Cricklewood PropCo Ltd

Edgware Road, Cricklewood

Noise Assessment

Report Ref.
2303910-R02

March 2024

HEAD OFFICE: 3rd Floor, The Hallmark Building, 52-56 Leadenhall Street, London, EC3M 5JE T | 020 7680 4088
EDINBURGH: Suite 35 4-5 Lochside Way Edinburgh EH12 9DT T | 0131 516 8111
ESSEX: 1 - 2 Crescent Court, Billericay, Essex, CM12 9AQ T | 01277 657 677
KENT: Suite 10, Building 40, Churchill Business Centre, Kings Hill, Kent, ME19 4YU T | 01732 752 155
MIDLANDS: Office 3, The Garage Studios, 41-43 St Mary's Gate, Nottingham, NG1 1PU T | 0115 697 0940
SOUTH WEST: City Point, Temple Gate, Bristol, BS1 6PL T | 0117 456 4994
SUFFOLK: Suffolk Enterprise Centre, 44 Felaw Street, Ipswich, IP2 8SJ T | 01473 407 321

Email: enquiries@ardent-ce.co.uk

Contents

Appendices

Document Control Sheet

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
-	Draft	JR	AS	Draft only	27/02/24
-	Final	JR	JR	AS	13/03/24

Distribution

[redacted]

1. Introduction

1.1. Ardent Consulting Engineers has been appointed by Cricklewood PropCo Limited to undertake a Noise Assessment to support the development at Edgware Road, Cricklewood (hereafter referred to as the site).

1.2. The development has been undertaken over three phases, this report is to be submitted with the third and final phase for an extension of operations at the site.

1.3. This extension is following the previous application (ref. 23/4793/FUL), dated 8th November 2023, for a change of use at the site to Use Class B8/E(g)(iii).

1.4. The planning application seeks to deliver all non-mezzanine floorspace within the proposed warehouse extension. Built floorspace will comprise 2,143sqm GIA. However, a maximum of 5,872sqm GIA can be accommodated within the warehouse building through the use of demountable mezzanine floors.

1.5. In accordance with Section 55(2)(a) of the Town and Country Planning Act 1990, planning permission is not required for the carrying out of maintenance, improvement or other alteration to a building where works affect only the interior of the building and do not materially affect the external appearance of the building; this includes mezzanine floors for non-retail use. As such, additional floors can be installed at a later date through the use of demountable mezzanines, without requiring planning permission.

1.6. Therefore, this report assesses the maximum level of floorspace that can be accommodated within the building.

1.7. Prior to undertaking the development, it is necessary to ensure that the site will be able to operate efficiently, without disturbing the closest noise sensitive receptors.

1.8. The planning application for the proposed scheme is to be submitted to the London Borough of Barnet as the local planning authority.

1.9. The assessment is in accordance with BS 4142 and DMRB LA111 and provides details of the site surveys and subsequent qualitative and quantitative analysis.

2. Development Proposals

2.1. The proposed development description is provided below:

"Erection of rear extension to provide additional self-storage floorspace (Use Class B8) with associated car and cycle parking, landscaping and other works ancillary to the development."

2.2. The site is located directly adjacent to the A5 to the west, Cricklewood Rail Freight Facility is to the east, railway line serving Brent Cross West station to the north and a Lidl store to the south. Cricklewood Bus Garage is also present opposite the site to the west. The closest residential receptors are located to the north-west of the site above small commercial stores, with concentrated residential beyond this to the west.

2.3. Figure 2-1 shows the location site and the surrounding area.

Figure 2-1: Site location in context of the surrounding area)

2.4. An extract of the development proposals is shown in Figure 2-2.

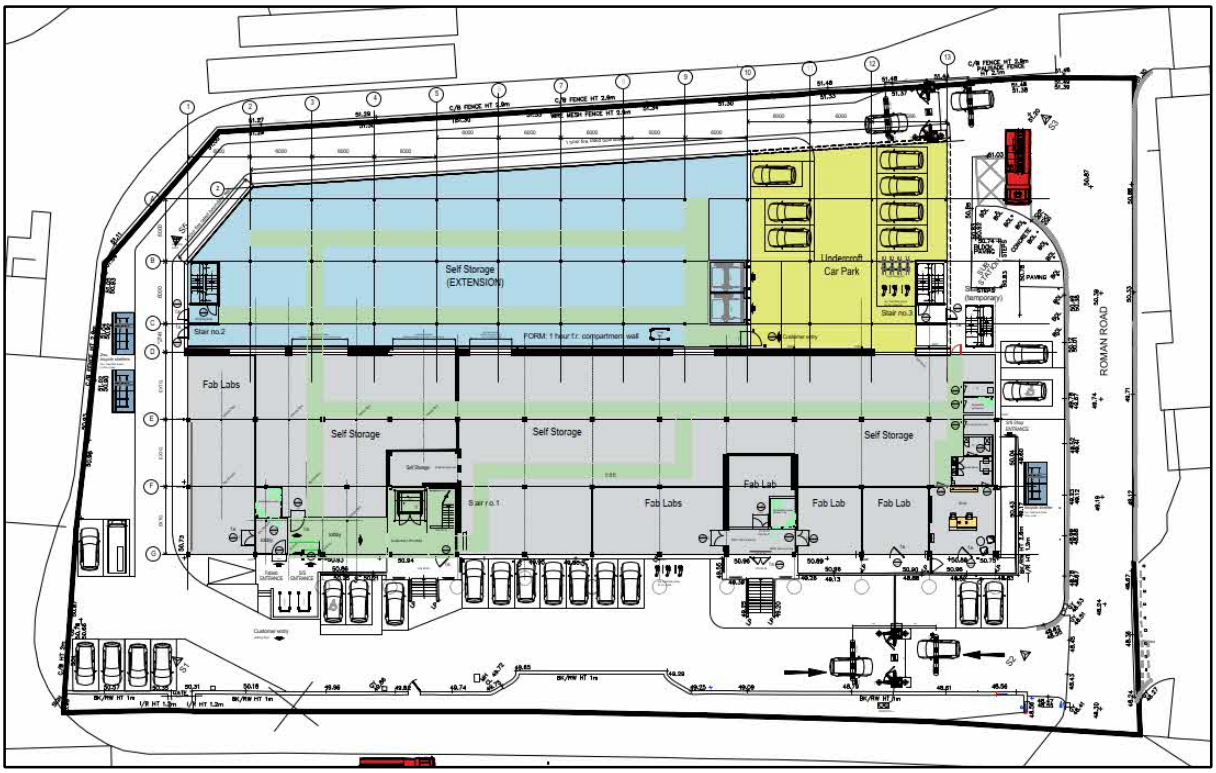


Figure 2-2: Development proposals

3. Local Authority Liaison

3.1. Contact[1] was made with officers at London Borough of Barnet, the following was agreed:

The survey methodology was agreed as acceptable;

It was recommended that a second monitoring location be placed on the eastern façade of the site to capture rail freight noise;

The assessment of fixed mechanical plant noise would be conducted in accordance with BS4142, with an aim to achieve a criterion of 5dB below the representative background sound level, as present within the Barnet SPD for Sustainable Design and Construction;

The impact of noise from vehicle movements would be considered in accordance with DMRB LA111.

