

## Centric Close, Oval Road London, NW1 7EP

### Mechanical Services Plant Noise Impact Assessment

**Report ref.**

RK3196/21183/Rev 0

**Issued to**

Stirling Grey Limited

**Prepared by**

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## 1. INTRODUCTION

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Stirling Grey Limited are seeking planning permission to install new mechanical services plant at Centric Close in Camden. The proposed equipment would be located externally at the rear of a ground floor commercial unit which has flats directly above. Accordingly, a noise impact assessment is required.

Spectrum Acoustic Consultants have been instructed by Stirling Grey to carry out a Noise Impact Assessment to support the application. This report is submitted with the intention of providing sufficient information to both inform and satisfy the requirements of the Local Planning Authority.

## 2. SITE DESCRIPTION & PROPOSALS

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The site is located at Centric Close, Oval Road, NW1 7EP. The scheme is part of a wider development consisting of commercial units at ground floor level, with apartments directly above. Bounding the site to the north are existing flats. To the east are existing commercial and residential properties fronting on to Oval Road. Bounding the site to the south and west is a busy railway line leading Euston Station. An existing site location plan is included in Appendix A.

Proposals involve installing an external air conditioning condenser unit close to existing mechanical plant within a courtyard on the west side of the building. The unit would provide cooling air to a commercial unit which occupies the basement of the building. The commercial unit would be used during normal office hours only i.e. typically 08:00 to 18:00. Scheme proposals are included in Appendix B.

## 3. NOISE CRITERIA

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### 3.1 BS 4142:2014 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

The noise impact assessment relating to mechanical plant will be carried out in accordance with the procedures set out in BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*. The principle of BS 4142 is to determine an initial estimate of impact of industrial/commercial sound on nearby residents by comparing the Rating Level (sound level from the industrial/commercial source, with a correction applied for any acoustic features that characterise the sound) with the Background Sound Level ( $L_{A90}$  as measured in absence of the industrial/commercial source).

Generally, the greater the difference by which the Rating Level exceeds the Background Sound Level, the greater the magnitude of impact. BS 4142 states that *'a difference of around +10 dB or more is likely to be an indication of a significant adverse impact [...]. A difference of around +5 dB is likely to be an indication of an 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.'*

However, BS 4142 also advises that *'when making assessments and arriving at decisions [ ... ] it is essential to place the sound in context'* so in each case, the context in which the sound is placed must be considered and the initial estimate of impact should be modified accordingly. For example it advises *'Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.'* It also indicates that impacts estimated during *'the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.'*



### 3.2 GUIDELINES FOR COMMUNITY NOISE - WORLD HEALTH ORGANIZATION, 1999 (WHO)

Table 4.1 of WHO references a guideline façade level of  $L_{Aeq,8 \text{ hour}}$  45dB outside of bedrooms during the night time to avoid sleep disturbance. During the daytime and evening, Table 4.1 recommends a guideline noise level of  $L_{Aeq,16 \text{ hour}}$  55dB for outdoor living areas to avoid serious annoyance. Whilst noise levels outside of living rooms during the daytime are not listed in Table 4.1, a guideline internal level of  $L_{Aeq,16 \text{ hour}}$  35dB for habitable rooms is provided to avoid moderate annoyance. Given that a difference of 15dB(A) between noise levels outside and inside of bedrooms during the night time is stated, a guideline noise level of  $L_{Aeq,16 \text{ hour}}$  50dB outside of living rooms may be assumed.

### 3.3 CAMDEN COUNCIL'S PLANT NOISE CRITERIA

#### 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).

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 57dBLAmax	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB LAmax	'Rating level' greater than 5dB above background and/or events exceeding 88dBLAmax

**Table 1:** Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

\*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 1 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.

#### 4. BACKGROUND NOISE MEASUREMENT SURVEY

To inform the noise impact assessment, measurements of existing background noise levels were carried out during a noise survey conducted at the site during the daytime when the proposed unit would operate on Friday 21 May 2021. Weather conditions during the survey were mild and dry, with low wind speeds, presenting good conditions for noise measurement purposes.

Attended measurements of noise were carried out at the rear of the building in accordance with BS 4142:2014. The monitoring location is considered representative of the nearest noise sensitive residential receptor locations to the proposed condenser unit. Measurements consisted of continuous 15 minute periods. The microphone was mounted on a pole at first floor level. The location of the microphone is shown on the existing site location plan included in Appendix A.

The following instrumentation was used during the survey.

