



## **South Kensington Station Redevelopment**

### Initial Construction Noise Assessment Report

Report for

Thurloe Owners & Leaseholders Association

September 2020

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## 1.0 INTRODUCTION

SPL Acoustics Ltd has been commissioned by the Thurloe Owners & Leaseholders Association (TOLA) to advise them on the potential construction noise issues for the proposed South Kensington Station Redevelopment.

The proposed site covers an area of approximately 0.8 hectares and is bounded by Thurloe Street to the North, Thurloe Square to the East, Pelham Street to the South and Cromwell Place to the West (the redevelopment site is presented in Figure 1). The development proposals have been submitted to the Royal Borough of Kensington and Chelsea (RBKC) planning department under reference PP/20/03216 (and LB/20/03217) in July 2020, in summary the proposals are:

*“Mixed use development of the land around South Kensington Station providing for: the demolition and redevelopment of the Bullnose (including Use Classes A1, A2, A3 and B1), demolition and facade retention of the Thurloe Street Building, refurbishment of the retail facades along Thurloe Street, refurbishment of the Arcade, construction of a building along Pelham Street comprising of residential use (Use Class C3), retail use (A1, A2 and A3), and Office use (use Class B1), construction of a building along Thurloe Square to provide for Use Class C3, alterations to South Kensington Station to provide for Step-free access to the District and Circle Lines and fire escape, including consequential alterations to the layout of the Ticket Hall, construction of two retail facades within the Subway, and other works incidental to the application proposal”*

This assessment utilises the noise survey data gathered by PC Environmental Ltd (PCE, August 2020) and further assess the demolition aspects of the Bullnose/Thurloe St as well as the night-time piling for the proposed podium/deck works adjacent to Thurloe Bridge/Pelham Place.

This Report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

**Figure 1 Application Site**



## 2.0 POLICY CONTEXT & ASSESSMENT METHODOLOGY

### 2.1 National planning policy framework (England)

The National Planning Policy Framework (NPPF) was initially published on March 27th 2012, with an updated version published in February 2019. It sets out the Government's planning policies for England and attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

The NPPF sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Under Section 15; Conserving and enhancing the natural environment, the following is stated:

Planning policies and decisions should contribute to and enhance the natural and local environment by:

*preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans (paragraph 170e)*

The document goes on to state:

Planning policies and decisions should aim to:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation (Paragraph 180)*

As stated above, this document makes reference to avoiding noise generation from new developments that would adversely impact on health and quality of life. It effectively supersedes Planning Policy Guidance (PPG) 24 but does not set absolute criteria. As a result, the guidance and criteria in other relevant documents have been adopted, as a point of specific reference.

## **NPSE**

The Noise Policy Statement for England is published by the Department for Environment, Food and Rural Affairs (Defra) and sets out the approach to noise within the Government's sustainable development strategy.

The significance of impacts from noise within the NPSE are defined as follows:

There are two established effects that are currently being applied to noise impacts, for example, by the WHO. These are:

NOEL – No Observed Effect Level

- *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

LOAEL – Lowest Observed Adverse Effect Level

- This is the level above which adverse effects on health and quality of life can be detected.

Extending the above concepts, the NPSE defines the following:

SOAEL – Significant Observed Adverse Effect Level

- *This is the level above which significant adverse effects on health and quality of life occur.*

In March 2014, the Department for Communities and Local Government (DCLG) released its *Planning Practice Guidance (PPG)* web-based resource to support the NPPF. This guidance introduced the concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is 'noticeable', 'very disruptive' and should be 'prevented' (as opposed to SOAEL, which represents a situation where noise is 'noticeable' and 'disruptive', and should be 'avoided')

The three aims of the NPSE are stated as:

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

## **2.2 BS5228:2009+A1:2014 'Construction Code of Practice for noise & vibration control on construction & open sites'**

Noise levels generated by construction plant and activities have the potential to impact upon nearby noise-sensitive receptors.