3.2. A second position was recommended by the Environmental Health Officer to capture rail freight noise. However, this was due to concerns that there may be an educational use at the site and internal noise limits would need to be considered. As this has been confirmed to not be the case, the secondary position was not included in the survey.

3.3. Additionally, considering the existing infrastructure at the freight yard including the solid border fencing extending to the boundary of the site, freight noise will be sufficiently screened. Considering the proposed industrial use of the site, the proposed development is not sensitive to noise.

3.4. A summary of relevant policy and guidance is shown in Appendix D.

[1] Email contact with Nicole Asante on 10/10/2023, response on 12/10/2023

4. Environmental Noise Measurements

4.1. A noise survey was conducted between 25th and 30th October 2023. The long term measurement position was chosen to be representative of the acoustic environment in the vicinity of the closest noise sensitive receptors.

4.2. The measurement position and closest sensitive receptors (blue outline) are shown in Figure 4-1.

Figure 4-1 Measurement position

4.3. A description of the measurements positions is as follows:

Measurement Position 1 (long term) - The microphone was mounted at approximately 9m above ground height out of the top floor window.

This was extended out 1m from the building façade via a T-frame. The monitoring position is representative of the noise environment at receptors in close proximity to the A5 and railway line.

4.4. The equipment used was as follows:

Svantek 977 Sound Level Meter (serial number: 45350);
Rion NC-74 Calibrator (serial number: 34172694)

4.5. All equipment used has been professionally calibrated. Field calibration of the sound level meters (and complete measurement signal chain) was undertaken before and after measurement to ensure no drift of the calibration signal. Calibration certificates are available upon request.

4.6. Weather conditions were generally suitable for the duration of the surveys with a variable but low wind speeds noted.

4.7. A summary of the measurements taken at the site are summarised in Table 4-1. A time history of measured noise levels at Position 1 are shown in Appendix A.

Monitoring Position	Ambient Sound Level dB $L_{Aeq, T}$ Range (Average)		Background Sound Level, dB L_{A90} Range	
	Daytime	Night-time	Daytime	Night-time
P1	63-80 (65)	60-80 (63)	53-63	43-64

Table 4-1: Summary of measured noise levels

4.8. A 3 dB reflection correction has been applied in accordance with BS 7445 given the location of the monitoring position 1m from the façade of the building and with no tonal characteristics recorded.

4.9. The noise climate at the measurement positions was dominated by road traffic noise from the A5 Edgware Road, including Cricklewood Bus Garage opposite the site. Contributions were also present from the railway line serving Brent Cross West and Cricklewood station.

4.10. A histogram of the day and night background sound levels is shown in Figure 4-2.

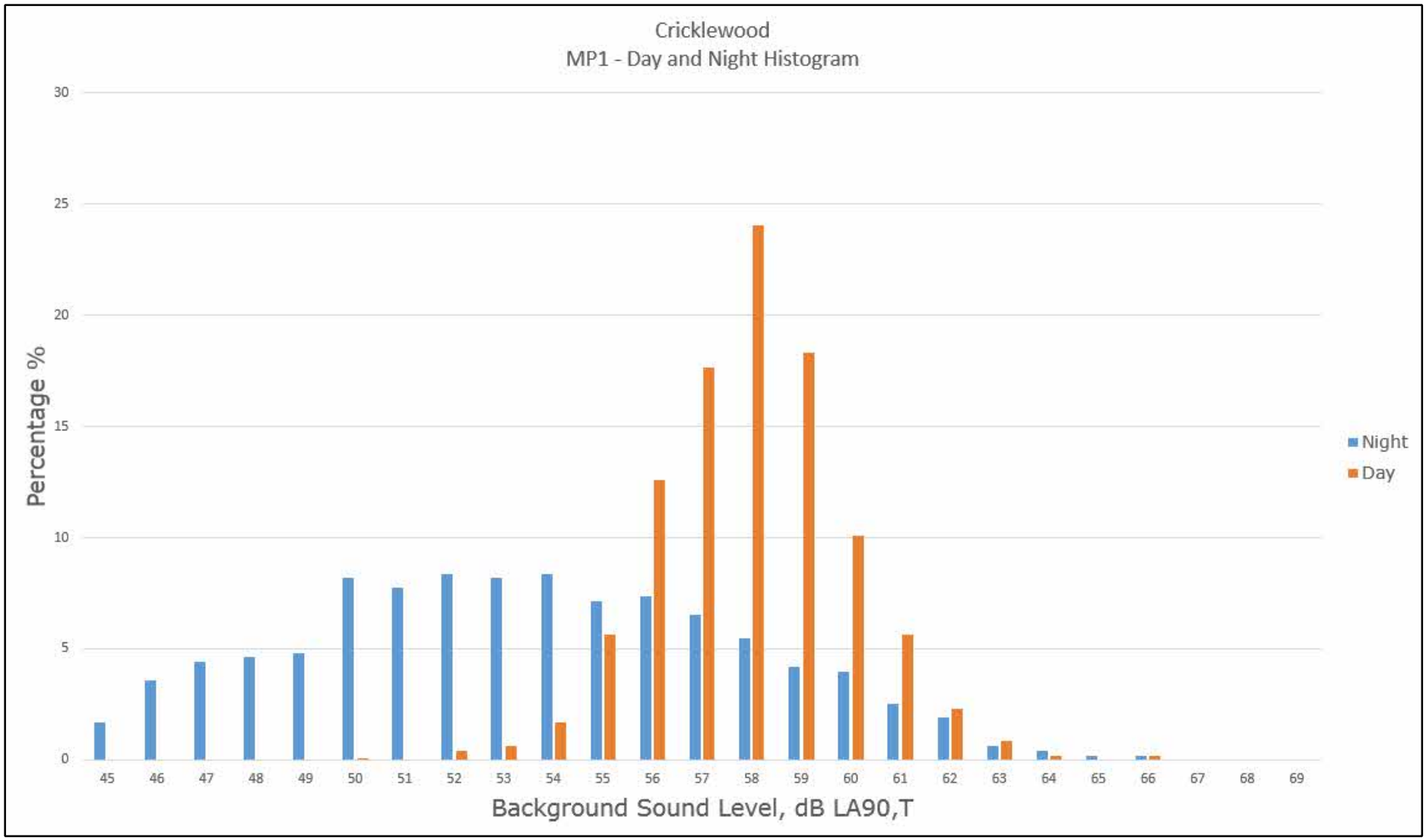


Figure 4-2: Histogram of daytime & night-time background sound levels at Position 1

