184-186 Tottenham Court Road
Fitzrovia
London

Environmental Noise Survey
and Plant Noise Assessment Report

27707/PNA1-Rev1

29 April 2020

For:
Pontsarn Investments Ltd
33 Cavendish Square
London
W1G 0PW

Hann Tucker Associates
Consultants in Acoustics Noise & Vibration

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Hann Tucker Associates

Environmental Noise Survey and Plant Noise Assessment Report Report 27707/PNA1-Rev1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
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Hann Tucker Associates

Environmental Noise Survey and Plant Noise Assessment Report Report 27707/PNA1-Rev1

Contents

Attachments

1.0 Introduction

The commercial units at 184-186 Tottenham Court Road are to be refurbished and the existing condenser removed and replaced with 3No. external condensers and 2No. extract fans.

Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey and plant noise impact assessment and set noise emission limits with reference to the requirements of the Local Authority.

This report presents the methodology and findings of our noise survey and proposed plant noise emission limits.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of an unmanned 24 hour survey the existing $L_{Amax,}$ L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at a secure and accessible on-site position, using fully computerised noise monitoring equipment.

Measurement procedures shall be in general accordance with British Standard BS 7445 “Description and measurement of environmental noise”.

Measurement procedures shall be in general accordance with those described in BS 4142: 2014, Method for rating industrial noise affecting mixed residential areas, published by the British Standards Institution.

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise the possibility of noise nuisance to neighbours.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability.

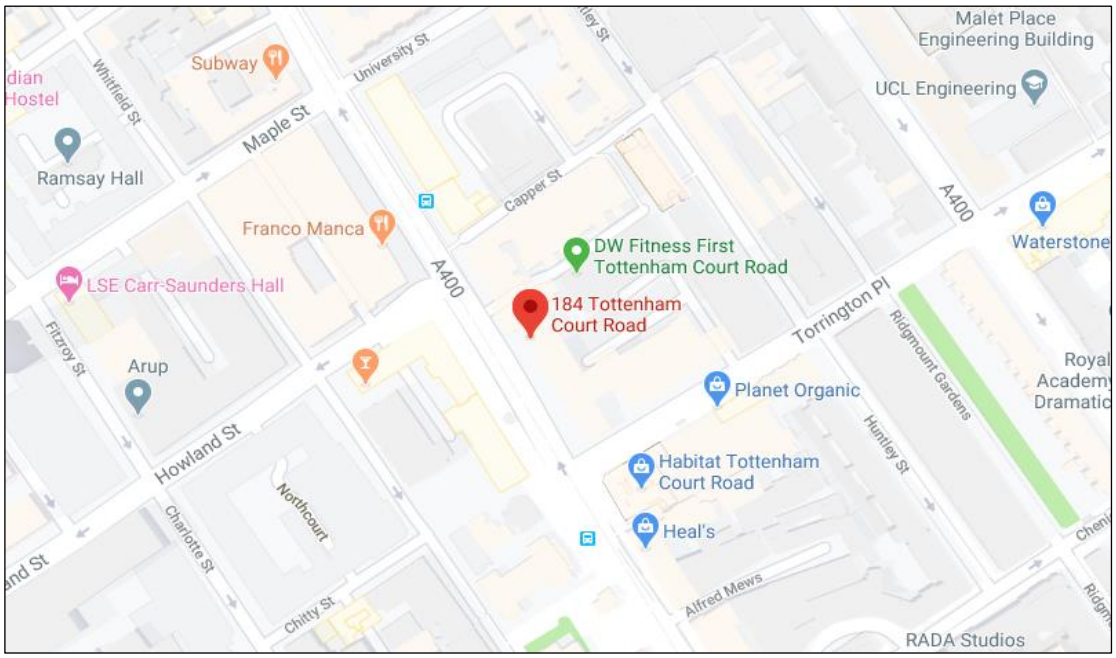
To outline noise control measures if required with reference to the requirements of the Local Authority.