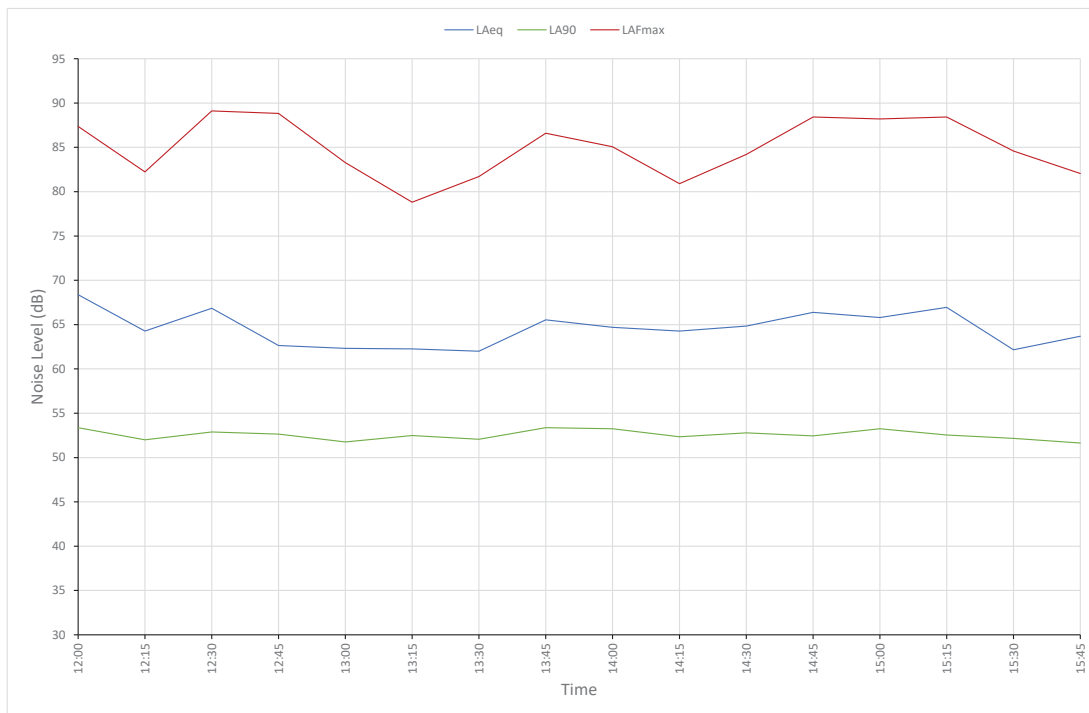
- Bruel & Kjaer Type 2250 Sound Level Meter s/n 2726905
- Bruel & Kjaer Type 4189 Microphone s/n 2710995
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2730220

Before and after the survey, the sound level meter was field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The meter, microphone and field calibrator are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

Measurements made were of the following parameters:

- Maximum Noise Level – defined as the maximum ( $L_{Amax}$  the maximum noise level)
- Residual Noise Level – defined as the Energy Average Level of a period, in the absence of noise from the proposed development ( $L_{Aeq}$ )
- Background Noise Level – defined as level exceeded for 90% of a period, in the absence of the noise from the proposed development ( $L_{A90}$ )

The measured noise profile at the noise monitoring location is shown in the following chart.



**Chart 1:** Ambient noise profile – Friday 21 May 2021.

When determining the representative background  $L_{A90,T}$  level for the relevant period, BS 4142<sup>1</sup> guidance states “a representative level ought to account for the range in background levels and ought not automatically to be assumed to be either the minimum or modal value.” With this in mind, statistical analysis has been used to determine the typical background  $L_{A90,T}$  noise level. This analysis derives the Mode, Mean and Mean -1 standard deviation values. Once these three values have been established, a judgement is made as to which value is considered representative. In this instance, both the mean and modal values were the same. Therefore this value is regarded as being representative.

Table 2 shows the representative background noise level measured at the nearest noise sensitive receptor location, during the daytime period when the plant items would be operating.

Measurement Location	Period	Background Noise Level
Nearest Flats directly above	08:00 – 18:00	$L_{A90,1hour}$ 53 dB

**Table 2:** Summary of the representative background noise level measured during the sensitive daytime period

As shown in Table 2, the representative background noise level at the nearest noise sensitive receptors to the proposed mechanical plant is  $L_{A90,1hour}$  53dB during the daytime when the unit would be operating. This reflects a typical steady noise profile controlled by other nearby mechanical plant in the area.