4.11. During the day, a representative daytime background sound level of 58 dB $L_{A90,T}$ has been used for assessment.

4.12. At night, a representative background sound level of 50 dB $L_{A90,T}$ has been used in order to present a worst case assessment.

5. Construction Phase

5.1. The construction phase of the proposed development will include various noise generating processes and plant. The most significant processes in terms of noise generation would be site clearance/excavation operations, piling and concreting operations.

5.2. To assess reasonable noise limits for construction noise experienced at the nearest residential properties, Example Method 1 (the ABC Method) of BS 5228, within section E.3.2 is used. Table E.1 from the standard is reproduced at Table 4.1.

Table E.1 **Example threshold of significant effect at dwellings**

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23.00–07.00)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

[B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

[C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

Table 5-1: Table E.1 – BS5228 Part 1

5.3. Ambient noise levels place the site within Category B of Table E.1. Therefore, the following noise levels set out in Table 4-2 from construction activities are considered to be a reasonable noise limit to avoid significant adverse impact at the nearest receptors.

Time Period	Construction Target Noise Level dB L_{Aeq}
Monday to Friday (07:00 – 19:00) & Saturday (07:00 – 13:00)	70

Table 5-2: Construction Target Noise Level

5.4. Construction and mobile plant operations are likely to generate high noise levels that have the potential to adversely affect neighbouring noise sensitive properties.

5.5. During construction, the contractor will employ best practicable means to control noise from construction operations.

5.6. Operations will be reasonably transient, and it is expected that noisy operations will take place for relatively short periods throughout construction.

5.7. Temporary screening in the form of solid timber hoarding can be used where operations are adjacent to sensitive receptors. Consideration will be given to neighbouring residential properties when locating the temporary compounds and material stockpiles.

5.8. Stationary equipment and plant such as generators will be placed as far as practicable from noise sensitive properties, and preferably in areas benefiting from existing or purpose-built attenuation such as bunding or behind non-sensitive buildings.

5.9. Delivery of materials and removal of waste from the Development will be planned to minimise disturbance to neighbouring properties. Idling of plant, machinery and delivery vehicles should be prohibited when not in use.

5.10. If required noise levels can be monitored regularly in accordance with BS 5228 to ensure the above set limits are not exceeded. In addition to the above all other guidance within BS 5228−1 will be followed at all times.

5.11. Piling operations have the potential to generate ground borne vibration in the immediate surroundings. Mitigation methods and techniques will be employed during these and other vibration generating activities to minimise any potential impacts from the operations. This can include (but is not limited to) use of drilled (CFA) piles rather than impact driven piles.

5.12. When undertaking vibration monitoring during construction works, a limit of around 1mm/s PPV can be set as an action level. The effects at nearby residential receptors due to vibration would be controlled accordingly. This limit is derived from Table D.1 of BS5228 2009-02 (vibration); boring to a depth of 12m on made ground/gravel – (Continuous Flight Auger (CFA) piling method). This identifies that at a plan distance of 3.7m, predicted vibration levels (PPV) would be 1.1mm/s.

6. Operational Noise Assessment

6.1. The assessment includes the following elements which are considered to be the most significant sources:

- Changes to road traffic levels as a result of the development;
- Operational noise at the self-storage facility;
- Fixed mechanical plant;
- External condenser unit introduced as part of previous application.

Changes to Road Traffic

6.2. Transport Consultants at Ardent have provided traffic flows for the current and proposed use of the site. It is understood that no HGV vehicles would service the development, only smaller vehicles such as cars and vans will be able to access the site.

6.3. The traffic flows for the current use of the site are 33 movements for the B8 use and 89 movements for the educational use. For the proposed use of the site there will be 127 movements for the self-storage facility and 5 for the Fab Labs. The proposed operational flows of the site show an increase of approximately 8% from its previous use.

6.4. DMRB LA111 notes that a 25% increase in vehicle movements leads to a 1dB change in sound level. Based on DfT traffic counts for the area from 2022, traffic flows on the A5 are approximately 25,294 vehicles respectively. It demonstrates that there are a high number of vehicles on the road accessed from the site.

6.5. The site traffic is proposed to access from the A5 only. Therefore, it is considered that vehicles movements associated with site will be negligible in the context of the surrounding road network and when compared to the sites current permitted use.

Self-Storage Facility

6.6. It is understood that the self-storage facility will only operate during the day (07:00 – 23:00). Trollies will be used to load good from/into car and vans.

6.7. Bump rails shall be put in place in storage areas to reduce potential noise impact associated with the use of the trollies. The loading/unloading area should be a smooth concrete surface to reduce noise from trolley movements, paving stones or similar should be avoided.

6.8. Due to the residual noise level in the area, which is controlled by road traffic noise, vehicles movements associated with the self-storage facility are not considered to be significant against the existing acoustic environment.

6.9. With the above recommended control measures, it is considered that noise from the from the self-storage facility will not have an adverse impact on the nearest sensitive receptors.

Fixed Mechanical Plant

6.10. Fixed mechanical plant should be designed to achieve a low impact when assessed in accordance with BS4142, which typically would be equal to the background noise levels. However, Barnet's SPD 'Sustainable Design and Construction 2013' states that proposed plant shall be operated so that any noise generated is 5 dB(A) below the existing background level at a 1m point outside of a neighbouring properties window.

6.11. As discussed in Section 4, the representative background sound levels during the day and night and 58dB $L_{A90,T}$ and 50dB $L_{A90,T}$ respectively.

6.12. Given the elevated representative background and residual noise levels monitored during the survey, it is considered that a design limits at 5dB below the background level would not be appropriate for plant at the site. A limit 10 dB below the existing representative background levels is more suitable in this instance, to avoid further elevating the existing residual acoustic environment.