To present our methodology and findings in a detailed Environmental Noise Survey and Plant Noise Impact Assessment Report to accompany the planning application.

3.0 Site Description

3.1 Location

The site is located in Fitzrovia, London at 184-186 Tottenham Court Road. The location is shown in the Location Map below.



Location Map (Map data ©2020 Google.)

The site falls within the jurisdiction of the London Borough of Camden.

3.2 Description

The site are the commercial units at 184 to 186 Tottenham Court Road in Fitzrovia, London. The site is bound by Tottenham Court Road to the west, Queen's yard to the north, Huntly Street to the east and Torrington Place to the south. The site is surrounded by commercial buildings.

The site is shown in the Site Plan below.

Site Plan (Imagery 2020 © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation, Map Data © 2020 Google)

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 (i.e. before the NPPF). 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."

"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 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."

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 Local Authority Requirements

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"*

5.5 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".

5.6 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.

5.7 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 $L_{Aeq,8hour}$*

5.8 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 $L_{90(15minutes)}$ at 1m from the nearest noise sensitive residential 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

The survey was undertaken by Sandy Wilson BSc(Hons), AMIOA.

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 15:00 hours on Tuesday 18th February to 12:00 hours on Thursday 20th February.

During the periods we were on site the wind conditions were strong and the sky was generally overcast. We understand that generally throughout the survey period the weather conditions were clear. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

6.2 Measurement Position

The sound level meter was positioned with a microphone attached to a pole approximately 4 metres above ground level. The microphone was attached to a railing and positioned approximately 1 metre from the façade.

The measurement positon is shown on the plan below:

Plan Showing Measurement Position (Imagery 2020 © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation, Map Data © 2020 Google)

6.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	PCB	377B02	107417	Calibration on 12/07/2019
Preamp	Larson Davis	PRM902	4158	Calibration on 12/07/2019
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3804	Calibration on 12/07/2019

The sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were 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 27707/TH1 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} and L_{eq} noise levels at each measurement position throughout the duration of the survey.

The lowest $L_{A90\ (15\ min)}$ measurements recorded during the survey are presented in the table below:

Lowest Measured $L_{A90(15min)}$ Background Noise Level (dB re 2 x 10^{-5} Pa)	
Daytime (07:00 – 23:00) Hours	**Night-Time (23:00 – 07:00) Hours**
54 dBA	54 dBA

8.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise sources were noted to be the existing plant and the road traffic from Tottenham Court Road.

9.0 Plant Noise Emission Criteria

9.1 Residential 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"*

9.2 Commercial Windows

London Borough of Camden do not have a specific criteria for noise impact to commercial properties. We therefore propose that at the nearest commercial properties, the guidelines of BS 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” should be followed.

In relation to the commercial properties within the vicinity of the proposed location of the new plant, Table 6 of this standard states that for “reasonable conditions for study and work requiring concentration”, an appropriate internal ambient noise level design range is 35-45dB $L_{Aeq,T}$.

In addition, BS 8233:2014 states that attenuation of approximately 15dB can be provided by a partially open window. Hence the following external noise level criteria must be satisfied outside the nearest office façade (based on achieving the above design range):

External Ambient Noise Level Limit, dB $L_{Aeq,T}$
50-60

9.3 Plant Noise Emission Limits

Based on above requirements and the results of the environmental noise survey, the proposed L_{Aeq} dBA criteria are shown in the table below:

	Proposed Plant Noise Limit L_{Aeq} dBA at Nearest Noise Sensitive Façade		
Type	**Daytime (07:00-23:00 hours)**	**Night-time (23:00-07:00 hours)**	**24 Hours**
Residential Window	44 dBA	44 dBA	44 dBA
Any Commercial Window	55 dBA		

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

10.0 Plant Noise Assessment

10.1 Proposed Plant

We understand the new items of plant that are being proposed are as followed:

Plant Unit	Description
3No. Condensers	PUZ-ZM140YKA
2No. Extract Fans	-
Fresh Air Unit	-

At the time of writing we have not received the models of the 2No. Extract Fans and Fresh Air Unit.

