21-31 New Oxford Street Limited

21-31 New Oxford Street

Noise assessment for planning submission

Issue | 20 September 2019

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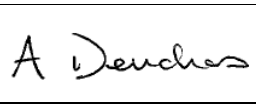
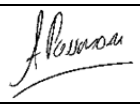
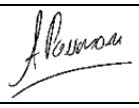
		Signature			
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Appendices

1 Introduction

21-31 New Oxford Street is a mixed-use development that includes offices and retail units. A new tenant taking office and retail space proposes to install standby electrical generators for their tenancy. This report covers the noise assessment for the proposed standby generators.

The assessment of noise from the standby generators has been undertaken by Arup and Hann Tucker Associates. The roles, responsibilities and liabilities for each consultant in preparing the assessment are:

1. Arup is advisor to the developer 21-31 New Oxford Street Limited, responsible for the site noise survey, setting noise emission limits according to London Borough of Camden's (LBC) Local Plan[1].
2. Hann Tucker Associates (HTA) is advising the tenant on noise abatement for the generators. This includes calculating the noise level at the nearest noise sensitive receptor based upon the proposed noise abatement.

The outcome from assessing the calculated noise levels at the nearest noise sensitive receptor has been summarised in this report. HTA's report that documents the noise abatement and assessment has been appended to this report.

2 Environmental noise survey

Arup undertook a noise survey to verify the prevailing noise climate along New Oxford Street close to the potentially affected noise sensitive receptors that are nearest to 21-31 New Oxford Street. The survey was initially undertaken for the redevelopment of the former Royal Mail postal sorting offices occupying this site. Long-term unattended monitoring (5-minute sampling) was undertaken in the period between 19/07/13 and 25/07/13. The survey data is considered representative of the current noise climate because the site was and remains exposed to heavy traffic volumes along New Oxford Street.

New Oxford Street is a busy one-way arterial road. The noise climate is dominated by road traffic noise.

Table 1 lists the lowest measured background noise data from the noise loggers. Figure 1 shows the approximate measurement locations. To avoid façade effects the logger microphone was located at least 1m from the façade.

During the daytime measurements, intermittent noise from the construction of 10 Bloomsbury Way interfered with some of the measurements. However, because the lowest background noise level has been reported, the effect of construction noise during the daytime period is likely to be minimal, confirmed by the day and evening levels being the same. The evening and night-time noise data was not affected by construction noise.

[1] Camden Local Plan, 2017

Logger location	Approx. height above grade	Lowest background noise level, $dBL_{A90,5min}$		
		0700-1900	1900-2300	2300-0700
Location C (New Oxford Street)	9m (first floor)	61	61	47

Table 1: Noise survey results - background noise

Figure 1: Noise survey location

Appendix A includes more detail regarding the noise survey including 24-hour time history from the logger location.

3 Planning requirements

Noise emission limits for the standby generators have been defined to satisfy "Policy A4 Noise and Vibration" in the London Borough of Camden Local Plan[2]. Pertinent paragraphs from the policy that have informed the development of noise emission limits are reproduced below:

> "6.89 - Where uses sensitive to noise and vibration are proposed close to an existing source of noise or when development is likely to generate noise is proposed, the Council will require an acoustic report to accompany the application. In assessing applications, we will have regard to noise and

[2] Camden Local Plan, 2017

> vibration thresholds, set out in Appendix 3, and other relevant national and regional policy and guidance and British Standards…
>
> 6.90 - Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces. The impacts on external amenity spaces such as gardens and balconies will also be considered…
>
> 6.100 - Emergency equipment such as generators which are only to be used for short periods of time will be required to meet the noise criteria of no more than 10dB above the background level (L90 15 minutes). During standby periods, emergency equipment will be required to meet the usual criteria for plant and machinery. Conditions to this effect may be imposed in instances where emergency equipment forms part of the application."

Building services noise from 'normal plant' will not contribute because generator noise is set 15-20dB above the limit for normal services.