BS5228 sets out an appropriate methodology for predicting, assessing and controlling noise levels arising from a wide variety of construction plant and related activities. As such, it can be used to predict noise levels arising from the operations at proposed construction sites. BS5228 also sets out tables of sound power levels generated by a wide variety of construction plant to facilitate such predictions.

The magnitude of the potential impact on sensitive receptors would depend upon a number of variables, the following of which are of particular relevance to this assessment:

- The amount of noise generated by plant and equipment being used at the site, generally expressed as a sound power level;
- The periods of operation of the plant at the site, known as the 'on-time';
- The distance between the noise source and the receptor, known as the 'stand-off';
- The attenuation due to ground absorption or barrier screening effects; and
- The reflection of noise due to the presence of hard vertical faces such as walls.

In order to determine the likely effect of noise during construction of the proposed development, noise predictions have been carried out in accordance with the procedures presented in BS5228, taking full account of BPM. The prediction method described in BS5228 comprises taking the source noise level of each item of plant and correcting it for the following variables:

- Distance effects between source and receiver;
- Percentage operating time of the plant;
- Barrier attenuation effects;
- Ground absorption; and
- Facade corrections.

BS5228 gives several examples of acceptable limits for construction noise. In particular, paragraph E.3.2 describes Example Method 1 (The ABC Method), which considers the existing ambient noise environment (the  $L_{Aeq}$  noise level environment) at the neighbouring sensitive receptors and identifies levels that if exceeded would be considered to result in a significant adverse effect and is noted to apply to residential receptors only.

Table E.1 of BS5228 sets out significance effect threshold values at receptors. The process for determining this requires the determination of the ambient noise level at the relevant receptor (rounded to the nearest 5dB), which is then compared to the total noise level, including the predicted construction noise level. If the combined noise level exceeds the appropriate category value, then the impact is deemed to be significant. The relevant statistics from Table E.1 are set out in Table 1 below:

**Table 1 Construction Noise Impact Significance Criteria**

Assessment category and threshold value period (L <sub>Aeq</sub> )	Threshold value, in decibels - dB(A)		
	Category A	Category B	Category C
Daytime (0700 to 1900 hrs) and Saturdays (0700 to 1300 hrs)	65	70	75
Evenings & Weekends	55	60	65
Night-time (2300 to 0700 hrs)	45	50	55
<i>NOTE 1 A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.</i>			
<i>NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.</i>			
<i>NOTE 3 Applied to residential receptors only.</i>			
<i>A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</i>			
<i>B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.</i>			
<i>C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.</i>			

In addition to the above method of assessing impacts, BS 5228 also suggests the 5 dB(A) change method. This states that noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction ambient noise plus construction noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB L<sub>Aeq, Period</sub>, from construction noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.

For the purposes of assessment, the above threshold values for each Category are interpreted as SOAEL. The UAEL is defined as being 10 dB above the Category C threshold values (residential use).

### 3.0 BASELINE NOISE SURVEYS

#### 3.1 Noise Survey Results

Several surveys at various locations were conducted by PCE in August 2020 which are reproduced below:

Environmental noise measurements were carried out over several consecutive days and nights at a total of four locations (for TOLA) around the proposed development site. The measurements of concern to this report were carried out in July and August 2020 at the following locations:

- 3rd floor front façade of 25 Thurloe Street
- 1st floor rear façade of 18 Thurloe Street
- Ground floor rear façade of 51 Thurloe Square
- 1st floor façade of 29 Pelham Place (overlooking Pelham Street)

Full details of the equipment that was used for the surveys, their locations (including photographs) and graphical results are given in Appendix A at the end of the PCE report.

The summary results of the noise surveys are presented below in Table 3 (detailed data in graphical format is presented in Appendix B). Piling is expected to be undertaken at night (0050 to 0500 hrs) for podium/deck build adjacent to Pelham St/Place/Thurloe Bridge/Thurloe Square and therefore the existing ambient  $L_{Aeq,T}$  noise levels during these periods is also reported below.