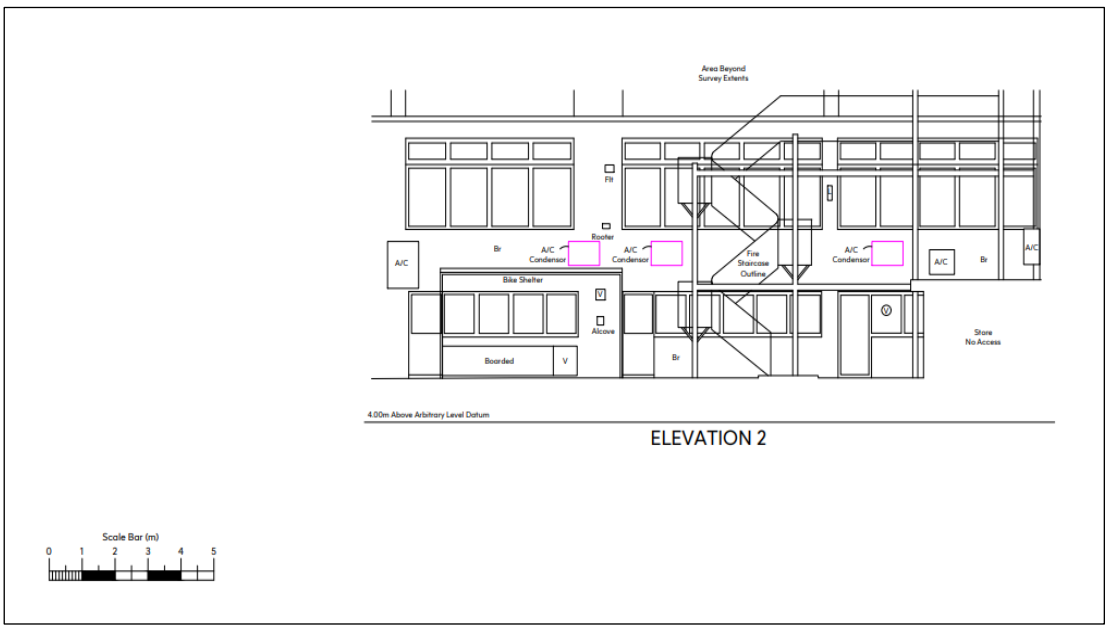
10.2 Drawings

Our acoustic analyses is based on the following drawings provided by Hollis.