Table 2 lists the noise emission limits at the nearest noise sensitive receptors the standby generators should achieve to satisfy LBC requirements. Should noise from the generators exhibit distinguishing characteristics that will attract attention the penalties defined in BS4142 shall be applied.

Sensitive location	**Building services noise emission limit at 1m external to sensitive receptor, dBL$_{Ar, Tr}$**			
	Type	**0700-1900**	**1900-2300**	**2300-0700**
Nearest commercial receptor: 10 Bloomsbury Way – at 9m above grade	Noise from generators	71	71	57
Nearest residential receptor: flats above The Old Crown Public House	Noise from generators	71	71	57

Table 2: Standby generator noise limits at the nearest noise sensitive receptor

The measured noise climate is considered representative at both sensitive receptors because they both overlook New Oxford Street. 10 Bloomsbury is directly opposite the measurement locations along New Oxford Street. The Old Crown Public House overlooks junctions between New Oxford Street and Museum Street, and Museum Street and Bloomsbury Way; it is likely the noise climate at this location is higher because it overlooks these intersections.

Because the predominant source of noise at the site is from road traffic during all time periods, any variation between 5 and 15-minute sampling would be negligible for this assessment.

4 Assessment

4.1 Commercial receptor

At 10 Bloomsbury Way, the calculations undertaken by HTA indicate LBC noise emission limits are satisfied should there be a power failure during the day (0700 – 1900) or evening (1900 – 2300) period but exceeded during the night (2300 – 0700) period. Periodic testing of the generators will occur during the day or evening periods complying with the limits and not during the night period.

Arup undertook a usage assessment of the standby generators (included in the planning pack reference: *Tenant Generator Installation – Air Quality, dated 18/11/2019*) that considered the likelihood of a power failure to the building. The projects utilities specialist, TUSC, have confirmed that UKPN have encountered only 91 minutes of power outages to the infrastructure serving the building since 2015, of which only 1 minute has been since recent infrastructure upgrades which were completed at the end of 2017. The data indicates that power failures to the building are infrequent. Power failures from the power supply within the building are also considered to be infrequent.

Considering 10 Bloomsbury Way is a commercial building, which generally would not be occupied between 2300 – 0700 and that the occurrence of a power failure is anticipated to be infrequent, it is suggested the predicted levels at night should not preclude planning permission from being granted.

4.2 Residential receptor

At the flats above The Crown Public House overlooking New Oxford Street, the calculations undertaken by HTA indicate LBC noise emission limits are satisfied for all time periods.

5 Conclusions

A new tenant at 21-31 New Oxford Street proposes to install standby electrical generators. Noise emission limits for the generators at the nearest sensitive receptors have been defined based upon London Borough of Camden's Area Plan and measurements of the prevailing noise climate close to the effected sensitive receptors.

The results from the assessment indicate at 10 Bloomsbury way (nearest sensitive receptor to 21-31 New Oxford Street) LBC noise emission limits are satisfied during the day (0700 – 1900) and evening (1900 – 2300) periods but exceed the limit during the night period (2300 – 0700) by 8-10dB. At the flats above The Crown Public House (nearest residential receptor) overlooking New Oxford Street, the calculations undertaken by HTA indicate LBC noise emission limits are satisfied for all time periods. Considering 10 Bloomsbury Way is a commercial building, which generally would not be occupied between 2300 – 0700 and that the occurrence of a power failure is anticipated to be infrequent, it is

suggested the predicted levels at night should not preclude planning permission from being granted.

Appendix A

Survey data

A1 Noise survey details

A1.1 Dates, times and personnel

Noise loggers continually monitored noise at the site between 19-25 July 2013 Location C.

During the measurements the weather was generally dry with a low wind speed.

Measurement locations are shown in Figure 1 in Section 2.

A1.2 Equipment and procedures

For all measurement locations, statistical levels were recorded, storing L_{Aeq}, L_{A10}, L_{A90} and $L_{Amax,f}$ indices. Octave band frequency spectra were also recorded.

