St Pancras Commercial Centre
63 Pratt Street
London

Noise Impact Assessment Report

25789/NIA3- Rev2

10 September 2021

For:

Camden Property Holdings Ltd
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Hann Tucker Associates

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Document Control

Rev	Date	Comment	Prepared by	Authorised by
2	10/09/2021	Updates to advice following latest proposals		
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1	22/01/2020	Updates to Sections 8.0 and 10.0	Piret Libene Consultant MSc, BSc (Hons), AMIOA	Andrew Fermer Director BSc(Hons), MIOA
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1.0 Introduction

This report has been commissioned in support of the full planning application made on behalf of Camden Property Holdings Limited (the Applicant) to demolish the existing buildings at the site and provide a new mixed use scheme comprising industrial, office, residential and commercial accommodation at 63 Pratt Street.

A Plant Noise Impact Assessment has therefore been undertaken by Hann Tucker Associates in order to assess the potential noise impact on the nearest potentially affected noise sensitive premises.

2.0 Objectives

To establish the existing noise levels by means of fully automated noise monitoring over a period of approximately 1No week, at up to 4No. secure and accessible positions.

To present our results in a full technical report, including proposed plant noise emission criteria based on Local Authority requirements and the results of the noise survey.

To assess proposed plant to the requirements of the Local Authority.

To assess the potential for noise break out from proposed industrial uses to noise sensitive locations.

3.0 Site Description

3.1 Location

The Site is located at 63 Pratt Street, London, and falls within the London Borough of Camden's jurisdiction.

See Location Map overleaf.

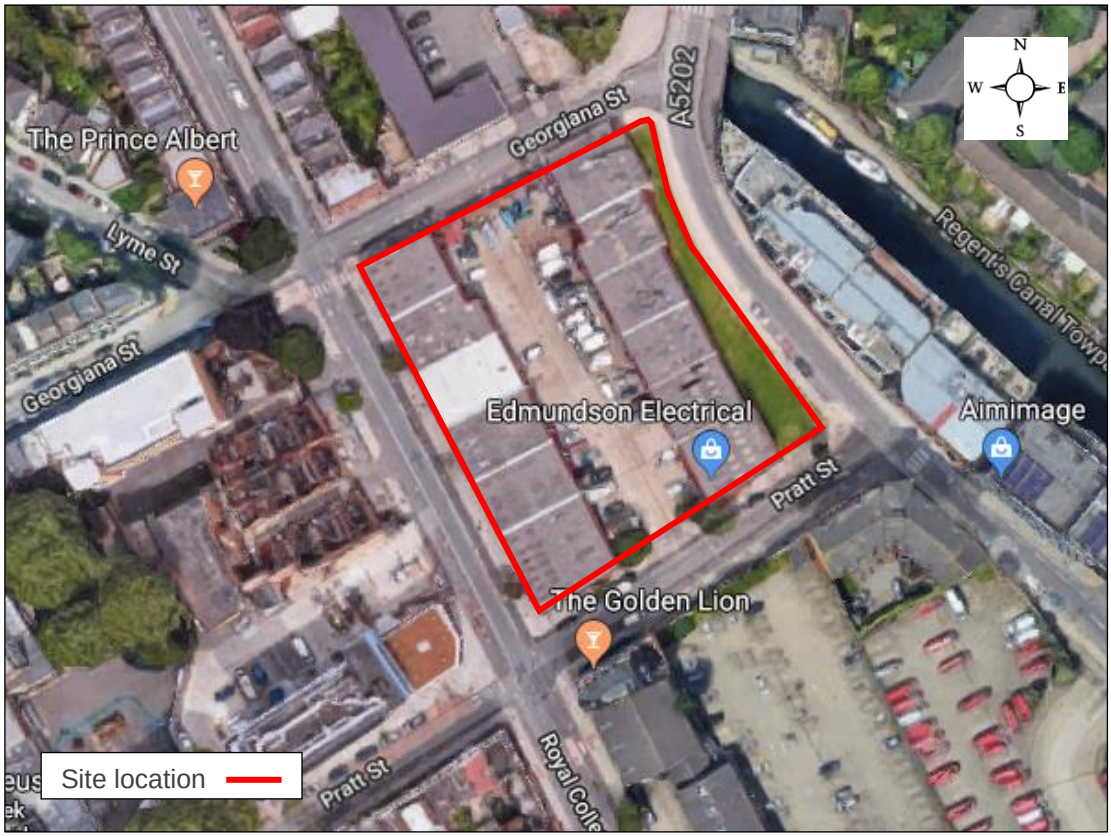
Location Map (Map Data ©2019 Google)

3.2 Description

The site currently comprises 12No. industrial units. The future development will comprise industrial, commercial, office and residential space.