**Table 2: Noise Measurement Results**

Location	Day (0700 to 1900 hrs)	Evening (1900 to 2300 hrs)	Night (0700 to 2300 hrs)	Night (0045 to 0500 hrs Mon/Fri)
	$L_{Aeq,T}$ dB			
3rd floor front façade of 25 Thurloe St	58.6	58.1	52.1	49.1
1st floor rear façade of 18 Thurloe St	60.1	60.0	55.8	51.6
Ground floor rear façade of 51 Thurloe Square	59.0	58.8	53.0	45.0
1st floor façade of 29 Pelham Place	67.2	66.7	60.1	56.7

## 4.0 NOISE ASSESSMENT

### 4.1 Daytime Demolition & Night-time Piling Works

To assess the potential construction noise effects of the redevelopment, reference is made to the Outline Construction Environmental Management Plan (CEMP) prepared by Gardiner & Theobald LLP (GTMS) on behalf of Native Land (Kensington) Limited, TTL South Kensington Properties Limited and London Underground. A more detailed assessment of construction noise and vibration is likely to be issued by the above parties in due course. However, to address the potential noise issues that are of concern to TOLA, this assessment considers assumed plant/locations for the demolition and night-time piling.

Noise data for each plant item has been taken from the lists of typical noise data given in the appendices of BS5228. The approximate locations of plant during respective phases of the demolition and construction have been taken from drawings contained in Appendix A of the CEMP. The plant items assumed to be utilised in each phase are summarised in below. The CFA piling rig shown below is included here is a mitigating factor.

**Daytime works:** 3x Breakers and 3x Areas of general demolition works within Thurloe Street development with a further 2x areas of general demolition works in the Bullnose. 2x fixed cranes located next to the Bullnose and Thurloe Street, along with loading/unloading lorries at the two bays adjacent to Thurloe Street and the Bullnose. Subsequent daytime Piling works/concrete operations at the Bullnose (1xCFA rig) and at the rear façade of the proposed redevelopment at the rear of Thurloe Street has also been included.

**Night-time works:** 1x CFA piling rig and 2 mini-piling rigs and 2x concrete pumps (one set of equipment is located at street level in the south east corner of the site with the second at track level to the west). 2x fixed cranes, along with loading/unloading lorries and concrete lorries on Pelham Street.

The equipment noise levels are shown in Table 3.

**Table 3 Equipment Noise Levels**

Equipment	Noise Level, $L_{Aeq,T}$ dB @ 10m	BS5228 Ref
Hand Tools	69	Table C1.19
CFA Piling	80	Table C3.22
Mini Piling Rig	75	Table C3.17
Fixed Crane	77	Table C4.49
Concrete Pump	78	Table C3.25
Concrete Lorry	80	Table C4.20
Welding Machines	73	Table C3.32
Saw	85	Table C4.71
Grinder	80	Table C4.93
Nail Gun	73	Table C4.95
Hand-held Breaker	95	Table C5.6
Lorry (Loading/unloading)	80	Table C2.34

The above works were processed using the computer modelling suite IMM12020 and together with other pertinent site data such as the topography, existing or natural acoustical screens such as mounds/buildings as well as the outline mitigation measures presented in the CEMP etc, noise levels were computed at the façade of the five properties of interest to TOLA. Further, the noise mitigation measures also include the retained façade (windows blocked up) of the Thurloe Street properties that are due for demolition (at the rear of the retained façade).

The night-time piling operations are separated into Phase 1 and Phase 2. Phase 1 assumes the use of CFA piling operations at street level adjacent to 52 Thurloe Square as well as ancillary operations attributed to cranes and concrete operations. Phase 2 uses the mini-pile operations at platform level as well as other piling/ancillary operations adjacent to Pelham Street.