Measurements were made over 5-minute intervals.

Sound level meters and microphones are Type 1 conforming to BS 61672-1:2003. The survey staff carried out a check of the calibration of the sound level meter and microphone before and after use, to confirm that there was no significant drift in meter response at the calibrator frequency and level. This verification indicated that there was no more than a 0.1dB variation between checks.

Each SLM kit used by Arup has a full traceable calibration carried out in a UKAS accredited laboratory on an annual basis. All measurements were made with a fast (0.125s) time constant.

A1.3 Logger time histories

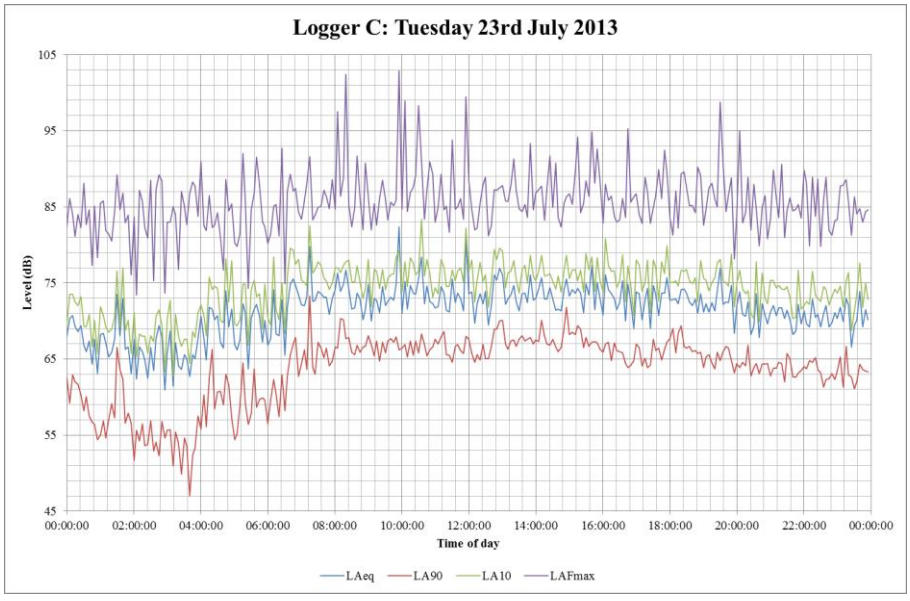

Figure 2: Typical 24-hour profile for Logger C (New Oxford Street 1F)

Appendix B

Hann Tucker Associates' report

Proposed Standby Generators
The Post Building

Plant Noise Impact Assessment Report

26946/PNA1

26 September 2019

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Plant Noise Impact Assessment
Report 26946/PNA1

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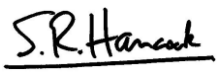
0	26/09/2019	-		
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Plant Noise Impact Assessment
Report 26946/PNA1

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Attachments

1.0 Introduction

Nationwide Building Society propose to install 3No. standby generators at The Post Building, 21-32 New Oxford Street.

Hann Tucker Associates have therefore been commissioned to undertake a plant noise impact assessment, based on the requirements of the Local Authority, to support the planning application.