The site is bound by Georgiana Street to the north, St Pancras Way to the east, Pratt Street to the south and Royal College Street to the west. The surrounding area is characterised by a mix of residential and commercial uses.

See Site Plan overleaf.



Site Plan (Photos ©2019 Google, Map Data ©2019 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. The NPSE is the overarching statement of noise policy for England that applies to all forms of noise other than occupational noise, and states:

"1.6 This Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy:

Noise Policy Vision

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 aims of the revised NPPF (February 2019) (see section 8.2 below).

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

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 acknowledge 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 aims listed in paragraph (b) 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 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 The London Plan (2016)

The London Plan, published in 2011 with minor revisions in 2013, 2015 and 2016, provides an overall strategic plan for London, and it sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031. The Plan brings together the Mayor's strategies, including policy on a range of environmental issues, such as climate change, air quality, noise and waste. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

Policy 7.15 specifically relates to noise and states:

"Development proposals should seek to reduce noise by:

a) *Minimising the existing and potential; adverse impacts of noise on, from, within, or in the vicinity of, development proposals;*
b) *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;*
c) *Promoting new technologies and improving practices to reduce noise at source."*

London Plan – Housing Supplementary Planning Guidance

The Housing SPG 2016 highlights the elements of the London Plan that are relevant to housing development, and where applicable, provides more detail. The SPG states:

"Noise – Baseline

Standard 5.3.1 (and Policy 7.15) – The layout of adjacent dwellings and the location of lifts and circulation spaces should seek to limit the transmission of noise to sound sensitive rooms within dwellings.

Policy 7.15 Reducing Noise and Enhancing Soundscapes requires development proposal to seek to reduce noise and manage the effects of noise. It is another important aspect of retreat and privacy in a dwelling. Noise from the street and adjoining properties can cause stress, sleep disturbance and friction between neighbours as recognised in the NPPF154.[1]

2.3.43 All dwellings should be built with acoustic insulation and tested to current Building Regulations standards 155. However, acoustic insulation should not be relied upon as the only means of limiting noise and the layout and placement of rooms within the building should be

considered at an early stage in the design process to limit the impact of external noise on bedrooms and living rooms. The impact of noise should also be considered in the placement of private external spaces."

[1] CLG NPPF 2012. Updated on 19 February 2019.

5.5 The Draft New London Plan (2019 Draft)

This is a new London Plan (also known as a Replacement Plan). This means it is not an alteration or update to previous London Plans. This new London Plan, once published will be the third London Plan, the previous ones being the 2004 London Plan produced by former Mayor of London Ken Livingstone and the 2011 London Plan produced by former Mayor of London Boris Johnson. All of the other iterations of the London Plan from 2004-2016 have been alterations. Once published adopted this London Plan will replace all previous versions.

Policy D13 Noise states:

A. *"In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*

1) *avoiding significant adverse noise impacts on health and quality of life*
2) *reflecting the Agent of Change principle as set out in Policy D12.*
3) *mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses.*
4) *improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity).*
5) *separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation.*
6) *where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles.*
7) *promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*

B. *Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations.*

3.13.1. *The management of noise is about encouraging the right acoustic environment in the right place at the right time. This is important to promote good health and a good quality of life within the wider context of achieving sustainable development. The management of noise should be an integral part of development proposals and considered as early as possible. Managing noise includes improving and enhancing the acoustic environment and promoting appropriate soundscapes. This can mean allowing some places or certain periods to become noisier (within reason), whilst others become quieter. Consideration of existing noise sensitivity within an area is important to minimise potential conflicts of uses or activities, for example in relation to internationally important nature conservation sites which contain noise-sensitive species. Local Authorities, developers, businesses and other stakeholders should work collaboratively to identify the existing noise climate and other noise issues to ensure effective management and mitigation measures are achieved in new development proposals.*