**Table 4 Calculated Noise at Receptors**

Location	Daytime Demolition Works	Daytime Piling Works	Night-time Piling Phase 1 Works	Night-time Piling Phase 2 Works
	$L_{Aeq,T}$ dB			
3 <sup>rd</sup> floor front façade of 25 Thurloe St	75.4	69.6	55.1	57.1
1 <sup>st</sup> floor rear façade of 18 Thurloe St	65.4	80.9	67.0	68.7
3 <sup>rd</sup> floor rear façade of 52 Thurloe Square	57.6	66.9	72.0	74.4
1 <sup>st</sup> floor façade of 29 Pelham Place	56.4	58.1	68.1	70.3
1 <sup>st</sup> floor façade of 8 Pelham Street	72.3	58.6	71.5	72.3

It should be noted that noise calculations are undertaken at 52 Thurloe Square utilises the ambient noise surveys undertaken at 51 Thurloe Square (access to 52 Thurloe Square was not available at the time of the surveys). Similarly, the noise surveys for 29 Pelham Place are considered to be representative for 8 Pelham Street.

The significance of the calculated noise levels against the BS5228 adopted threshold levels and the night-time (0045 to 0500 hrs) ambient noise levels are presented below:

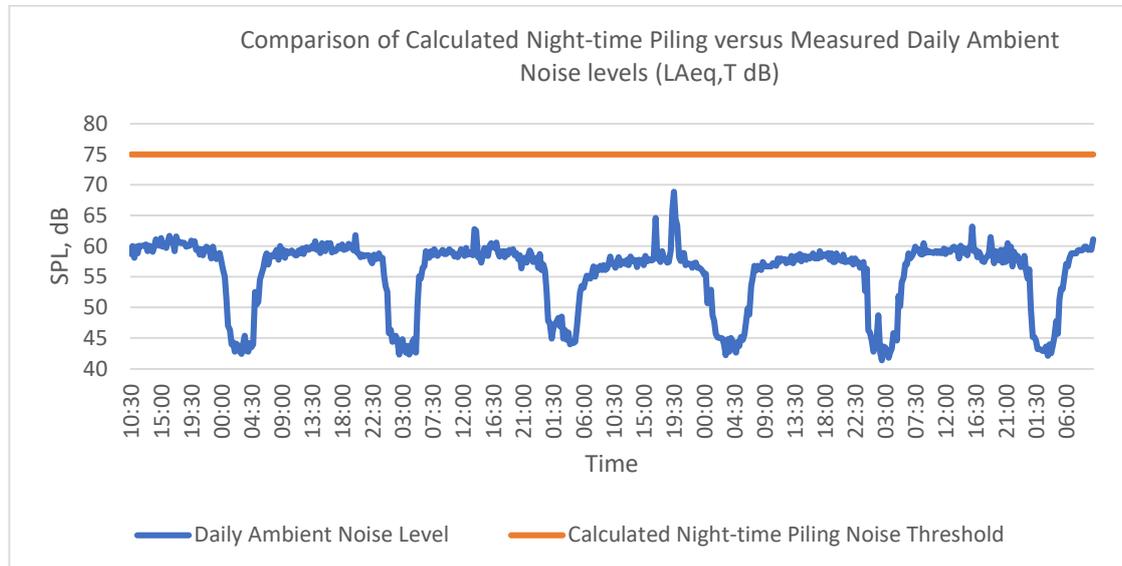
**Table 5 Significance of Calculated Noise Levels**

Location	Daytime Demolition Works	Daytime Piling Works	Night-time Phase 1 Piling Works	Night-time Phase 2 Piling Works	Noise Level Increase over night-time period (0045 to 0500 hrs) dB (ambient $L_{Aeq,T}$ )
	Above SOAEL?				Phase 1, Phase 2
3rd floor front façade of 25 Thurloe St	Yes	Yes	No*	Yes	6,8
1st floor rear façade of 18 Thurloe St	No*	Yes	Yes, above UAEL	Yes, above UAEL	15,17
3rd floor rear façade of 52 Thurloe Square	No	Yes	Yes, above UAEL	Yes, above UAEL	27,29
1st floor façade of 29 Pelham Place	No	No	Yes, above UAEL	Yes, above UAEL	11,14
1st floor façade of 8 Pelham Street	Yes	No	Yes, above UAEL	Yes, above UAEL	15,16

*\*The construction noise level at this receptor is on the borderline of the SOAEL criterion*

For the consideration of the calculated noise levels in context of the existing ambient noise levels ( $L_{Aeq,T}$ ), the chart below shows the above level difference for 52 Thurloe Square.

