

90 Tottenham Court Road

Environmental Noise Survey and Plant Noise Assessment Report

27350/PNA1-Rev2

5 February 2020

For:

Derwent Valley Central Limited
25 Savile Row
London
W1S 2ER



Hann Tucker Associates

Consultants in Acoustics Noise & Vibration



Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595

Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041
(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk



Environmental Noise Survey and Plant Noise Assessment Report Report 27350/PNA1-Rev2

Document Control

Rev	Date	Comment	Prepared by	Authorised by
2	05/02/2020	New Plant Location		
			Firas Farhan Principal Consultant BSc(Hons), MIOA	John Ridpath Director BSc(Hons), MIOA
1	11/12/2019	Plant selection finalised	Firas Farhan Principal Consultant BSc(Hons), MIOA	John Ridpath Director BSc(Hons), MIOA
0	29/10/2019	-	Firas Farhan Principal Consultant BSc(Hons), MIOA	John Ridpath Director BSc(Hons), MIOA



Environmental Noise Survey and Plant Noise Assessment Report Report 27350/PNA1-Rev2

Contents	Page
1.0 Introduction	1
2.0 Objectives	1
3.0 Site Description	2
4.0 Acoustic Terminology	2
5.0 Acoustic Standards and Guidelines	3
6.0 Survey Methodology	9
7.0 Results	11
8.0 Discussion Of Noise Climate	11
9.0 Plant Noise Emission Criteria	11
10.0 Plant Noise Impact Assessment	13
11.0 Conclusions	15

Attachments

Appendix A – Acoustic Terminology



1.0 Introduction

It is proposed to install items of building services plant on the roof of 90 Tottenham Court Road.

Hann Tucker Associates have therefore been commissioned to undertake a detailed 24 hour daytime and night-time fully automated environmental noise survey of the site to establish the currently prevailing noise climate and propose suitable plant noise emission criteria, based on the results of the survey and the requirements of the Local Authority.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window.

This report presents the survey methodology and findings.

2.0 Objectives

To establish, by means of detailed 24 hour daytime and night-time fully automated environmental noise monitoring, the existing A-weighted (dBA) L_{90} , L_{eq} and L_{max} environmental noise levels at a selected accessible position, thought to be representative of the nearest affected property.

Based on the results of the noise survey, and with reference to the requirements of the Local Authority, to recommend suitable plant noise emission criteria.

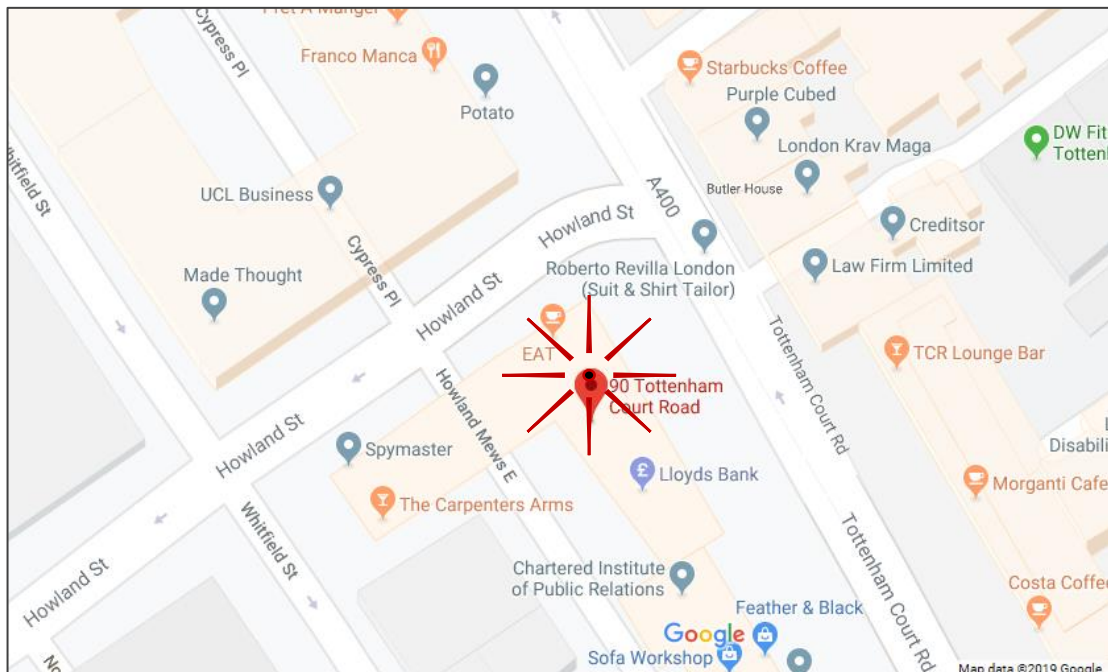
To assess the proposed plant and comment on its acceptability.