3.13.2. *The 'Agent of Change Principle' places the responsibility for mitigating impacts from existing noise-generating activities or uses on the new development. Through the application of this principle existing land uses should not be unduly impacted or affected by the introduction of new noise-sensitive uses. For noise-generating uses regard should be had to not prejudicing their potential for intensification or expansion.*

3.13.3. *The management of noise also includes promoting good acoustic design of the inside of buildings. Section 5 of BS 8223:2014 provides guidance on how best to achieve this. The Institute of Acoustics has produced advice Pro:PG Planning and Noise (May 2017) that may assist with the implementation of residential developments. BS4214 provides guidance on monitoring noise issues in mixed residential/industrial areas.*

3.13.4. *Deliberately introducing sounds can help mitigate the adverse impact of existing sources of noise, enhance the enjoyment of the public realm, and help protect the relative tranquillity and quietness of places where such features are valued. For example, playing low-level music outside the entrance to nightclubs has been found to reduce noise from queueing patrons, leading to an overall reduction in noise levels. Water features can be used to reduce the traffic noise, replacing it with the sound of falling water, generally found to be more pleasant by most people[33].*

3.13.6. The definition of Tranquil Areas, Quiet Areas and spaces of relative tranquillity are matters for London Boroughs. These are likely to reflect the specific context of individual boroughs, such that Quiet Areas in Central London Boroughs may reasonably be expected not to be as quiet as Quiet Areas in more residential Boroughs. Defra has identified parts of Metropolitan Open Land and local green spaces as potential Quiet Areas that Boroughs may wish to designate[34]."

33 For more information on approaches to minimise noise related to road and rail traffic, aircraft, water transport and industry see the Mayor's Environment Strategy.

34 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/276228/noise - actionplan-agglomerations-201401.pdf

5.6 Local Planning Policy

The Site lies within London Borough of Camden's (LBC) jurisdiction. LBC's advice regarding criteria for atmospheric noise emissions from building service plant is contained within their Local Plan, version June 2017 as follows:

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

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 or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{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 given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

Paragraph 28.2 of Policy DP28 in the Local Development Framework for Camden states:

"Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces, while noise is generated by rail, road and air traffic, industry, entertainment (e.g. nightclubs, restaurants and bars) and other uses."

5.7 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".

Section 9.2 of BS 4142:2014 states the following:

"***Tonality***

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

Impulsivity

A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible and 9dB where it is highly perceptible."

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”.

5.8 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.

5.9 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 $L_{Aeq,8hour}$*

5.10 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 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 Environmental Noise Survey Results

An Environmental Noise Survey has previously been undertaken by Hann Tucker Associates. The results of the survey are presented in our Environmental Noise Survey Report 25789/NIA2. and have also been plotted on Time History Graphs 25789/TH1 to 25789/TH4 enclosed presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

7.0 Plant Noise Emission Criteria

On the basis of the aforementioned acoustic standards and guidance, together with the results of the Environmental Noise Survey, we propose that the following plant noise emission criteria be achieved at in the nearest garden ‘used for main amenity’ or at 1 metre from the nearest living room, dining room, or bedroom in the daytime, and at 1 metre from the nearest bedroom window at night-time with all plant operating simultaneously.

Position	**Plant Noise Emission Criteria (dB re $2x10^{-5}$ Pa)**	
	Daytime (07:00 – 23:00 hours)	**Night-time (23:00 – 07:00 hours)**
1	40dBA / NR35*	39dBA / NR35*
2	35dBA / NR35*	30dBA / NR35*
3	38dBA / NR35*	37dBA / NR35*
4	46dBA / NR35*	40dBA / NR35*

*NR35 criterion applies to 'smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units, and condensers. where noise sensitive premises are located in a quiet background area' as per Camden's Local Plan.

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

The above criteria are based on a level of 10dB below background noise in order to fall into Camden's 'Green' criteria for **dwellings**. Whilst we understand that Camden considers other uses noise sensitive, the Local Plan states that the criteria is use dependent but does not define criteria that correspond to 'Green', 'Amber', or 'Red' for these other uses. We request that Camden clarify their policy in this respect. The criteria could be relaxed by 5dB in line with the 'Amber' criteria in Camden's Local Plan, which may be acceptable to Camden depending on 'the context of other merits of the development'.