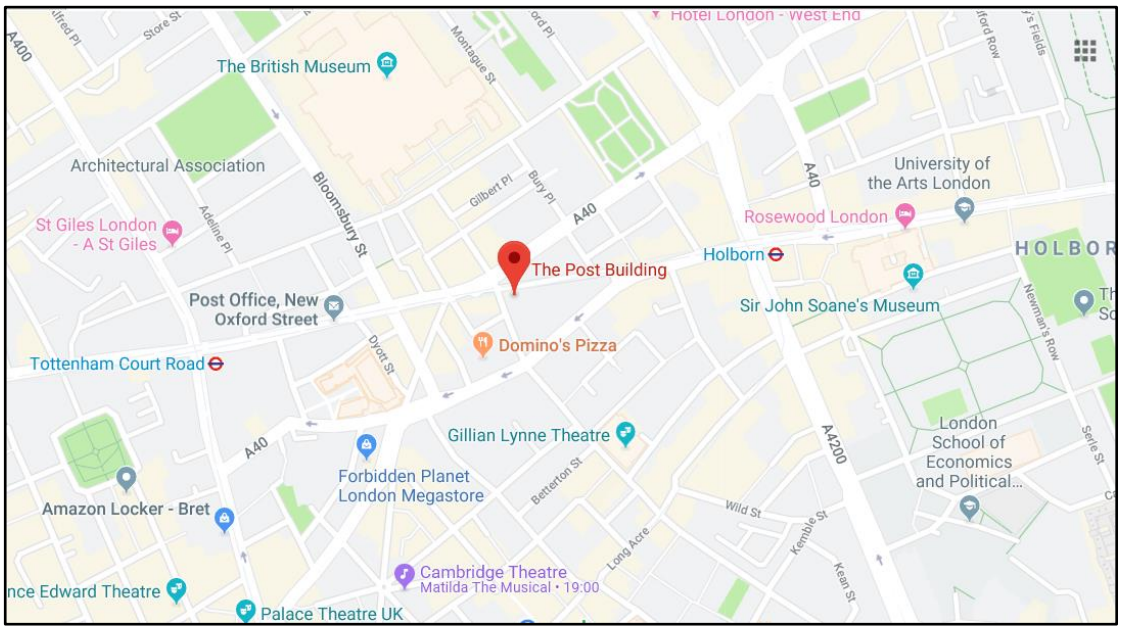
2.0 Objectives

To assess the noise emissions from the proposed standby generators, based upon data with which we are provided, with reference to the requirements of the Local Authority.

3.0 Site Description

3.1 Location

The site is located at 21-31 New Oxford Street, Camden. The location is shown in the Location Map below.

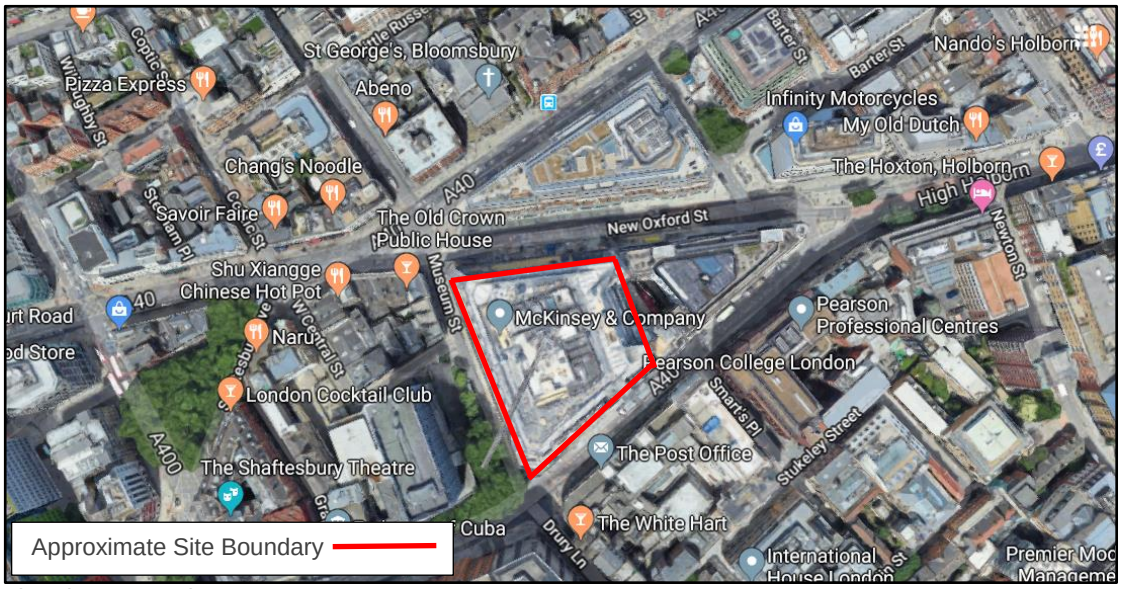


Location map © Google 2019.