6.13. Therefore, the criteria that the cumulative noise from fixed mechanical plant should achieve at the nearest sensitive receptors is 48dB $L_{Ar,Tr}$ and 40dB $L_{Ar,Tr}$ during the day and night, respectively.

6.14. Plant should be designed and selected so that it does not produce distinguishable acoustic characteristics, such as tonal and impulsive characteristics. The above criteria need to be considered on the basis of the configuration of plant and the operational conditions.

Cooling / Heating Plant

6.15. Details have been provided for the available external mechanical plant for the previous application at the site. One external condenser unit was proposed located

within the under-croft car park area on the eastern façade of the building. The location of this condenser unit can be seen in Figure 6-1 below.

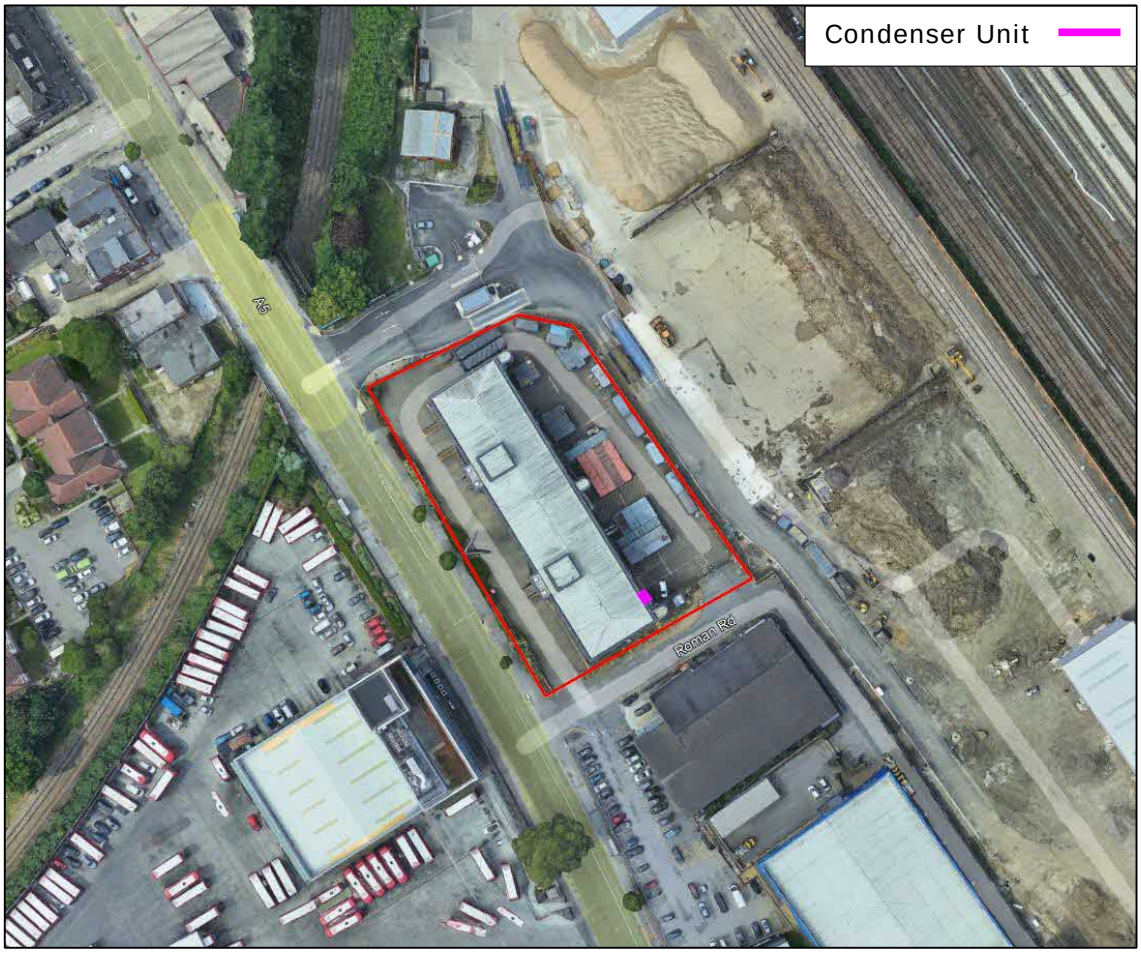


Figure 6-1: External condenser unit location

6.16. The specification and acoustic information of the proposed unit is provided below in Table 6-1 and Appendix C.

Model	No. of Units	Sound Power Level (L_{WA}) dB
Mitsubishi Electric PUMY-SP112VKM2(-BS)	1	74.0

Table 6-1: Proposed external condenser unit

6.17. A noise propagation calculation has been completed to assess the potential acoustic impact of the condenser unit on the closest sensitive receptor during the more sensitive night-time period, taking into account distance loss, reflections and directivity and acoustic feature corrections.

6.18. Due to the specific sound level being significantly below the background sound level, an acoustic feature correction is not considered appropriate.

6.19. Table 6-2 presents the results of the BS 4142 assessment.

On Site Receptors	Assessment Night-time
Specific Level, dB $L_{Aeq,T}$	22
Rating Level, dB $L_{Ar,Tr}$	22
Background sound level, dB $L_{A90,T}$	50
Excess over background, dB	-28
Initial Assessment	Low Impact

Table 6-2: BS4142 assessment of condenser unit

6.20. The calculated rating level is 28 dB below the existing background levels during the night. Therefore, it would present a low impact in accordance with BS4142 and will have a negligible contribution to the proposed cumulative plant design limits set out above. The calculation is presented within Appendix B.

7. Conclusions

7.1. Ardent Consulting Engineers has been appointed by Cricklewood PropCo Limited to undertake a Noise Assessment to support the extension of operations at the development on Edgware Road, Cricklewood.

7.2. Target noise and vibration limits have been set for construction noise to achieve in accordance with BS5228. Best practice recommendations have been provided to reduce noise and vibration by as much as practicably possible.

7.3. There will be an increase of 8% of traffic numbers as a result of the development, resulting in a negligible impact when viewed in the context of existing movements in the area.

7.4. Only small vehicle movements, such as cars and vans, would be associated with the self-storage facility and the Fab Labs. The traffic flows are very low compared to the existing traffic flows and the existing noise environment is dominated by vehicles movements on the A5. Vehicle movements will therefore be indistinguishable from the existing noise environment.

7.5. Given the nature of activities associated with the self-storage facility, the proposed operations will not result in an adverse impact at the nearest sensitive receptors.

