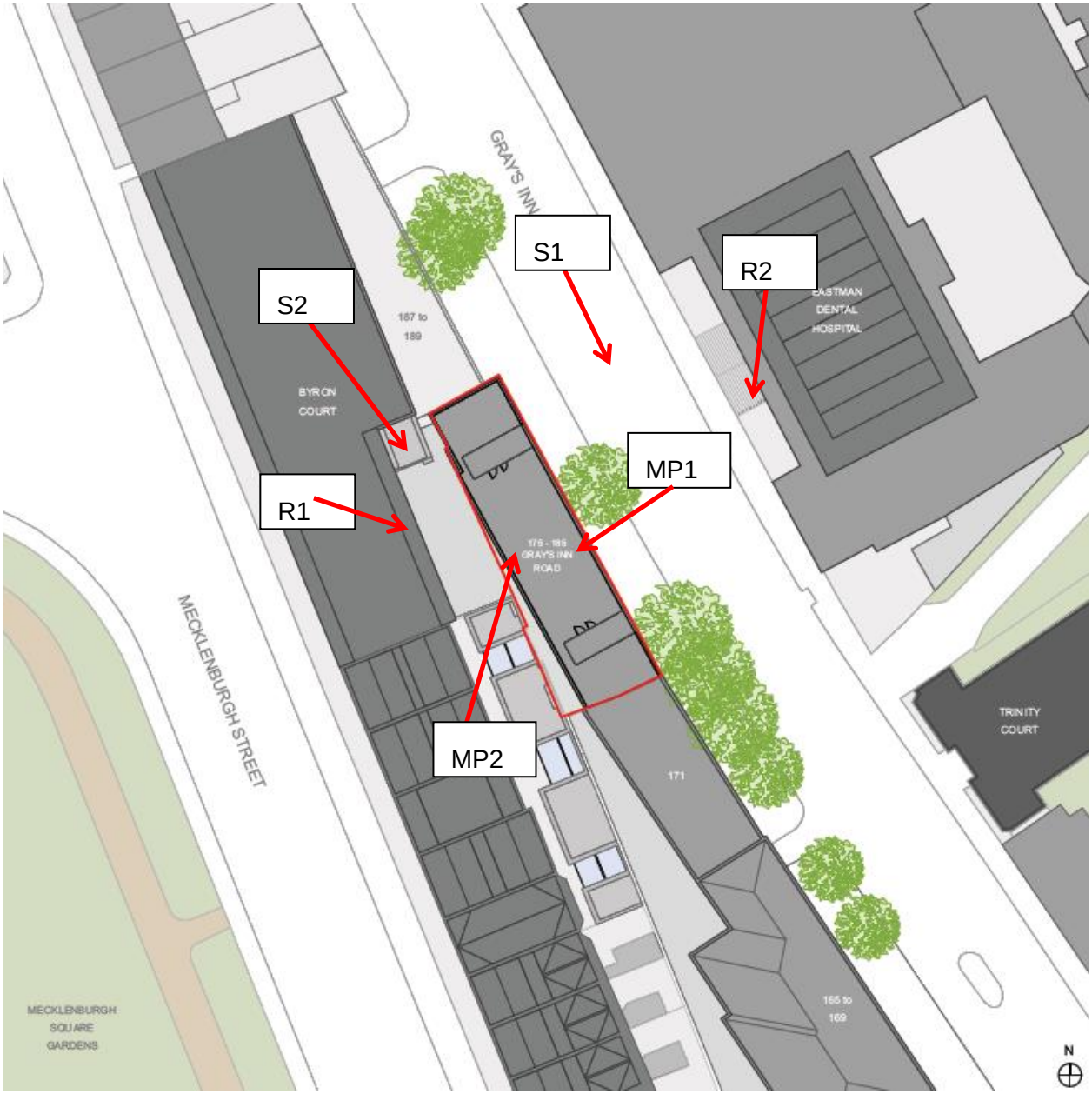

Figure 2 – Site layout

Figure 3 – Unattended noise monitoring location

Figure 4 – Receptor 1: Hotel premises at the rear of the 175-185 Gray's Inn Road

Figure 5 – Receptor 2: Eastman Dental Hospital opposite 175-185 Gray's Inn Road

Figure 6 – Attended measurement on the rear of the rooftop

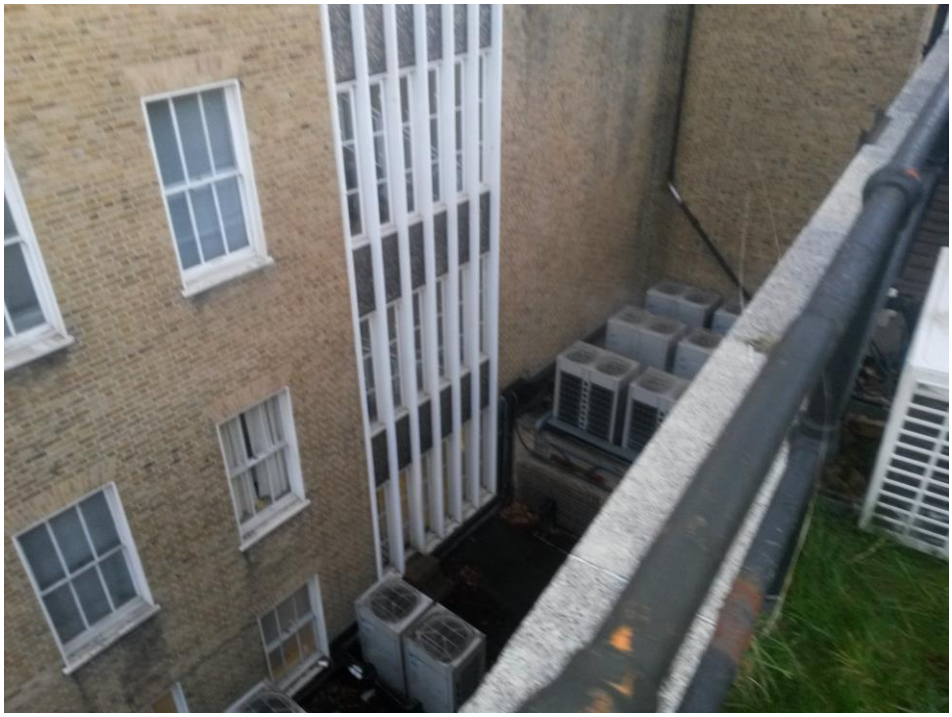

Figure 7 – External plant at the rear of 175-185 Gray's Inn Road

Appendix III – Meteorological Conditions

Table 15 – Survey Meterological Conditions[11]

Date	Max Wind Speed (mps)	Mean Wind Speed (mps)	Precipitation (mm)	Events
03/02/2015	5.8	3.1	0	Light Rain
04/02/2015	5.3	3.6	0	Light Rain
05/02/2015	6.7	3.9	0	Light Rain
06/02/2015	8.1	5.0	0	
07/02/2015	4.4	3.1	0	
08/02/2015	4.4	2.8	0	
09/02/2015	5.8	3.1	0	

[11] Historical weather data derived from www.wunderground.com station Warner Street, ID: ILONDON326

Temple Group Ltd
Devon House
58-60 St Katharine's Way
London E1W 1LB

Tel: +44 (0) 20 7394 3700
Fax: +44 (0) 20 7394 7871

www.templegroup.co.uk

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