3.0 Site Description

3.1 Location

The Site falls within London Borough of Camden's jurisdiction. The location is shown in the Location Map below.



3.2 Description

90 Tottenham Court Road is a retail on ground plus 5 storey office building situated on the corner of Tottenham Court Road and Howland Street. The surrounding area is commercial building of similar height. The dominant noise source was noted to be from road traffic on Tottenham Court Road and nearby building services plant.

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.



5.0 Acoustic Standards and Guidelines

5.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010. The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

“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.”*

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an



SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *“all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

5.2 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was first published in March 2012. This document replaced the existing Planning Policy Guidance Note 24 (PPG24) “Planning and Noise”. A new edition of NPPF was published in July 2018 and comes into effect immediately. This new edition however, contains no new directions with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2018 edition.

Paragraph 170 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by (amongst others) *“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, water or noise pollution or land stability.”*

The following paragraphs are from the NPPF (revised February 2019):

“180. 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 impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;



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.

182. 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."

Paragraph 180 also references the Noise Policy Statement for England. This document does not refer to specific noise levels but instead sets out three aims:

"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."

The NPPF document does not refer to any other documents or British Standards regarding noise other than the NPSE.

Paragraph 2 of the NPPF states that "planning law required that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."

Paragraph 12 of the NPPF states that "The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date



development plan, but only if material considerations in a particular case indicate that the plan should not be followed.”

5.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at <http://planningguidance.planningportal.gov.uk/blog/guidance/>. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

Perception	Examples of Outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent



5.4 BS 4142:2014

When setting plant noise emission criteria reference is commonly made to BS 4142: 2014 *“Methods for rating and assessing industrial and commercial sound”*.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: *“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”*. An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

- *“Typically, the greater this difference, the greater the magnitude of the impact.”*
- *“A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”*
- *“A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”*
- *“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.”*

The determination of the “rating level” and the “background level” are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to “No Observed Effect Level” as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of “low impact”.



5.5 World Health Organisation Guidelines on Community Noise

BS8233:2014 is based upon the current World Health Organisation (WHO) guidance “Guidelines on Community Noise”. A summary of the noise guidelines relevant to the proposed scheme is presented in the table below.

Residential Environment	Critical Health Effect(s)	L _{Aeq}	L _{AFmax}	Time Base
Outdoor living area	Serious annoyance, daytime and evening	55	-	07:00-23:00
	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

These WHO guidelines are based, in almost all cases, on the lower threshold below which the occurrence rates of any particular effect can be assumed to be negligible.

5.6 British Standard BS8233: 2014

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” provides guidance for the control of noise in and around buildings.

BS8233:2014 Section 7.7.2 titled “Internal ambient noise levels for dwellings” states:

“In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 - 23:00	23:00 - 07:00
Resting	Living Rooms	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}



5.7 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB (or 10dB if tonal) below the minimum background $L_{90(15\text{minutes})}$ at 1m from the nearest noise sensitive window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

6.0 Survey Methodology

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:00 hours on Thursday 17 October 2019 to approximately 12:00 hours on Friday 18 October 2019.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were moderate. The sky was generally patchy cloud. We understand that generally throughout the survey period the weather conditions were similar to this. These conditions are considered suitable for obtaining representative measurement results.