**Figure 2 Comparison of potential night-time piling noise against the existing ambient noise levels (day/night), 52 Thurloe Square**



As can be seen from the above, night-time piling works will have the potential to cause wide-spread community disturbance (with noise level increases between 6 and 29 dB anticipated at night) and taking into account that some listed properties have single glazed windows and piling works at night may continue for several weeks, there is likely to be regular sleep deprivation/awakening which may, perhaps, lead to a physiological response. This situation will be greatly exacerbated during the spring/summer months when open windows may be desired by the residential occupiers adjacent to the works.

#### 4.2 Other Considerations

There will be a number of ancillary operations associated with the night-time piling including concrete deliveries. Currently, it is anticipated that there will be between 9 to 11 HGV deliveries for a 24 period for the first six months of 2023. However, the number of deliveries at night is not in the public domain. We anticipate several night-time deliveries on Thurloe Street, Pelham Place/St and Thurloe Square and with noise levels for each delivery approaching 80 dB LAeq,T (at 10m), a potential for sleep awaking due to short event high noise changes over the night-time ambient noise levels between 0045 to 0500 hrs is a genuine concern for TOLA.

## 5.0 SUMMARY AND CONCLUSIONS

SPL Acoustics, on behalf of TOLA, has undertaken an initial construction noise assessment for a proposed redevelopment of South Kensington Station, Royal Borough of Kensington & Chelsea.

Ambient noise levels adjacent to the redevelopment site have been measured and utilised for the assessment of noise as calculated in accordance with BS5228:2009+A1:2014 'Construction Code of Practice for noise & vibration control on construction & open sites'.

Information contained in the development's outline Construction Environmental Management Plan (CEMP) has been applied for an assessment of demolition and day/night-time piling. For the purposes of this assessment, typical plant for the above-mentioned activities including the mitigation measures in the CEMP have been modelled to gauge the potential construction related noise levels at nearby residential receptors.

Our findings indicate that during the daytime demolition and piling activities, noise levels at some of the receptors is above the adopted criterion which will therefore require further mitigation measures. At night, piling activities show an exceptionally large increase in noise levels over the existing early morning hours at all receptors under consideration. Further, our assessment indicates that night-time piling noise at the majority of the receptors outlined in this report to be above both the SOAEL and the UAEL adopted criterion.

## Appendix A

### Introduction to Noise

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided. The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the  $L_{A10}$ , the noise level exceeded for 10% of the measurement period. The  $L_{A90}$  is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level,  $L_{Aeq}$ . This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as  $A_{90(1hour)}$  and  $L_{A90(5mins)}$ . The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