The site falls within the jurisdiction of Camden City Council.

3.2 Description

The site is shown in the Site Plan below.



Site Plan © Google 2019.

New Oxford Street is a busy one-way arterial road. The noise climate is dominated by traffic noise.

4.0 Acoustic Terminology

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

5.0 Project Proposals

5.1 Proposed Plant

The proposals comprise the installation of 3No. MTU 12V1600 DS730 662kVA diesel generator sets. These are to be located inside a plantroom on the ground floor of The Post Building, near the north east corner of the building with ventilation louvres facing New Oxford Street.

5.2 Operating Hours

We understand that the proposed standby generators are likely to operate for approximately 15 hours per year. This is split between the following:

- Scheduled off-load testing – approximately 15mins, once per 4-6 weeks outside retail hours. One generator operational at a time.
- Scheduled on-load testing – 4 hours once per year. Initially 3No. generators running (for a matter of minutes) then 2No. running for the duration.
- Power outages (rare occurance).

6.0 Acoustic Standards and Guidelines

6.1 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."

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.

6.2 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."

6.3 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

6.4 Local Authority Requirements

6.4.1 Usual Criteria for Plant and Machinery

The site comes under the jurisdiction of Camden, which outlines its requirements for plant (excluding emergency/standby plant) as below in *Camden Local Plan 2017: Appendix 3*.

Note: NOAL – No Observed Effect Level, LOAEL- Lowest Observed Averse Effect Level, SOAEL – Significant Observed Adverse Effect Level.

"…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"*

6.4.2 Criteria for Standby Generators

The requirements for standby generators are contained within "Policy A4 Noise and Vibration" in the London Borough of Camden Local Plan. Relevant paragraphs from the policy are reproduced below:

"6.89 - Where uses sensitive to noise and vibration are proposed close to an existing source of noise or when development is likely to generate noise is proposed, the Council will require an acoustic report to accompany the application. In assessing applications, we will have regard to noise and vibration thresholds, set out in Appendix 3, and other relevant national and regional policy and guidance and British Standards…

6.90 - Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces. The impacts on external amenity spaces such as gardens and balconies will also be considered…

6.100 - Emergency equipment such as generators which are only to be used for short periods of time will be required to meet the noise criteria of no more than 10dB above the background level (L90 15 minutes). During standby periods, emergency equipment will be required to meet the usual criteria for plant and machinery. Conditions to this effect may be imposed in instances where emergency equipment forms part of the application."

7.0 Environmental Noise Levels

An environmental noise survey had been undertaken by Arup Acoustics.

The lowest background L_{90} noise levels recorded during the survey at the most representative position are presented in the table below:

Logger location	Approx. height above grade	Lowest background noise level, $dBL_{90, 5min}$		
		0700-1900	19-00-23-00	2300-0700
Location C (New Oxford Street)	9m (first floor)	61	61	47

The above measurement position is deemed to be representative of the nearest commercial receptor on New Oxford Street. Whilst no measurements have been made at the nearest residential premises (assumed to be either above the old crown public house, or Tavistock Chambers), noise levels there are likely to be higher than those presented above, since these properties overlook a busy road intersection. Therefore the levels above are considered to be worst case with regards to a plant noise assessment to residential premises.

8.0 Plant Noise Emission Criteria

External noise emission levels for the standby generators will need to comply with local authority requirements.

On the basis of the above, the results of the Arup environmental noise survey and the local authority requirements outlined in Section 6.4, the following plant noise emission criteria should be achieved at 1 metre from the nearest noise sensitive window based on the minimum measured L_{A90} noise level.