6.2 Measurement Position

The noise level measurements were undertaken at a single position at the development site. The measurement position is described in the table below.

Position No	Description
1	The sound level meter was located on the roof of the site. The microphone was attached to a pole approximately 20m above ground level and approximately 1m from the façade overlooking the rear of the site.

The position was selected in order to assess the lowest noise levels at the development site for subsequent use in setting plant noise emission criteria and is shown on the following plan.



6.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

Position	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 ½" Condenser Microphone	PCB	377B02	107842	Calibration on 13/09/2019
	Preamp	Larson Davis	PRM902	4199	Calibration on 13/09/2019
	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3541	Calibration on 13/09/2019
-	SLM Calibrator	Bruel & Kjaer	4231	2095100	Calibration on 04/02/2019

The sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant change was found to have occurred (no more than 0.1dB).

The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a windshield.



7.0 Results

The results have been plotted on Time History Graph 27350/TH1.01 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} noise levels at the measurement position throughout the duration of the survey.

Using the guidance outlined from Section 5.4 in BS4142:2014, a background level to be used with the Local Authority criteria has been selected using statistical analysis. The modal $L_{A90(15min)}$ measurements recorded during the survey are presented in the table below:

Modal Measured $L_{A90(15min)}$ Background Noise Level (dB re 2×10^{-5} Pa)			
Position	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	57 dBA	51 dBA	51 dBA

N.B. The above levels are as measured at the measurement positions and include local reflections.

8.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise source was noted to be from road traffic on surrounding roads and from nearby building services plant.

9.0 Plant Noise Emission Criteria

The site comes under the jurisdiction of Camden Borough Council, which outlines its requirements as below in *Camden Local Plan 2017: Appendix 3*

“...a ‘Rating Level’ of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion



Existing Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining window (façade)	Day	'Rating level' 10dB below background	'Rating level' 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings **		Night	'Rating level' 10dB below background and no events exceeding 57dBL _{Amax}	'Rating level' 9dB below and 5dB above background or noise events between 57dB and 88dBL _{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL _{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**Levels are given for dwellings, however, levels are use specific and different levels will apply dependant on the use of premises”

On the basis of the above and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive window.

Plant Noise Rating Emission Criteria (dB re 2x10 ⁻⁵ Pa)			
Position	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	47 dBA	41 dBA	41 dBA

The above criteria are to be achieved with all of the proposed plant operating simultaneously.



If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

It should be noted that the above are subject to the final approval of the London Borough of Camden Borough Council.

10.0 Plant Noise Impact Assessment

It is proposed to install the following items of building services plant.

Plant Description	Location	Qty	Plant Make	Model Number
Air-Cooled Heat Pump	Roof	2	RHOSS THAETY	2220 ASDP1