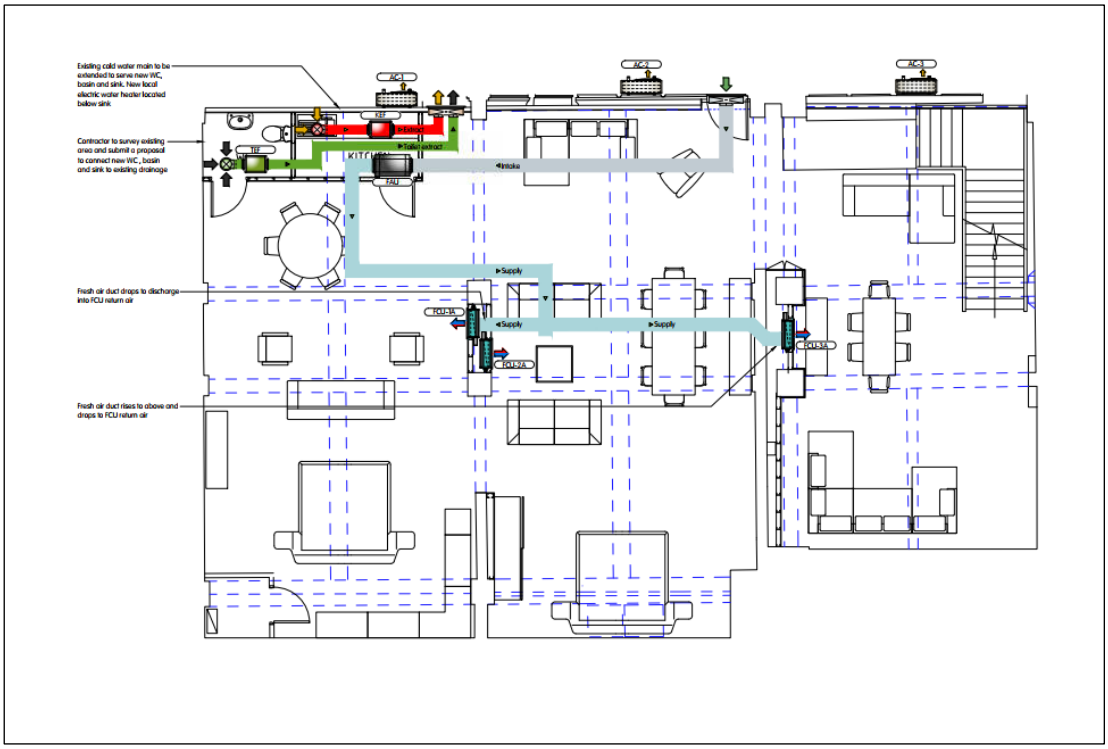
Reference	Title	Date
81732-HLS-02-ZZ-M2-G-10450-A7	Proposed Rear Elevation	November 2019
1261-MSK200-T2	Mechanical Services Basement Layout	January 2020

The proposed site plans are shown below.

Proposed Rear Elevation



Mechanical Services Basement Layout



10.3 Mitigation Measures

In order to control plant noise emissions in line with the proposed criterion, we recommend an acoustic enclosure for all 3No. Condensers. The enclosures for the 3No. PUZ-ZM140YKA will need to be capable of a 14dB reduction.

Please see Appendix for list of suitable suppliers for acoustic enclosures.

Please see Appendix for list of suitable suppliers for Attenuators.

10.4 Plant Noise Limiting Level Assessment

In the absence of the noise data for the 2No. extract fans and the fresh air unit we are unable to give a detailed assessment of these units but they can be attenuated as required. We would therefore recommend the following cumulative limit for these units when measured at 1 metre from the nearest noise sensitive receptor.

Approximate Cumulative Atmospheric Plant Noise Emission Limits Sound Pressure Level (SPL dB re $2x10^{-5}$ Pa)
Daytime (07:00 – 23:00 hours)
40 dBA @ 1m

This limit is set so that all the plant units, including the 3No. condensers, achieve the criteria simultaneously.

10.5 Plant Noise Impact Assessment

The nearest noise sensitive window is a commercial window approximately 1m away. The following tables summarise our predictions of plant noise emissions to the nearest noise sensitive window.

Condensers		
Description		**dBA**
PUZ-ZM140YKA	SWL	70
Correction for No. 3		+5
Enclosure		-12
Lw to Lp @ 1 metre		-8
Sound Pressure Level at 1m from Nearest Window		55

Fans	
Description	**Plant Noise Limiting Level (dBA)**
Extract Fan	40
Extract Fan	40
Fresh Air Unit	40
Resultant Sound Pressure Level at 1m from Nearest Window	45

Cumulative	
Description	**dBA**
2No. Extract Fans and Fresh Air Unit	55
3No. PUZ-ZM140YKA (Condenser)	45
Combined Sound Pressure Level at 1m from Nearest Window	55

Our calculations indicate that with the proposed attenuation measures the plant noise emissions of the 3No. Condensers, 2No. Extract Fans and Fresh Air Unit should achieve the proposed commercial criteria of 55dBA outlined in Section 9.