Noise Emission Limit (dBA)		
Daytime (07:00 – 19:00) Hours	Evening (19:00 – 23:00) Hours	Night-time (23:00 – 07:00) Hours
71 dBA	71 dBA	57 dBA

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

9.0 Plant Noise Impact Assessment

The proposals comprise the installation of 3No. MTU 12V1600 DS730 662kVA diesel generator sets. These are to be located inside a plantroom on the ground floor of The Post Building, near the north east corner of the building with ventilation louvres facing New Oxford Street.

Our assessment has considered the worst case neighbouring commercial and residential receptors (the ground floor of 10 Bloomsbury Way, approximately 17m across the street from

the Post Building, and above the Old Crown, approximately 50m away from the Post Building louvres, on the same side of the road). Predicted noise levels at other neighbouring receptors would be lower.

9.1 Plant Noise Data

We understand the manufacturer's noise data for each open engine (alone) to be as follows:

Description	Sound pressure level Lp (dB re2*10^{-5}Pa) or Vibration Velocity Level Lv (dB re 1nm/s) at 1/3 octave band centre frequencies													
	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500
Vibration Velocity Level Lv	96.3	86.1	96	86.3	97.9	108.2	91.1	95	99.6	99.4	101.3	91.3	82.3	86
Engine Lp at 1m (free field)	55.9	59.6	62.1	57.1	66.1	77.2	71.1	70.3	73.4	76.1	81.6	82.7	83.8	86.6
Exhaust Lp at 1m (Free Field)	87.3	77.8	87.4	86.6	104.6	117.5	99.6	101.5	114.1	101.8	106.1	106	108.2	105.2

Description	Sound pressure level Lp (dB re 2*10^{-5}Pa) or Vibration Velocity Level Lv (dB re 1nm/s) at 1/3 octave band centre frequencies												dBZ	dBA
	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	
Vibration Velocity Level Lv	88.3	90.8	88.8	84	86.9	85.8	83.9	83.1	80.4	79.3	84.2	75.2	70	110.9	-
Engine Lp at 1m (free field)	87.2	86.3	85.7	85.3	87.7	88.1	88.6	90.1	88.9	91.4	92.8	94.8	103.1	105.2	103.8
Exhaust Lp at 1m (Free Field)	97.4	93.8	94.5	89.5	87.4	86.3	84	82.4	79.2	73.3	63.3	54.3	55.3	120.4	109

Tolerances are given as + 5dB for individual 1/3 octave bands, +3dB for overall exhaust noise and +2dB for overall structureborne vibration levels and engine noise.

The above data does not include the effect of the alternators or radiator fans and therefore does not include all noise sources. We have therefore used the following typical noise levels in our calculations to account for the inclusion of the other noise sources that will make up the generator sets.

Sound Pressure Level of Typical 500kW Generator Set at 1m (free field) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
95	101	95	97	96	98	95	104

We have not been provided with details of the proposed air intake fans however these should be selected such that in-duct noise levels are at least 10dB below those due to by the generator in each third octave band and positioned such that the fans are on the plantroom side of the attenuators.

9.2 Location of Plant and Nearest Noise Sensitive Receptor

The proposals comprise the installation of 3No. MTU 12V1600 DS730 662kVA diesel generator sets. These are to be located inside a plantroom on the ground floor of The Post Building, near the north east corner of the building with ventilation louvres facing New Oxford Street.

We have been advised by the base build team that the 'nearest sensitive façade' is all floors of 2-28 New Oxford Street / 10 Bloomsbury Way on the opposite side of New Oxford Street, approximately 17m away.

1 New Oxford Street is also close by, on the same side of the road as the Post Building, between approximately 10-38m from the louvres, however due to the angle of view (90 degrees) and distance from the loudest components of the generator noise (approximately 20m from discharge louvres) 10 Bloomsbury Way is considered to be the worst case neighbouring commercial receptor.

The nearest residential receptors are further away (approximately 50m from nearest louvres), and have the same criteria, however they are likely to be more noise sensitive at night-time when the commercial premises would likely be unoccupied.