10.1 Plant Noise Data

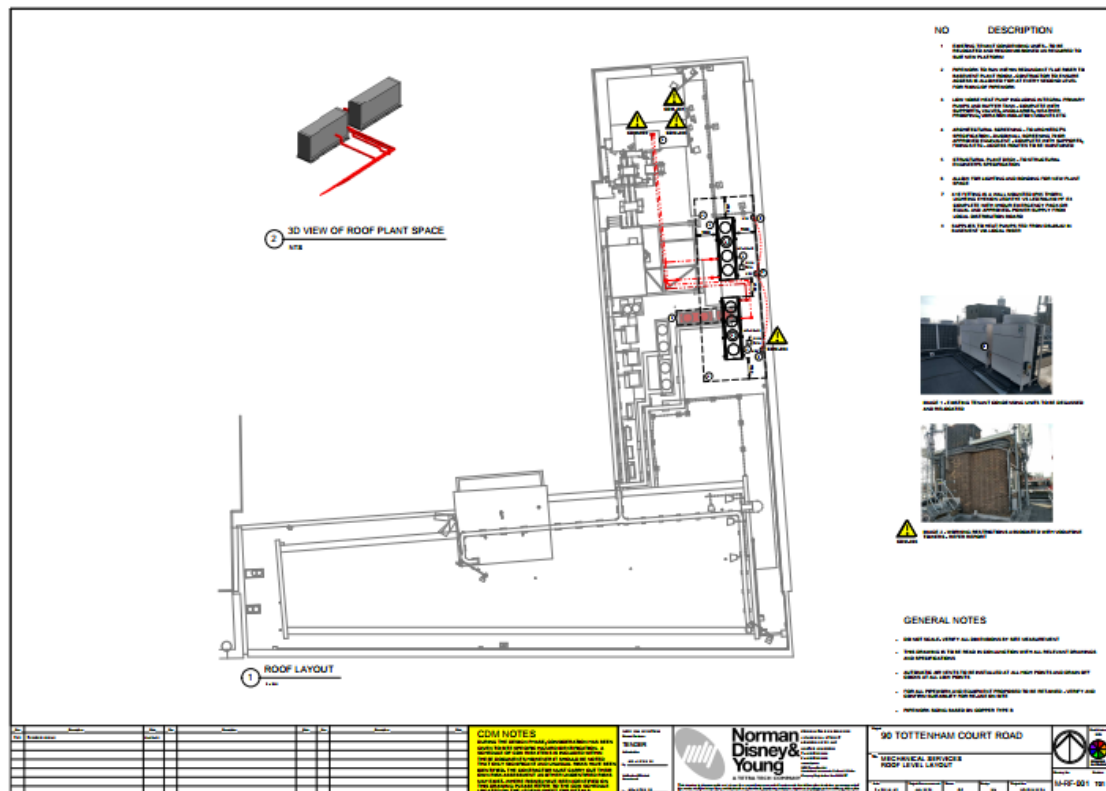
We understand the manufacturer's noise data for the equipment is as follows:

Plant Description	Sound Level at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
2220 ASDP1 (L _w)	-	87	84	81	77	70	65	59	82



10.2 Location of Plant

We understand the new plant is to be installed on the roof of 90 Tottenham Court Road. The nearest noise sensitive receptor is to the southeast of the plant location approximately 16m away and one storey lower and thus is screened by the building envelop. The following plan show the proposed plant layout.



10.3 Plant Noise Impact Assessment

We understand that the proposed unit will be operational during daytime period only. Due to the intermittent nature of the proposed plant, 3dBA acoustic feature correction has been applied in accordance with BS4142:2014. The following tables present our calculations relating to the proposed plant installation for each of the outlined option.



	Sound Level at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
2220 ASDP1 (L _w)	-	87	84	81	77	70	65	59
2 No.	+3	+3	+3	+3	+3	+3	+3	+3
16m Distance Loss	-32	-32	-32	-32	-32	-32	-32	-32
Barrier Loss	-7	-9	-10	-13	-15	-18	-20	-20
Acoustic feature correction	+3	3	+3	+3	+3	+3	+3	+3
Calculated Noise Level at Window	44 dBA							
Façade Reflection	+3 dBA							
Resultant Rated Sound Pressure Level at Nearest Window	47 dBA							

Our calculations indicate that the proposed plant unit should meet the requirements of the Local Authority outlined in Section 9.0.

11.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's planning condition.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window.

The assessment indicates that the proposed plant should be capable of achieving the requirements of the local authority at the nearest noise sensitive window.