It should be noted that the above are subject to the final approval of the Local Authority (Camden Council).

8.0 Project Proposals

8.1 Drawings

Our acoustic analysis is based on the following drawings provided by Norman Disney & Young.

Drawing Title	Drawing Number	Drawn by	Rev Ref	Date
External Noise-Level 6 Floor Plan	NDY-SK-007	JMO	2.0	20/11/2019
External Noise- Level 7 Floor Plan	NDY-SK-008	JMO	2.0	20/11/2019
Extended Event Space Rooftop Plant Changes	NDY-SK-058	JMO	2.0	26/07/2021
Views – Option A	SK01	GP	A	01/09/2021

8.2 Proposed Uses

The redevelopment of the site is proposed to provide three buildings ranging in height up to seven storeys and a single basement level comprising a mixed use development of light industrial space (Class B1c/ B8), office spaces (Class B1), residential units and retail space (Class A1/ A3).

8.3 Proposed Plant

We understand the proposed plant comprises the following items of plant:

Plant Ref	Plant Description	Qty	Plant Make	Model Number
ASHP-M-RF.01-ASHP-M-RF.03	Hot Water Heat Pump	3	Mitsubishi Electric	CAHV-P500YA-HPB(-BS)
ASHP-A-RF.01-ASHP-A-RF.03	Hot Water Heat Pump	3	Mitsubishi Electric	CAHV-P500YA-HPB(-BS)
ASHP-C-RF.01-ASHP-C-RF.03	Air Source Heat Pump	3	Trane	CMAF 190 HE XLN EC
AHU-RF.01	Air Handling Unit	1	FläktGroup	-

We also understand the following units shall be installed in the future:

M- Block

- Exhaust fan operating only during smoke exhaust mode
- 4No. 10kW tenant DX outdoor units operating 24/7

A- Block

- Exhaust fan operating only during smoke exhaust mode
- 4No. 10kW tenant DX outdoor units operating 24/7

Office Building

- Exhaust system
- 40No. 10kW tenant DX outdoor units operating 24/7
- 10No. 10kW tenant DX outdoor units operating 24/7
- Life safety generator

8.4 Plant Noise Data

We understand the manufacturer's single figure sound power level noise data for the pumps serving the residential buildings to be as follows:

Plant Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
ASHP-A-RF.01-ASHP-A-RF.03; ASHP-M-RF.01-ASHP-M-RF.03;	66	60	66	60	52	51	56	48	63

We understand the manufacturer's octave band sound power level noise data for the pumps serving the office building to be as follows:

Plant Description	Sound Power Level (dB re 10^{-12} W) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
ASHP-C-RF.01-ASHP-C-RF.03	-	96	90	91	87	80	79	72	92

We understand the manufacturer's sound power level noise data for the air handling unit serving the office building to be as follows:

Plant Description	Sound Power Level (dB re 10^{-12} W) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
AHU-RF.01 Fresh Air	77	86	76	72	68	64	57	53
AHU-RF.01 Exhaust	76	88	93	93	87	81	76	71
AHU-RF.01 Breakout	73	87	68	58	57	54	47	42

We understand the indicative sound power level of each of the future tenant DX outdoor units is as follows:

Plant Description	Single Figure Sound Power Level (dB re 10^{-12} W)
Future Tenant DX Outdoor Units	65dBA

Please note we understand the air source heat pumps serving the residential block, as well as the Air Handling Unit appear to have tonal characteristics. With reference to Section 5.7, a +4dB correction therefore applies to noise levels from these units.

8.5 Location of Plant

The proposed location of all plant items is as shown on the latest rooftop drawings provided to us by the services consultant.

9.0 Plant Noise Mitigation Measures

In order to control plant noise emissions in line with the proposed criterion, we have specified atmospheric attenuators for the air handling unit serving the office building. The attenuator specifications are shown in the enclosed Attenuator Schedule 25789/AS1.

10.0 Plant Noise Impact Assessment

We have used the CadnaA 2021 3D modelling software to undertake an assessment of the potential atmospheric noise impact of the proposed plant.

Our assessment assumes use of the proposed attenuators to the air handling unit louvres detailed in Section 9.0.