<sup>1</sup> BS 4142:2014 Methods for rating and assessing industrial and commercial sound



## 5. ASSESSMENT OF NOISE IMPACT

### 5.1 PROJECTED NOISE FROM MECHANICAL PLANT

The proposed new external condenser unit would be located close to existing units within the courtyard at the back of the site. The noise output (sound power level) generated by the unit is set out in Table 3 below.

Plant Item	Overall Sound Power Level dB(A)
Daikin REYQ12U Condenser Unit	81

**Table 3:** Sound power level of the proposed external mechanical plant

Predictions of how the noise from the mechanical plant source propagates to sensitive community receptors, has been determined by noise modelling using proprietary software (Predictor<sup>2</sup>) which meets the requirement of ISO 9613 Part 2:1996<sup>3</sup>. The noise model takes account of the following in its calculations procedures:

- Source sound power level (for point, line and area sources)
- Reflection from nearby structures and source directivity
- Distance from noise source (geometric spreading)
- Atmospheric absorption
- Acoustic screening of intervening structures and topography
- Ground absorption
- Ground effects (which includes the height of ground relative to the noise source)

Detailed noise calculations, providing information on the total specific noise level at each receptor are computed. To illustrate the scheme, a diagram showing the location of the mechanical plant noise source, superimposed on a 3D view of the site, is included in Appendix C.

Note, the condenser unit operates on thermostatic, speed and timer controls according to heat loads and occupation rates and so would not be operating 100% of the time. Whilst a typical on-time for this type of equipment might only 20-35%, a conservative and therefore more robust assessment assumes a 50% on-time for a typical worst-case scenario.

Predicted specific noise levels from the proposed new plant at each of the nearby sensitive receptor locations for the daytime operating scenario are provided in Table 4 below.

Receptor	$L_{Aeq}$ dB(A)	$L_{Aeq}$ Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
R1. Plot 35 (1st Floor)	46	21	30	36	41	41	36	30	23
R2. Plot 36 (1st Floor)	49	24	32	40	45	44	39	34	28
R3. Plot 53 (3rd Floor)	42	19	27	33	38	38	33	27	20
R4. Plot 54 (3rd Floor)	46	23	31	37	42	41	36	31	24

**Table 4:** Predicted specific noise contribution from the proposed new mechanical services plant at the nearest sensitive receptor locations.

<sup>2</sup> Bruel and Kjaer – Predictor V7 Environmental Noise Calculation Software Package, Type 7810

<sup>3</sup> ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation to determine Noise Levels"



As indicated in Table 4, predicted noise levels at the nearest sensitive receptor locations, from the proposed new mechanical services plant would be  $L_{Aeq}$  42-49dB.

## 5.2 MECHANICAL PLANT NOISE IMPACT ASSESSMENT

The proposed plant item would run during office hours only. Therefore, the predicted plant rating levels will be compared with the representative  $L_{A90,1hour}$  background noise level measured during the daytime at the nearest sensitive receptor locations.

Table 5 shows a BS 4142 assessment covering the mechanical plant noise impact during the daytime. The proposed new unit does not emit any distinct tones or impulses. There is also existing plant operating in the vicinity of the nearest sensitive receptors. Therefore, the proposals would result in no change in the character of the noise currently experienced and no acoustic feature correction has been included in the rating level.

Residential Location	Rating Level (dB)	Background $L_{A90}$ Noise Level (dB)	Assessment Level (dB) (Background excess)
R1. Plot 35 (1st Floor)	46	53	-7
R2. Plot 36 (1st Floor)	49	53	-4
R3. Plot 53 (3rd Floor)	42	53	-11
R4. Plot 54 (3rd Floor)	46	53	-7

**Table 5:** Predicted rating levels from the proposed plant items at the nearby sensitive receptor locations, compared with the representative background  $L_{A90,1hour}$

As indicated in Table 5, the predicted rating levels would be 42-49dB at the nearby residential receptor locations. The predicted rating levels would be 4-11dB lower than the representative background  $L_{A90,1hour}$  level. In line with BS 4142:2014, the noise impact would be low. The difference between the rating levels and background levels is such that any uncertainty would have no significance on the outcome of the assessment.

The predicted plant noise levels would be lower than the criteria set out in Guidelines for Community Noise - World Health Organization, 1999.

The predicted rating levels would fall within Camden Council's amber noise criteria which falls between 9dB below and 5dB above background at all of the nearby residential receptor locations. The unit would only be required to operate during daytime hours when cooling is needed in the office space and the predicted rating levels would not exceed the background level, indicating a low noise impact. Furthermore, in order to reduce noise levels from the unit, an acoustic enclosure would be required. Such a mitigation measure would be onerous, particularly given the costs involved. Therefore, on balance, noise levels from the proposed plant would be acceptable.