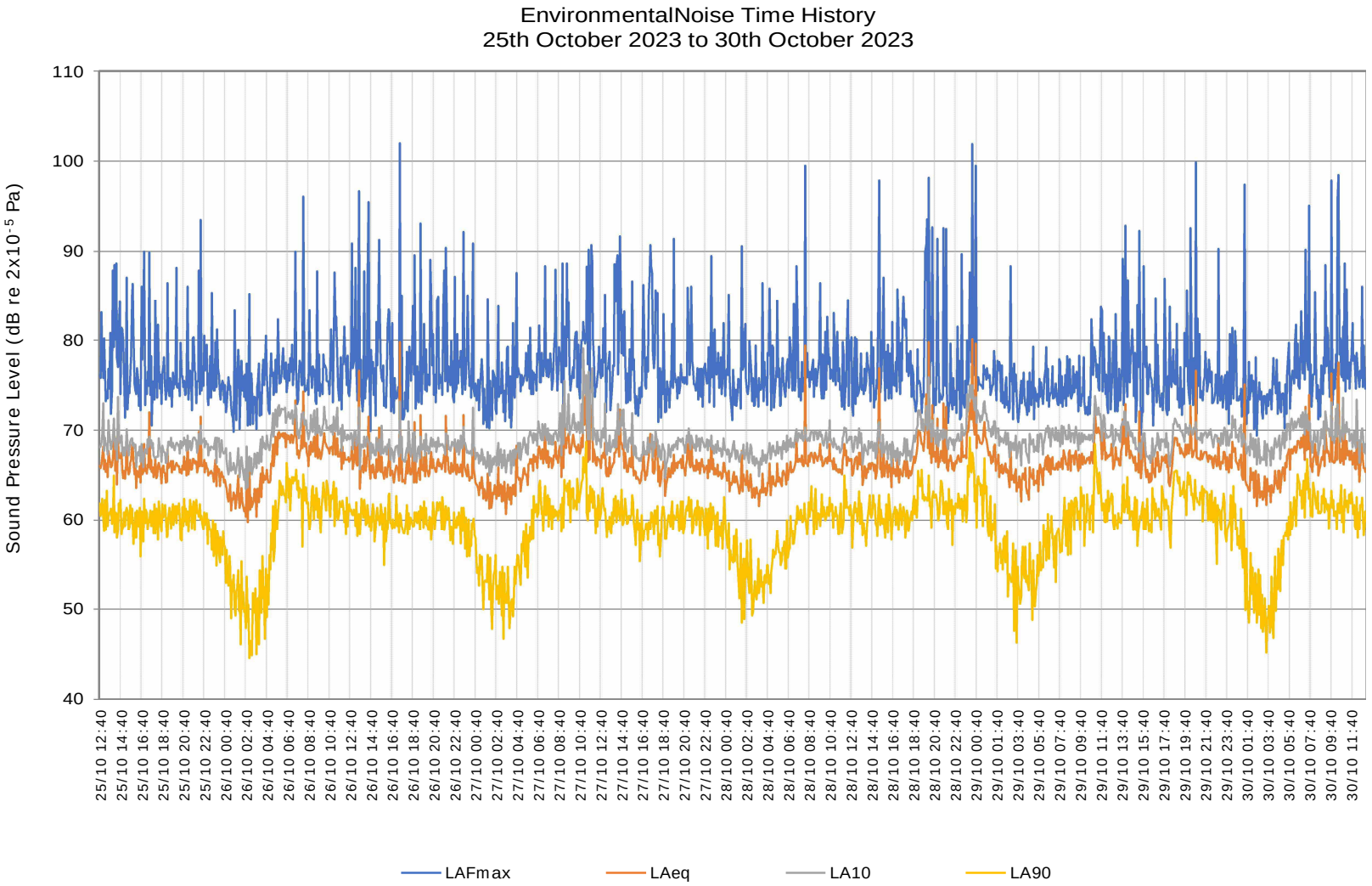
7.6. Fixed plant and equipment should be selected to achieve cumulative rating sound levels of no greater than 48dB $L_{Ar,Tr}$ and 40dB $L_{Ar,Tr}$ during the day and night respectively.

7.7. The rating level for the proposed condenser unit of the previous application is significantly below the existing background level during the night and presents a low impact in accordance with BS4142 and will have a negligible contribution to the proposed cumulative plant design limits set out above.

7.8. This assessment demonstrates that the site is suitable for development subject to the recommendations included in this report.

APPENDIX A

Position 1 -Cricklewood



APPENDIX B

External Condenser Propagation Calculation

	LWA (dB)	Distance to Receptor (m)	Q	Distance Correction	Acoustic Feature Correction	Screening	Specific Level (dB)	Rating Level (dB)
Mitsubishi Electric PUMY-SP112VKM2(-BS)	74	130	4	-47	0	-5	22	22
Specific Level dB LAeq / Night								**22**
Rating Level LAeq / Night								22
Background Noise Level / Night								**50**
Excess over Background / Night								-28

APPENDIX C

MITSUBISHI ELECTRIC

Changes for the Better

AIR CONDITIONING SYSTEMS

CITY MULTI

DATA BOOK

MODEL

PUMY-SP112-140VKM2 (-BS)

PUMY-SP112-140YKM2 (-BS)

GENERAL LINE-UP

Line-up of Outdoor Units of R410A CITY MULTI

Heat Pump S Series

PUMY-SP112VKM2(-BS)	PUMY-SP112YKM2(-BS)
PUMY-SP125VKM2(-BS)	PUMY-SP125YKM2(-BS)
PUMY-SP140VKM2(-BS)	PUMY-SP140YKM2(-BS)