Please note that as stated in Section 8.4, we have applied a +4dB correction for tonality to the following units:

- ASHP-A-RF.01- ASHP-A-RF.03
- ASHP-M-RF.01- ASHP-M-RF.03
- AHU-RF.01 Fresh Air, Exhaust and Breakout

Please note that a correction for tonality could also apply to other items of plant. In this instance, in the absence of octave band data for the remaining units, we have assumed this is not the case. Please note to confirm this we would need receipt of octave band noise data for each proposed item of plant.

Please also note it is our understanding that the proposed external plant will not have any impulsive characteristics. When going between daytime and night-time duty, units will ramp up and down smoothly. Intermittency will therefore not be perceptible. We have therefore not

applied any acoustic penalties for intermittency.

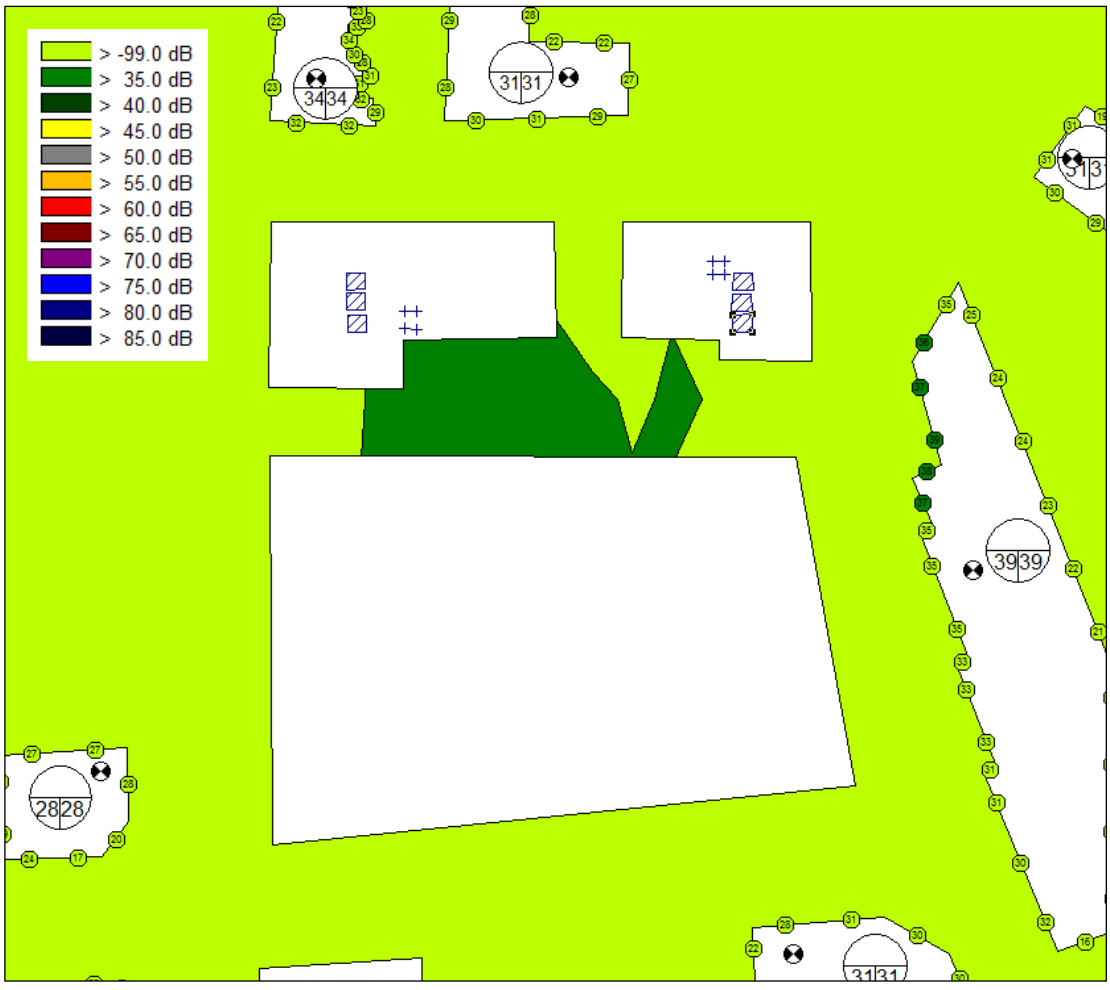
10.1 Night-Time Noise Levels

We have undertaken an assessment of the atmospheric noise impact of the proposed plant during night time with the following plant operating:

- A-Block air source heat pumps
- M-Block air source heat pumps
- Future tenants' DX units at residential building

Please note that our assessment does not include extract systems or life safety generators. We would be happy to include these in our assessment upon receipt of octave band noise data for these units.