11.0 Conclusions

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

Noise emission limits from the development have been identified with reference to the requirements of the Local Authority and to minimise the possibility of noise nuisance to neighbours.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's requirements, together with the limiting levels for the proposed plant and required attenuation to meet the requirements.

The environmental noise impact upon the surrounding buildings has been assessed in the context of the national and local planning policies.

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.

$L_{90,T}$ — L_{90} 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).

Specification for

Small Acoustic Enclosures

The condenser units shall be supplied complete with acoustic treatment which shall achieve adequate levels of attenuation to ensure that the following limiting sound pressure levels are not exceeded when measured at a distance of 1m free field over a reflecting plane are in any horizontal direction or in any horizontal or vertical direction under any load conditions.

Condenser units: PUZ-ZM140YKA

Each condenser unit will require its own enclosure.

Duty/Time	**A-weighted Limiting Sound Pressure Level @ 1m (dB re 2 x 10^{-5} Pa)**
24 hours	58

Furthermore they shall not exhibit any significant tonal content.

Exceedances in excess of the measurement tolerance for a Type 1 sound level meter shall constitute a failure.

The enclosed outer panels shall be constructed from galvanized sheet steel having a minimum thickness of 1.6mm and fixed at 300mm (max) centres. The enclosure inner panels shall be constructed from punch-perforated (round-hole) galvanised sheet steel facing, having a minimum thickness of 0.7mm fixed at 300mm (max) centres. Flattened-expanded ("Expamet") sheet shall not be used, unless all edges of the sheet are mechanically fixed to the panel casing and galvanised steel cover strips are used to prevent rivet heads pulling through the perforated sheet (trapping the Expamet between two solid steel layers).

The inert, rot and vermin proof, non-hygroscopic and non-combustible mineral wool or glass fibre acoustic medium shall be packed to a density of not less than 48kg/$m^{3.}$ This shall be faced with a glass fibre cloth, or other approved infill protection membrane. Panels shall be constructed and assembled so that no egress of the acoustic medium will occur under the operating conditions.

Doors, access panels, windows and ventilation ducts or electrical cable penetrations hall be treated so as to maintain the specified acoustic insulation of the assembled enclosure.

Demountable sections shall be designed to allow easy disassembly and reassembly by unskilled personnel without affecting the acoustic performance.

The supplier shall ensure that the assembled enclosure is designed and constructed to withstand site operating conditions such as wind and snow loads, roof mounted plant, etc., as appropriate, and if outside, to be suitably weatherproofed.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.

Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

Suitable Suppliers

of

Acoustic Enclosures

Name & Address	Telephone Number	Contact
IAC Acoustics IAC House Moorside Road Winchester SO23 7US	01962 873000	Paul Gilbert
Allaway Acoustics Ltd 1 Queens Road Hertford SG14 1EN	01992 550825	Jim Grieves Roger Wade
Acoustic Engineering Services (UK) Ltd The Redwood Suite Guardian House Borough Road Godalming Surrey GU7 2AE	01483 495963	Barry Austin Mark Stagg
QuietStar Limited 1 Glen Road Fleet Hampshire GU51 3QS	01252 674327	Luke Willis

Suitable Suppliers

Of

Attenuators (H & V)