9.3 Assessment Assumptions

We understand that the proposed generator will only be operational during power outage, plus occasional testing during daytime/evening hours only as described in Section 5.2.

Noise emissions from the standby generators comprise 3No. transmission paths: noise from the engine exhaust, from the intake air louvres, and from the discharge air louvres.

9.3.1 Exhaust Flue Assumptions

The generator manufacturer has advised that including the effect of primary and secondary attenuators, they are able to achieve 65dBA at 1m in the free field with 2No. generators operating.

Based on the above noise level, including a +3dB tolerance allowance, +6dB radiation correction, -23dB distance loss (17m), and +3dB façade correction, our calculations indicate an

approximate sound pressure level of 51dBA / 54dBA / 56dBA at the façade of 10 Bloomsbury Way with 1No. / 2No. / 3No. generators operating simultaneously respectively.

9.3.2 Air Intake Assumptions

Our calculations are based on the following arrangement:

- Façade to comprise weather louvres.
- Acoustically lined (100mm absorption) lobby to function as a plenum.
- Internal partition separating lobby/plenum from plantroom to comprise high density blockwork outer layer, 4No. layers of Soundbloc or equivalent inner layer, with R_W63dB door set.
- 3m long acoustic attenuators penetrating this internal partition providing the following insertion losses on atmosphere side of all supply fans:

Minimum Insertion Loss at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
14	27	47	50	50	50	50	50

Based on the above and assumed typical noise data for the generator set, the sound pressure level is calculated to be approximately 51dBA / 54dBA / 56dBA at the façade of 10 Bloomsbury Way with 1No. / 2No. / 3No. generators operating simultaneously respectively.

9.3.3 Air Discharge Assumptions

Our calculations are based on the following arrangement:

- 1.2m long acoustic attenuators providing the following insertion losses on each generator extract/radiator fan:

Minimum Insertion Loss at Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
11	18	28	36	50	50	40	29

- Attenuators discharge into a plenum incorporating a 90 degree bend lined with 200mm mineral wool on all sides.
- Ductwork lined with 200mm mineral wool.
- Acoustically lined plenum (100mm mineral wool)
- Weather louvres

Based on the above, assumed typical noise data for the generator set, the indicative sound pressure level is calculated to be approximately 58dBA / 61dBA / 63dBA at the façade of 10 Bloomsbury Way with 1No. / 2No. / 3No. generators operating simultaneously respectively.

9.3.4 Tonality

Whilst the manufacturer's noise data shows that un-attenuated components of the generator are each likely to exhibit a tonal character, each component will have different attenuation paths with different spectral characteristics and therefore the cumulative effect of all attenuated paths at a distant receptor is likely to be less tonal than the un-attenuated noise data for an individual component suggests. BS4142:2014 states that a maximum of +6dB can be added when the specific sound at a receptor is highly tonal. Based on the above we consider a 3dB tonality correction to be a reasonably pessimistic assumption in this case.

9.4 Cumulative Atmospheric Noise Emissions – Commercial Receptor

9.4.1 Operation During Testing

Testing of the generators is to be scheduled to operate during daytime or evening hours only, when ambient noise levels are highest. Based on this, the following table presents the approximate predicted cumulative effect of each atmospheric noise component at the nearest commercial premises during testing:

Description	**Approximate Sound Pressure level dBA at 10 Bloomsbury Way during testing**	
	No Load Testing (1No. generator tested at a time) - 15mins per 4-6 weeks. Daytime/Evening only	On Load Testing - 3No. for short duration (matter of minutes) then 2No. for 4 hours once per annum. Daytime/Evening only
Exhaust	51	56 / 54
Air Intake	51	56 / 54
Air Discharge	58	63 / 61
Cumulative	59	64 / 62
Tonality Correction	+3	+3
Rating Level	**62**	67 / 65
Criterion	71	71

Our calculations indicate that the proposed generators, in conjunction with the proposed mitigation measures, should be capable of achieving the requirements of the Local Authority outlined in Section 6.4.2 at the nearest neighbouring commercial receptor during scheduled testing.