**Table A1: Glossary of Terms**

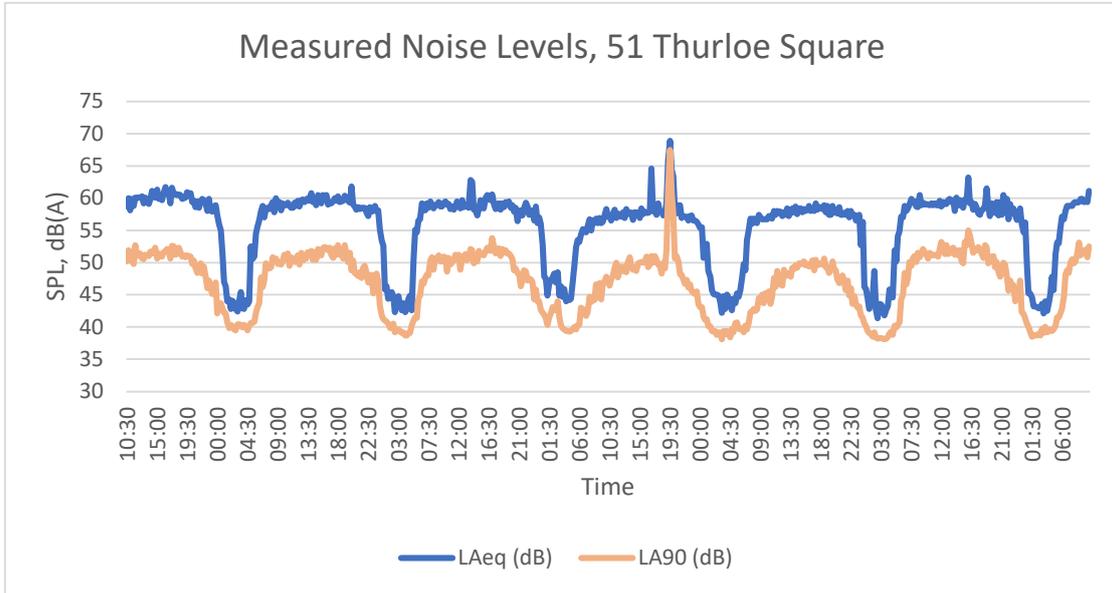
Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds $s_1$ and $s_2$ is given by $20 \log_{10}(s_1/s_2)$ . The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$ .
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. $L_{max}$ is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall $L_{eq}$ noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. $L_{90}$ can be considered to be the "average minimum" noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ( $L_{Aeq,T}$ ).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ( $L_{Aeq,T}$ )
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ( $L_{Aeq,T}$ )
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ( $L_{Ar,Tr}$ ).

## **Appendix B**

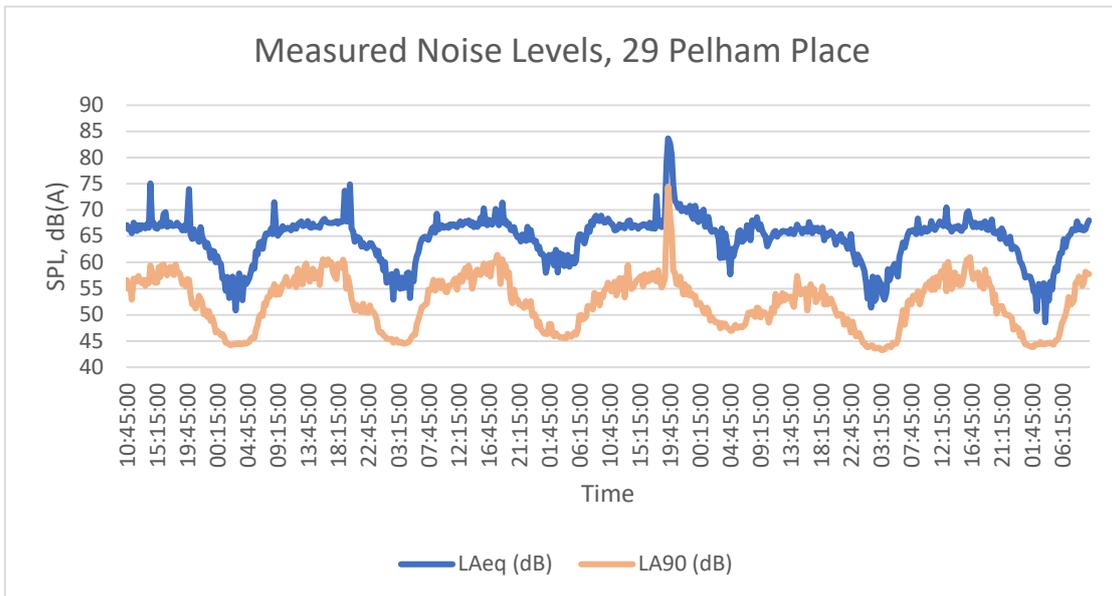
### **Noise Survey Details**



**Noise Survey Results, 51 Thurloe Square**



**Noise Survey Results, 29 Pelham Place**





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