4.5, 5, 6HP

Model					PUMY-SP112VKM2(-BS)	PUMY-SP125VKM2(-BS)	PUMY-SP140VKM2(-BS)
Power source					1-phase 220-230-240 V, 50 Hz; 1-phase 220 V, 60 Hz		
Cooling capacity (Nominal)	*1	kW			12.5	14.0	15.5
	*1	kcal/h			10,750	12,040	13,330
	*1	BTU/h			42,650	47,768	52,886
	Power input	kW			4.46	5.11	5.34
	Current input	A			20.69-19.79-18.97, 20.69	23.71-22.68-21.73, 23.71	24.77-23.70-22.71, 24.77
	EER	kW/kW			2.80	2.74	2.90
Temp. range of cooling	Indoor	W.B.			15 ~ 24°C (59 ~ 75°F)		
	Outdoor *3*4	D.B.			−5 ~ 52°C (23 ~ 126°F)		
Heating capacity (Nominal)	*2	kW			14.0	16.0	16.5
	*2	kcal/h			12,040	13,760	14,190
	*2	BTU/h			47,768	54,592	56,298
	Power input	kW			3.66	4.31	4.36
	Current input	A			16.98-16.24-15.57, 16.98	20.00-19.13-18.33, 20.00	20.23-19.35-18.54, 20.23
	COP	kW/kW			3.83	3.71	3.78
Temp. range of heating	Indoor	D.B.			15 ~ 27°C (59 ~ 81°F)		
	Outdoor	W.B.			-20 ~ 15°C (-4~ 59°F)		
Indoor unit connectable	Total capacity				50 to 130% of outdoor unit capacity		
	Model/ Quantity	CITY MULTI			P10-P140/12	P10-P140/12	P10-P140/12
		Branch box*6			P15-P100/8	P15-P100/8	P15-P100/8
		Mixed system	Branch box 1unit*6	CITY MULTI	P10-P140/5	P15-P140/5	P10-P140/5
				Branch box	P15-P100/5	P15-P100/5	P15-P100/5
			Branch box 2unit*6	CITY MULTI	P10-P140/3	P10-P140/3	P10-P140/3
				Branch box	P15-P100/8	P15-P100/8	P15-P100/8
Sound pressure level (measured in anechoic room)		dB <A>			52/54	53/56	54/56
Sound power level (measured in anechoic room)		dB <A>			72/74	73/76	74/76
Refrigerant piping diameter	Liquid pipe	mm (in.)			9.52 (3/8) Flare		
	Gas pipe	mm (in.)			15.88 (5/8) Flare		
FAN	Type × Quantity				Propeller Fan × 1		
	Air flow rate	m^3/min			77	83	83
		L/s			1283	1383	1383
		cfm			2719	2931	2931
	Control, Driving mechanism				DC control		
	Motor output	kW			0.20 × 1		
	External static press.				0Pa/30Pa*7		
Compressor	Type × Quantity				Twin rotary hermetic compressor × 1		
	Manufacture				Mitsubishi Electric Corporation		
	Starting method				Inverter		
	Motor output	kW			3.9	3.9	4.2
	Case heater	kW			0		
	Lubricant				FV50S (1.4litter)		
External finish					Galvanized Steel Sheet Munsell No. 3Y 7.8/1.1		
External dimension H × W × D		mm			981 × 1,050 × 330(+40)		
		in.			38-5/8 × 41-3/8 × 13 (+1-37/64)		
Protection devices	High pressure protection				High pressure Switch		
	Inverter circuit (COMP./FAN)				Overcurrent detection, Overheat detection(Heat sink thermistor)		
	Compressor				Compressor thermistor, Overcurrent detection, Compressor protector		
	Fan motor				Overheating, Voltage protection		
Refrigerant	Type × original charge				R410A×3.5 kg (8 lbs)		
	Control				Liner expansion valve		
Net weight		kg (lbs)			93 (205)*5		
Heat exchanger					Cross Fin and Copper tube		
HIC circuit (HIC: Heat Inter-Changer)					HIC circuit		
Defrosting method					Reversed refrigerant circuit		
Drawing	External				RK01B171		
	Wiring				BH79J995		
Standard attachment	Document				Installation Manual		
	Accessory				Grounded lead wire		
Optional parts					Joint: CMY-Y62-G-E Header: CMY-Y64/68-G-E Branch box: PAC-MK34/54BC		
Remarks					1. Nominal conditions *1, *2 are subject to ISO 15042. 2. Due to continuing improvement, above specifications may be subject to change without notice.		

Note:

	*1 Nominal cooling conditions	*2 Nominal heating conditions
Indoor :	27°C D.B./19°C W.B. [81°F D.B/66°F W.B.]	20°C D.B. [68°F D.B.]
Outdoor :	35°C D.B. [95°F D.B.]	7°C D.B./6°C W.B. [45°F D.B./43°F W.B.]
Pipe length :	7.5 m [24-9/16 ft]	7.5 m [24-9/16 ft]
Level difference :	0 m [0 ft]	0 m [0 ft]

*3 10 to 52°C D.B. [50 to 126 °F D.B.], when connecting following models: PKFY-P15/20/25VBM, PFFY-P20/25/32VLE(R)M, PFFY-P20/25/32VKM, and M series , S series , and P series type indoor unit with branch box , M series type indoor unit with connection kit.
*4 −15 to 52°C D.B. [5 to 126 °F D.B.]:, when using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor unit listed in *3.
*5 94 (207), for PUMY-SP112/125/140VKM2-BS.
*6 At least two indoor unit must be connected when using branch box.
*7 It is possible to set the External static pressure to 30 Pa by Dip Switch.

Unit converter

kcal/h = kW × 860
BTU/h = kW × 3,412
cfm = m^3/min × 35.31
lb = kg/0.4536

Above specification data is subject to rounding variation.