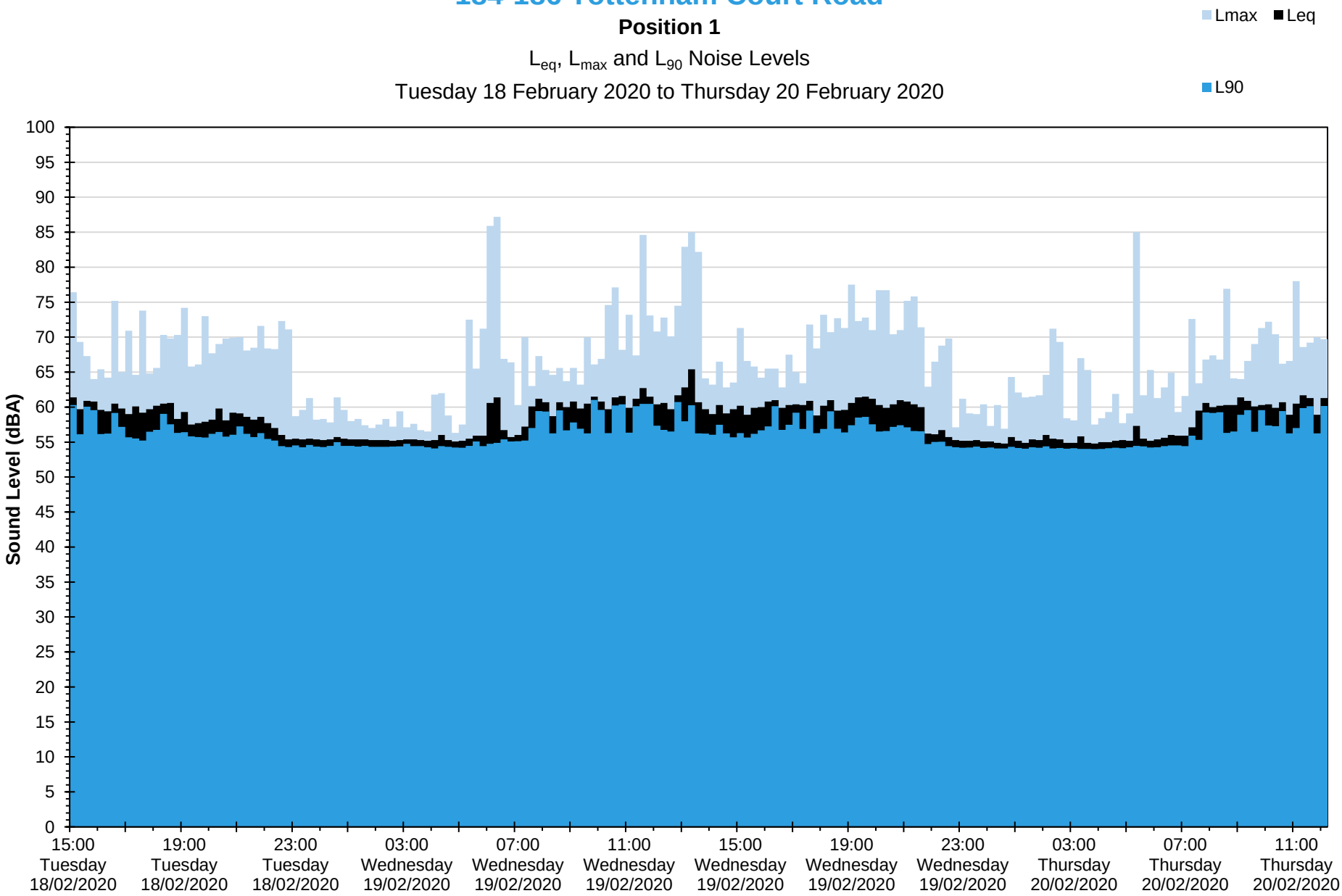
Name & Address	Telephone Number	Contact
IAC Acoustics IAC House Moorside Road Winchester SO23 7US	01962 87300	Kevin Shipway Gill Budd
Allaway Acoustics Ltd 1 Queens Road Hertford SG14 1EN	01992 550825	Jim Grieves Andy Smith
Caice Riverside House 3 Winnersh Fields Gazelle Close Winnersh Wokingham RG41 5QS	0118 918 6470	Mike Jackson

184-186 Tottenham Court Road

Position 1

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

Tuesday 18 February 2020 to Thursday 20 February 2020



27707/TH1