## **6. CONCLUSIONS**

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At the request of the Local Planning Authority, a noise assessment has been completed relating to the potential impact of noise produced by the operation of proposed mechanical services plant at Centric Close in Camden, NW1 7EP.

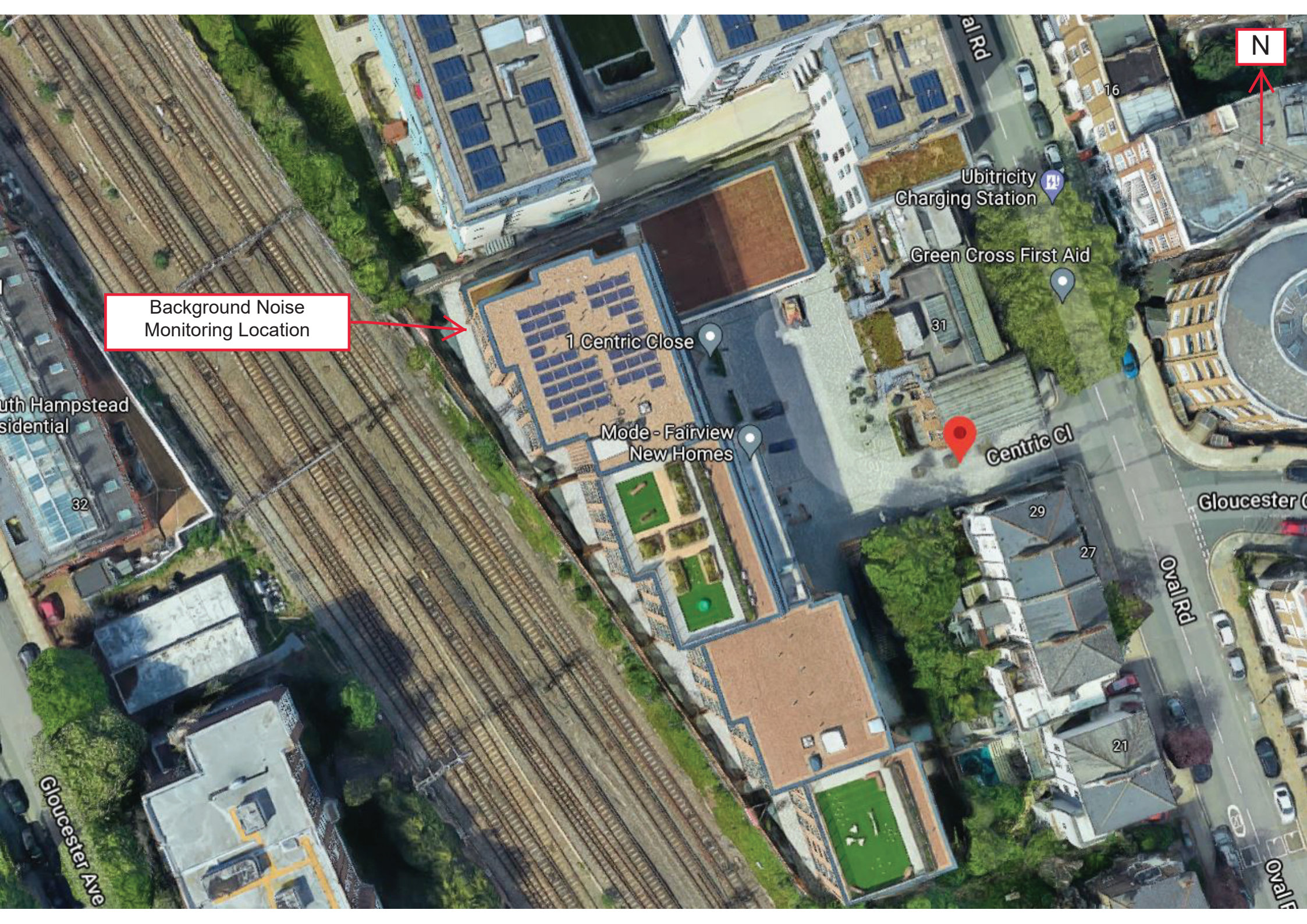
A background noise measurement survey has been conducted at a location representative of the nearest noise sensitive receptors to the proposed plant and predictions of noise have been completed.

Noise limits for the proposed mechanical plant have been established for the sensitive daytime period, based on the representative background noise level and taking account of BS 4142, WHO and Camden Council's criteria for noise. Predictions have indicated that noise levels from mechanical services plant would have a low impact and would therefore be acceptable.