1. SPECIFICATIONS

Model					PUMY-SP112YKM2(-BS)	PUMY-SP125YKM2(-BS)	PUMY-SP140YKM2(-BS)
Power source					3-phase 380-400-415V, 50 Hz; 3-phase 380 V, 60 Hz		
Cooling capacity (Nominal)	*1	kW			12.5	14.0	15.5
	*1	kcal/h			10,750	12,040	13,330
	*1	BTU/h			42,650	47,768	52,886
	Power input	kW			4.46	5.11	5.34
	Current input	A			7.14-6.78-6.54, 7.14	8.18-7.77-7.49, 8.18	8.55-8.12-7.83, 8.55
	EER	kW/kW			2.80	2.74	2.90
Temp. range of cooling	Indoor	W.B.			15 ~ 24°C (59 ~ 75°F)		
	Outdoor *3*4	D.B.			-5 ~ 52°C (23 ~ 126°F)		
Heating capacity (Nominal)	*2	kW			14.0	16.0	16.5
	*2	kcal/h			12,040	13,760	14,190
	*2	BTU/h			47,768	54,592	56,298
	Power input	kW			3.66	4.31	4.36
	Current input	A			5.86-5.57-5.36, 5.86	6.90-6.55-6.32, 6.90	6.98-6.63-6.39, 6.98
	COP	kW/kW			3.83	3.71	3.78
Temp. range of heating	Indoor	D.B.			15 ~ 27°C (59 ~ 81°F)		
	Outdoor	W.B.			−20 ~ 15°C (-4~ 59°F)		
Indoor unit connectable	Total capacity				50 to 130% of outdoor unit capacity		
	Model/ Quantity	CITY MULTI			P10-P140/12	P10-P140/12	P10-P140/12
		Branch box *6			P15-P100/8	P15-P100/8	P15-P100/8
		Mixed system	Branch box 1unit *6	CITY MULTI	P10-P140/5	P10-P100/5	P10-P140/5
				Branch box	P15-P100/5	P15-P100/5	P15-P100/5
			Branch box 2unit *6	CITY MULTI	P10-P140/3	P10-P140/3	P10-P140/3
				Branch box	P15-P100/8	P15-P100/8	P15-P100/8
Sound pressure level (measured in anechoic room)		dB <A>			52/54	53/56	54/56
Sound power level (measured in anechoic room)		dB <A>			72/74	73/76	74/76
Refrigerant piping diameter	Liquid pipe	mm (in.)			9.52 (3/8) Flare		
	Gas pipe	mm (in.)			15.88 (5/8) Flare		
FAN	Type × Quantity				Propeller Fan × 1		
	Air flow rate	m³/min			77	83	83
		L/s			1283	1383	1383
		cfm			2719	2931	2931
	Control, Driving mechanism				DC control		
	Motor output	kW			0.20 × 1		
	External static press.				0Pa/30Pa *7		
Compressor	Type × Quantity				Twin rotary hermetic compressor × 1		
	Manufacture				Mitsubishi Electric Corporation		
	Starting method				Inverter		
	Motor output	kW			3.9	3.8	4.1
	Case heater	kW			0		
	Lubricant				FV50S (1.4litter)		
External finish					Galvanized Steel Sheet Munsell No. 3Y 7.8/1.1		
External dimension H × W × D		mm			981 × 1,050 × 330(+40)		
		in.			38-5/8 × 41-3/8 × 13 (+1-37/64)		
Protection devices	High pressure protection				High pressure Switch		
	Inverter circuit (COMP./FAN)				Overcurrent detection, Overheat detection(Heat sink thermistor)		
	Compressor				Compressor thermistor, Overcurrent detection, Compressor protector		
	Fan motor				Overheating, Voltage protection		
Refrigerant	Type × original charge				R410A×3.5 kg (8 lbs)		
	Control				Liner expansion valve		
Net weight		kg (lbs)			94 (207) *5		
Heat exchanger					Cross Fin and Copper tube		
HIC circuit (HIC: Heat Inter-Changer)					HIC circuit		
Defrosting method					Reversed refrigerant circuit		
Drawing	External				RK01B171		
	Wiring				BH79J996		
Standard attachment	Document				Installation Manual		
	Accessory				Grounded lead wire		
Optional parts					Joint: CMY-Y62-G-E Header: CMY-Y64/68-G-E Branch box: PAC-MK34/54BC		
Remarks					1. Nominal conditions *1, *2 are subject to ISO 15042. 2. Due to continuing improvement, above specifications may be subject to change without notice.		

Note:

	*1 Nominal cooling conditions	*2 Nominal heating conditions
Indoor :	27°C D.B./19°C W.B. [81°F D.B/66°F W.B.]	20°C D.B. [68°F D.B.]
Outdoor :	35°C D.B. [95°F D.B.]	7°C D.B./6°C W.B. [45°F D.B./43°F W.B.]
Pipe length :	7.5 m [24-9/16 ft]	7.5 m [24-9/16 ft]
Level difference :	0 m [0 ft]	0 m [0 ft]

*3 10 to 52°C D.B. [50 to 126 °F D.B.], when connecting following models: PKFY-P15/20/25VBM, PFFY-P20/25/32VLE(R)M, PFFY-P20/25/32VKM, and M series , S series , and P series type indoor unit with branch box , M series type indoor unit with connection kit.
*4 −15 to 52°C D.B. [5 to 126 °F D.B.], when using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor unit listed in *3.
*5 95 (209), for PUMY-SP112/125/140YKM2-BS.
*6 At least two indoor unit must be connected when using branch box.
*7 It is possible to set the External static pressure to 30 Pa by Dip Switch.

Unit converter

kcal/h = kW × 860
BTU/h = kW × 3,412
cfm = m³/min × 35.31
lb = kg/0.4536

Above specification data is subject to rounding variation.

APPENDIX D

RELEVANT POLICY & GUIDANCE

National Planning Policy Framework (NPPF) – December 2023

Under the NPPF: paragraph 191 of Section 15, with regard to environmental noise; Planning policies and decisions should aim to: -

> mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
>
> identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Noise Policy Statement for England (NPSE)

To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to NPSE. The NPSE was published in March 2010 and covers all forms of noise, other than occupational noise. For the purposes of this report, "Neighbourhood Noise" is most relevant as NPSE defined at paragraph 2.5:

"neighbourhood noise which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street. "

NPSE introduces three concepts to the assessment of noise in the UK:

> 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.

NPSE does not numerically define levels for the NOEL, LOAEL or SOAEL rather it 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.

National Planning Practice Guidance (2023)

The purpose of the guidance is to complement the NPPF and provide advice on how to deliver its policies.

The guidance includes a table (as shown in Table 1) that summarises "the noise exposure hierarchy, based on the likely average response" and which offers "examples of outcomes" relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but no such that there is a change in the quality of life.	No Observed Adverse Effect Level	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect Level	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 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 Level	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Table 1: Noise Exposure Hierarchy, Based on the Likely Average Response.

Calculation of Road Traffic Noise – 1988

For new developments, road traffic noise levels should be predicted in accordance with CRTN. This prediction method uses the traffic flow, vehicle speed, and percentage of heavy-duty vehicles (HDVs, over 3.5 tonnes), road gradient and other factors to calculate noise levels at receptor points.

Design Manual for Road and Bridges, Volume 11 (LA111 – Noise and Vibration

Changes in noise level as a result of additional vehicles on the public highway can be assessed using methodologies presented in Design Manual for Road and Bridges (DMRB LA111),

This guidance document sets out the requirements for noise and vibration assessments from road projects. The construction, operation and maintenance of highway projects can lead to changes in noise and vibration levels in the surrounding environment.