The image below shows the predicted noise levels incident on the surrounding noise sensitive facades and displays the highest façade noise level at each building during night time.



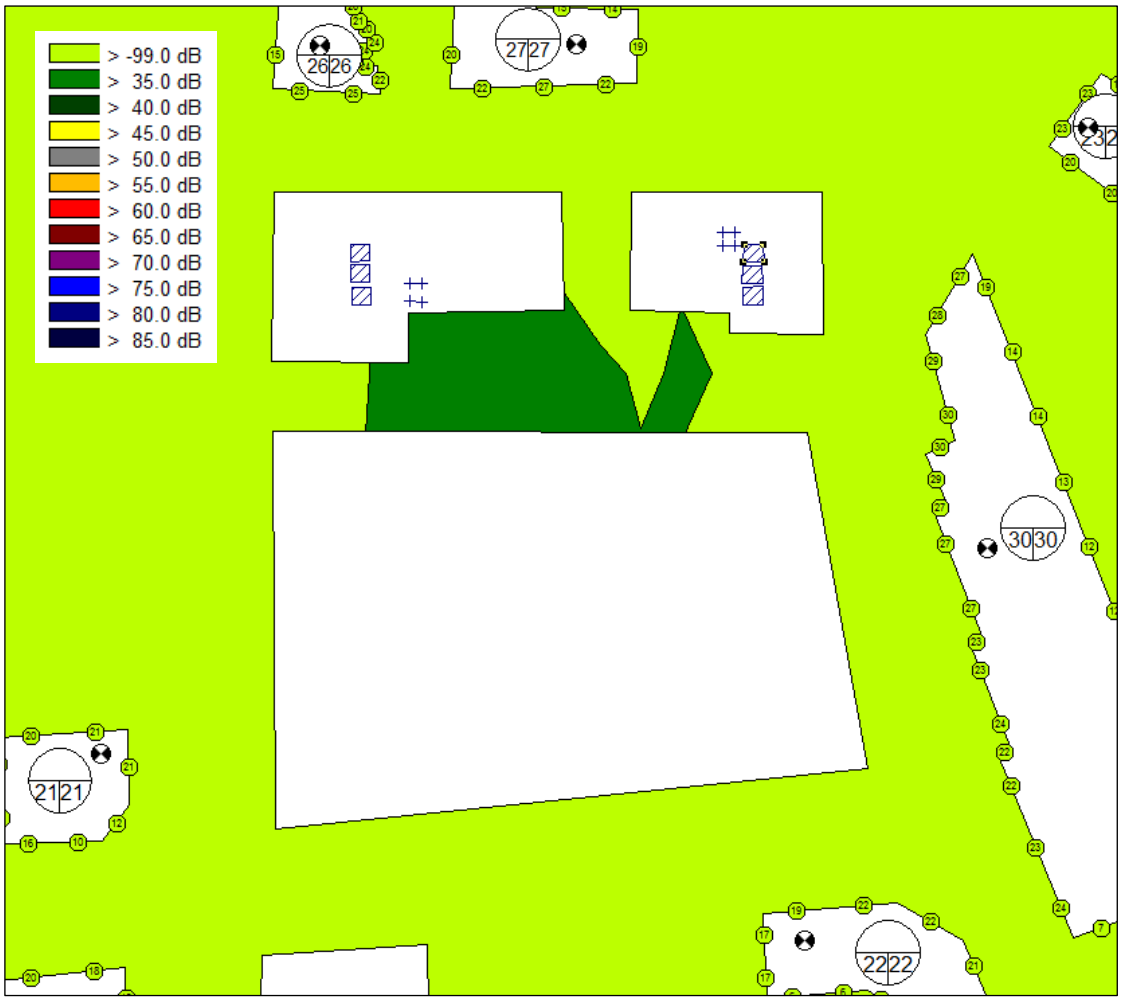
CadnaA model showing noise levels expected at nearest noise sensitive facades during night time (2D view)

It can be seen from the image above that the noise level at the worst affected façade due to the proposed plant is predicted to be approximately 39dBA during night time, exceeding the night time criterion by 9dB. According to our calculations air source heat pumps at both residential buildings contribute to this level. Based on our assessment, in order to be able to comply with the proposed night time criterion the following noise level reductions are required:

- A reduction of 12dB for the air source heat pumps serving the A-block
- A reduction of 9dB for the air source heat pumps serving the M-block

We recommend contacting the manufacturer to enquire about suitable acoustic kits to reduce noise levels. Alternatively, we would recommend plant reselection.