Appendix A

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

90 Tottenham Court Road

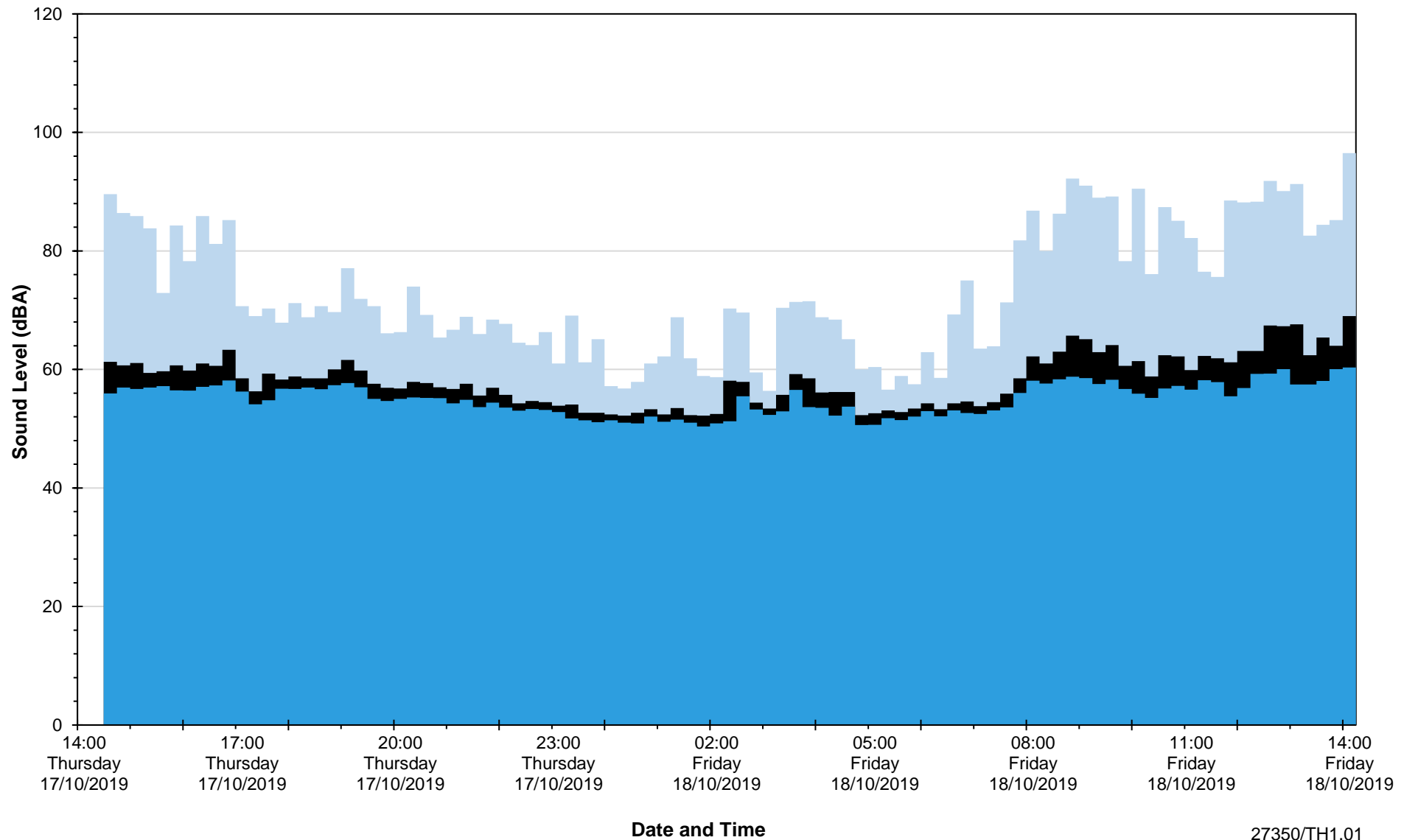
Position 1 - Rear

L_{eq} , L_{max} and L_{90} Noise Levels

Thursday 17 October 2019 to Friday 18 October 2019

L_{max} L_{eq}

L_{90}



27350/TH1.01