9.4.2 Operation During Power Outage

Power outage is a rare occurrence but could potentially happen at any time of day or night. However it is unlikely that the commercial units at 10 Bloomsbury way would be operational at night-time, especially during a power outage. The night-time assessment below has therefore only been included for completeness.

The following table presents the approximate predicted cumulative effect of each atmospheric noise component at the nearest commercial premises during power outage. We understand that in this event 3No. generators would initially run (for a matter of minutes) at a reduced duty before the full load is taken by 2No. generators (the system is designed for n+1 resilience):

Description	Approximate Sound Pressure level dBA at 10 Bloomsbury Way during power outage	
	Daytime (07:00-19:00) and Evening (19:00-23:00) 3No. / 2No.	Night-time (23:00-07:00) 3No. / 2No.
Exhaust	56 / 54	56 / 54
Air Intake	56 / 54	56 / 54
Air Discharge	63 / 61	63 / 61
Cumulative	64 / 62	64 / 62
Tonality Correction	+3	+3
Rating Level	67 / 65	67 / 65
Criterion	71	57

Our calculations indicate that the proposed generators operating during a power outage in conjunction with the proposed mitigation measures, should be capable of achieving the requirements of the Local Authority outlined in Section 6.4.2 at the nearest neighbouring commercial receptor during the daytime and evening.

Noise levels from the proposed generators are only predicted to exceed Camden's standard requirements during the night-time. However we suggest that this may not be an issue in practise for the following reasons:

- The commercial premises at 10 Bloomsbury Way are unlikely to be operational during the night-time, especially if there is a power outage.
- Night-time power outages are a very rare occurrence.
- The internal noise levels set out within BS8233 for commercial premises should still be met inside 10 Bloomsbury Way when the generators are running.

9.5 Cumulative Atmospheric Noise Emissions – Residential Receptor

In contrast to the commercial receptor assessed above, residential receptors would be noise sensitive during the night-time.

We understand the nearest residential receptor to be approximately 50m from the plantroom louvres on the same side of the road as the Post Building. Compared to the predicted levels above, our calculations indicate a further 9dBA of distance attenuation and an additional 3dBA reduction for 90 degree directivity.

Based on this, the following table presents the approximate predicted cumulative effect each atmospheric noise component at the nearest residential premises:

Description	Approximate Sound Pressure level dBA at The Old Crown		
	Power Outage	Testing (daytime or evening only)	
	3No. / 2No.	No Load Testing (1No.)	On Load Testing 3No. / 2No.
Exhaust	44 / 42	39	44 / 42
Air Intake	44 / 42	39	44 / 42
Air Discharge	51 / 49	46	51 / 49
Cumulative	52 / 50	47	52 / 50
Tonality Correction	+3	+3	+3
Rating Level	**55 / 53**	**50**	**55 / 53**
Criterion	57	71	71

Our calculations indicate that the proposed generators, in conjunction with the proposed mitigation measures, should be capable of achieving the requirements of the Local Authority outlined in Section 6.4.2 at the nearest residential receptor.

10.0 Conclusions

Plant noise emission criteria have been recommended based on the results of an environmental noise survey undertaken by Arup Acoustics and with reference to the Local Authority's

requirements.

An assessment has been carried out to determine the generators noise emissions at the nearest commercial and residential receptors.

The assessment indicates that the proposed generators, in conjunction with the proposed mitigation measures, should be capable of achieving Camden's standard requirements at the nearest commercial and residential receptors in almost all cases.

The only exception to this is at the nearest commercial receptor during power outages at night-time, however it is unlikely that the commercial premises would be operational at night, especially during power outage. Furthermore, night-time power outages are an extremely rare occurrence and noise levels inside the commercial premises are still predicted to meet the levels set out in British Standard BS8233 during this time.

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).