The image below shows the predicted noise levels incident on the surrounding noise sensitive facades when the above reductions have been applied.



CadnaA model showing noise levels expected at nearest noise sensitive facades during night time with the required reductions (2D view)

It can be seen from the image above that with the recommended reduced plant noise levels, the noise level at the worst affected façade due to the proposed plant is predicted to be approximately 30dBA which complies with the night time criterion.

10.2 Daytime Noise Levels

We have undertaken an assessment of the atmospheric noise impact of the proposed plant during daytime with the following plant operating:

- A-Block air source heat pumps
- M-Block air source heat pumps
- Future tenants' DX units at residential building
- Office building air source heat pumps
- Office building air handling unit
- Future tenant's DX units at commercial building

Please note that our assessment does not include extract systems or life safety generators. We would be happy to include these in our assessment upon receipt of octave band noise data for these units.

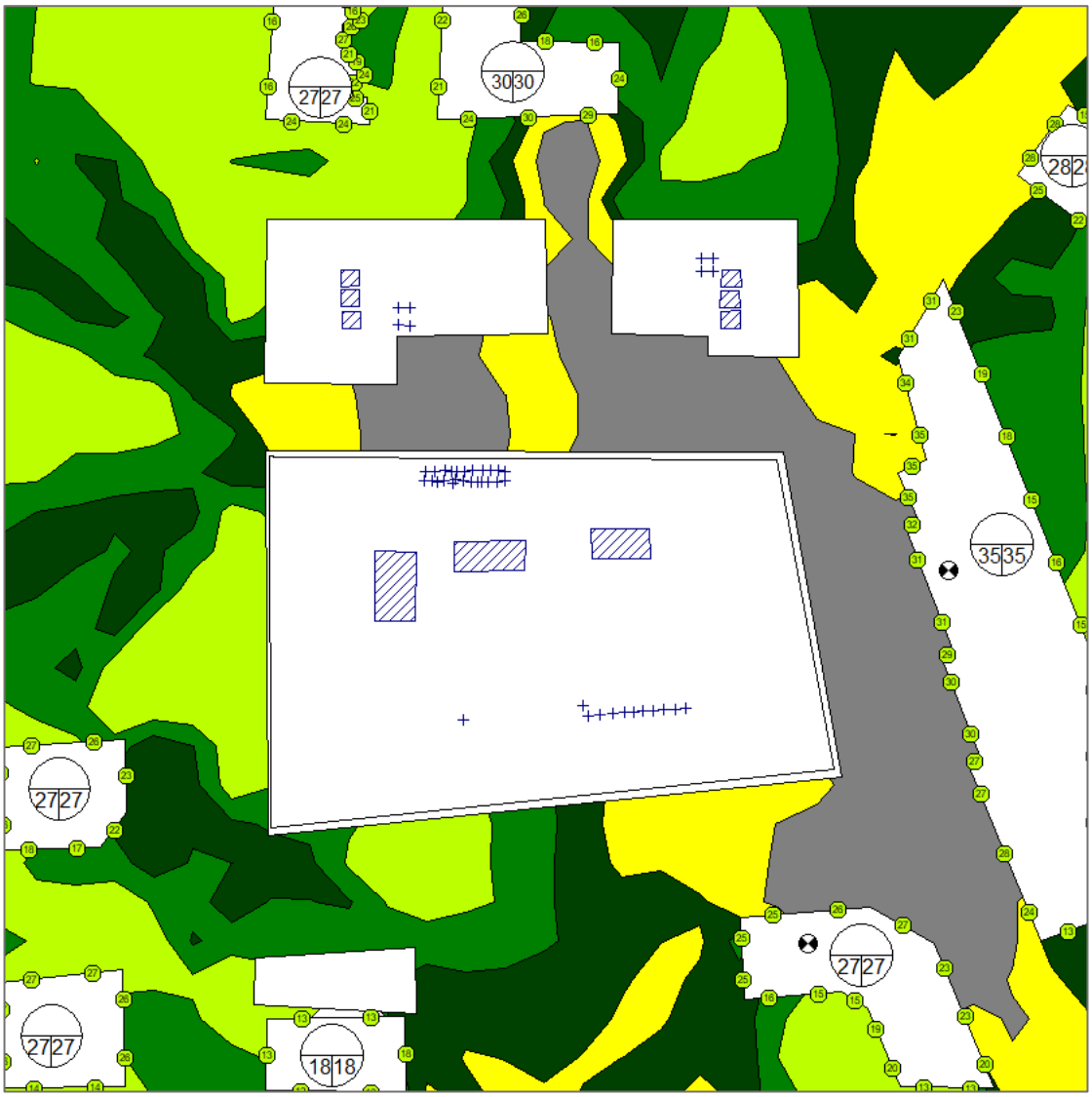
The noise level at the worst affected façade due to the proposed plant is predicted to be approximately 49dBA, exceeding the proposed daytime criterion.