The magnitude of change (in sound level) is defined in Table 3.54a of the guidance for short term and Table 3.54b for long term, as presented in Table 2:

Short term magnitude	**Short term noise change (dB $L_{A10,18hr}$ or L_{night})**
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	less than 1.0

Long term magnitude	**Long term noise change (dB $L_{A10,18hr}$ or L_{night})**
Major	Greater than or equal to 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	less than 3.0

Table 2 (Table 3.54a and b DMRB, LA 111 - Magnitude of Change)

Control of Pollution Act 1974

The local authority has powers under the Control of Pollution Act 1974 to control noise from construction sites. Section 60 of the Act allows a local authority to serve a notice of its requirements for the control of site noise. This notice may include specification of plant that is or is not to be used, hours during which the construction works can be carried out and levels of noise emission. Section 61 of the Act allows a contractor or developer to take the initiative and agree with the local authority the methods of construction, steps to minimise noise and hours of work.

The Environmental Protection Act 1990

Local authorities have a duty to deal with statutory nuisances under the Environmental Protection Act 1990. For noise to amount to a statutory nuisance, it must be "prejudicial to health or a nuisance" as outlined in Section 79 of the Act. Any proposed development should not result in a statutory nuisance being declared.

Should the Local Authority declare a development to cause a statutory nuisance, an abatement notice can be served to the developer who has up to 21 days to appeal to Magistrates' Court, as detailed in Section 80 of the Act.

BS4142:2014 Methods for rating industrial and commercial sound

BS4142:2014 uses a comparison between the rating and background sound levels to establish an initial estimate of the likely significance of impact. The standard notes:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) 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 context of the assessment must then be considered, which can significantly alter the outcome of the assessment. Factors that might alter the outcome of the assessment include the absolute level of sound compared to the residual sound level, the character of the sound compared to the residual, the sensitivity of the receptor etc.

The London Plan 2021

The latest version of the London Plan, as published in March 2021, provides an overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. The 'Publication London Plan' brings together the geographic and locational aspects of the Mayor's other strategies, including a range of environmental issues such as climate change (adaptation and mitigation), air quality, noise and waste.

The most relevant guidance in terms of the impact and assessment of noise is found within Policy D14: Noise, which states:

"...Policy D14 Noise

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 D13 Agent of Change

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…"

Policy D14: Noise refers to Policy D13: Agent of Change, which states:

"…Policy D13 Agent of Change

A The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development. Boroughs should ensure that Development Plans and planning decisions reflect the Agent of Change principle and take account of existing noise and other nuisance generating uses in a sensitive manner when new development is proposed nearby.

B Developments should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them.

C New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.

D Development proposals should manage noise and other potential nuisances by:

1) ensuring good design mitigates and minimises existing and potential nuisances generated by existing uses and activities located in the area

2) exploring mitigation measures early in the design stage, with necessary and appropriate provisions including ongoing and future management of mitigation measures secured through planning obligations

3) separating new noise-sensitive development where possible from existing noise-generating business and uses through distance, screening, internal layout, sound-proofing, insulation and other acoustic design measures.

E Boroughs should not normally permit development proposals that have not clearly demonstrated how noise and other nuisances will be mitigated and managed…"

Barnet London Borough Council - Sustainable Design and Construction (SD&C) SPD 2013

The revised SD&C SPD focuses on the design standards required for differing scales of developments. Table 2.14.3 has been included from the SPD highlighting Noise Quality Requirements within the Borough of Barnet.

Table 2.14.3: Noise Quality Requirements	Development Scale
To help consider noise at a site at an early stage an initial noise risk assessment should assess the Noise Risk Category of the site to help provide an indication of the likely suitability of the site for new residential development from a noise perspective.	Minor, Major, or Large scale developments
A Noise Impact Assessment is required for proposed residential development which is likely to be exposed to significant noise and/or vibration or cause a noise and/or vibration impact. For all noise-sensitive and noise creating developments the council will refer to the standards set out for internal and external noise levels in BS8233 (2014) and to the approach of BS4142:2014.	Minor, Major, or Large scale developments
The adverse impacts of noise should be minimised, using measures at source or between source and receptor (including choice and location of plant or method, layout, screening and sound absorption) in preference to sound insulation at the receptor, wherever possible.	All development
Any proposed plant and machinery shall be operated so as to ensure that any noise generated is at least 5dB(A) below the background level, as measured from any point 1 m outside the window of any room of a neighbouring residential property. Plant should also be installed to ensure that no perceptible noise or vibration is transmitted through the structure to adjoining premises.	All development with plant and machinery or activity which potentially has a noise impact

APPENDIX E

ACOUSTIC TERMINOLOGY

The effects of noise on human beings may be expressed in terms of physiological damage and annoyance. It is, however, only the annoyance impacts that need to be considered in detail when addressing environmental noise impacts. Annoyance also includes the immediate effects of activity interference, for example sleep disturbance and speech interference.

The practice has become to measure sound levels in decibels (dB). The decibel scale is logarithmic rather than linear and it is useful to bear in mind that a noise level change of 3dB would be equivalent to doubling the energy level (for example doubling the volume of traffic) and that an increase of 10 dB is perceived, subjectively, as a doubling of loudness. The human ear responds differently to sounds of different frequency. The ear perceives high frequency sound of a given sound pressure level more loudly than a low frequency sound at the same level. The A-weighted sound level, dB(A), takes this response into consideration and is commonly used for measurement of environmental noise in UK. It thus indicates the subjective human response to sound.

Environmental noise levels vary continuously from second to second, it is clearly impractical to specify the sound level continuously and thus time averaging is required. In practice human response has been related to various units which include allowance for the fluctuating nature of sound with time. For the purpose of this report these include:

LAeq,T : the equivalent A-weighted continuous sound level.

This unit relates to the equivalent level of continuous sound for a specific time period T, for example 16 hours for daytime noise. It contains all the sound energy of the varying sound levels over the same time period and expresses it as a continuous sound level over that period. The unit is used for assessing traffic and industrial noise for planning purposes and in particular for PPG24.

LA10,T : the A-weighted level of sound exceeded for 10% of the time period T.

This unit is used for traffic noise measurement and is the preferred unit for prediction of traffic noise in the publication, 'Calculation of Road Traffic Noise'.

LA90,T : the A-weighted level of sound exceeded for 90% of the time period T.

This unit is commonly used to represent the background noise and is used in assessing the effects of industrial noise in UK.

LAmax : the maximum A-weighted level of sound over a period of measurement.

LAr,T : the rating level.

The specific Noise plus any adjustments for the characteristic features of the noise. Used for comparison between background levels with the noise source off.

SEL : the Sound Exposure Level.

Sound exposure level abbreviated as SEL and LAE, is the total noise energy produced from a single noise event condensed into a 1 second time period.

Rw : weighted sound reduction index.

A laboratory-measured value as defined in ISO717 Part 1.

DnTw :

The equivalent of Rw, but measured onsite as oppose to in a laboratory