CadnaA model showing noise levels expected at nearest noise sensitive facades during daytime (2D view)

According to our calculations the biggest contributors to this noise level are all proposed air source heat pumps at both residential buildings and the commercial building. Based on our assessment, in order to be able to comply with the proposed night time criterion the following noise level reductions are required:

- A reduction of 12dB for the units serving the A-block
- A reduction of 9dB for the units serving the M-block
- An acoustic package for the ASHP's achieving 78dBLw

With the recommended reduced plant noise levels, the noise level at the worst affected façade due to the proposed plant is predicted to be approximately 35dBA which complies with the daytime criterion.



CadnaA model showing noise levels expected at nearest noise sensitive facades during daytime (2D view)

10.3 Acoustic Louvre Screening

We understand it is currently proposed to install an acoustic louvre screening across the Commercial Roof with the extent of this screening currently being considered, particularly to control plant noise from tenants.

We have reviewed the latest proposals to relocate tenant DX plant space, and some fans out onto the level 06 roof, outside the current enclosure.

Our assessment indicates that without the screen cumulative tenant plant noise emissions on the level 06 roof are likely to be limited to a sound pressure level of approximately 52 dBA at 1m from the plant area, which may be difficult to for tenants achieve as we understand they are likely to be installing multiple condensing units in the small spaces. We would therefore recommend louvre screening is installed regardless of where the tenant plant is located.

We understand the final specification of the acoustic louvre is yet to be finalised. We will be happy to provide limiting noise levels for Tennent plant on receipt of this.

11.0 Limiting Noise Levels

As stated in Sections 10.1 and 10.2, our external plant noise assessment does not include noise from future exhaust systems or life safety generators.

In order to be able to comply with the requirements of the Local Authority and assuming that the reduced noise levels recommended in Section 10.0 have been applied, any exhaust systems serving the residential and office buildings shall not exceed 25dBA at the nearest noise sensitive façade.

12.0 Industrial Noise Impact Assessment

We understand that the exact expected use of the light industrial space has not yet been determined. However, in order to maximise the sound insulation performance for floors separating residential and light industrial premises and to comply with Building Regulations and Local Authority requirements (London Plan Policy 7.15 and Draft London Plan Policy E7, D12 and D13) we would recommend the following build up:

- Floor finishes
- Cradle and batten system with cement particle board
- 250mm or thicker concrete slab

- 2 x 15mm dense plasterboard on resilient hangers
- Minimum 25mm of insulation in void between resilient hangers (10-30 kg/m^3)

Additionally, please see our attached Draft Form of Words for Tenant's Handbook which must be applied to the commercial tenants to be applied during their fit-out, management of the unit and their equipment specification/ selection.

On receipt of information pertaining to proposed uses of the space above may need to be reconsidered.

13.0 Conclusions

An environmental noise survey has been previously 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 relevant guidance.

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

The assessment indicates that the proposed plant, in conjunction with the proposed attenuation, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential windows.

The assessment indicates that the proposed light industrial unit, in conjunction with the proposed mitigation, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential windows.

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).