## **A P P E N D I X   A**

Existing Site Location Plan





Background Noise  
Monitoring Location

Ubitricity  
Charging Station

Green Cross First Aid

1 Centric Close

Mode - Fairview  
New Homes

Centric Cl

Gloucester C

Oval Rd

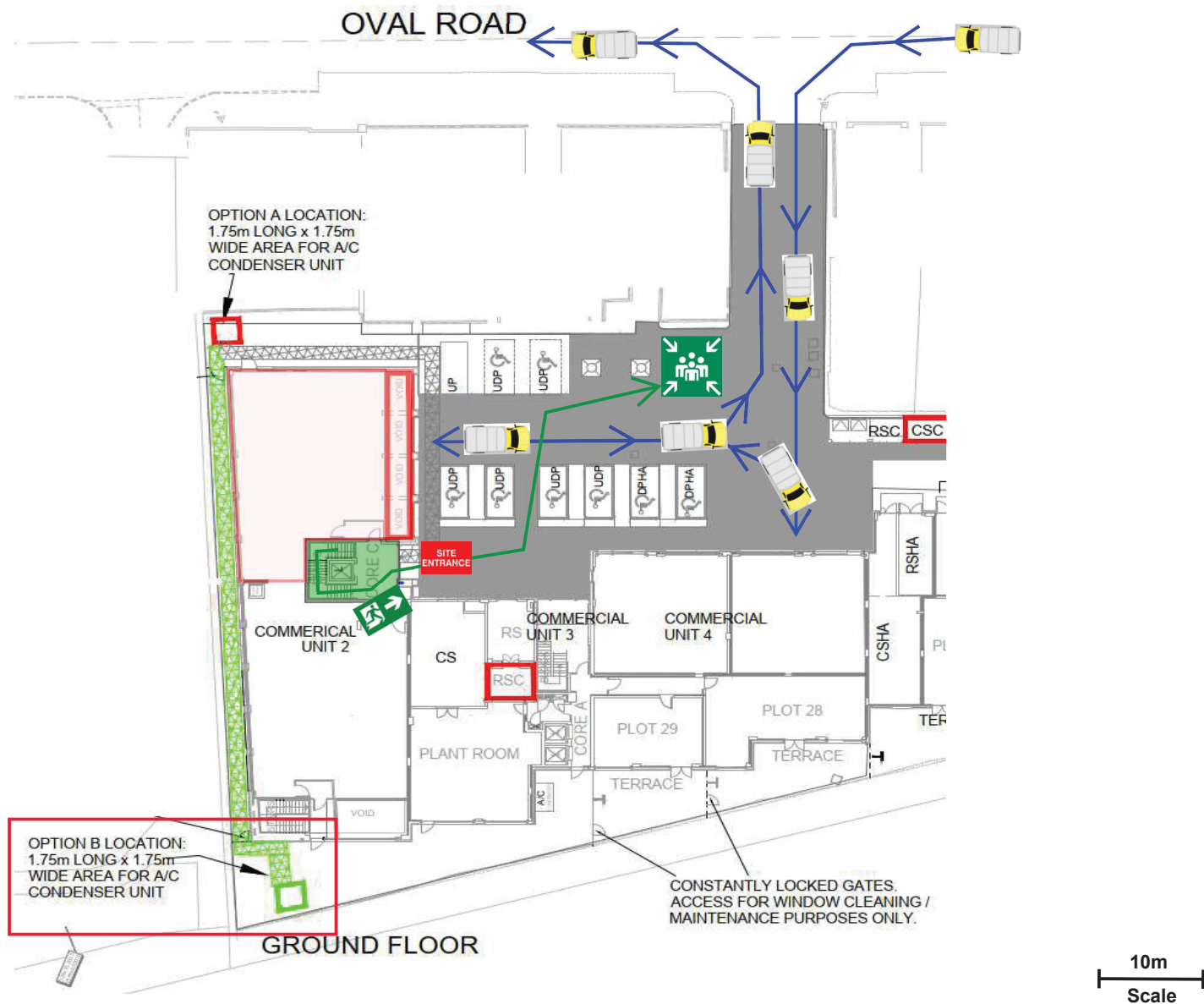
Gloucester Ave

South Hampstead  
Residential



## **APPENDIX B**

Scheme Proposals



SAFE ZONE

SITE BOUNDARIES

MATERIALS STORAGE

CONTRACTORS PARKING

Site Traffic Route

Site Traffic

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SITE ENTRANCE

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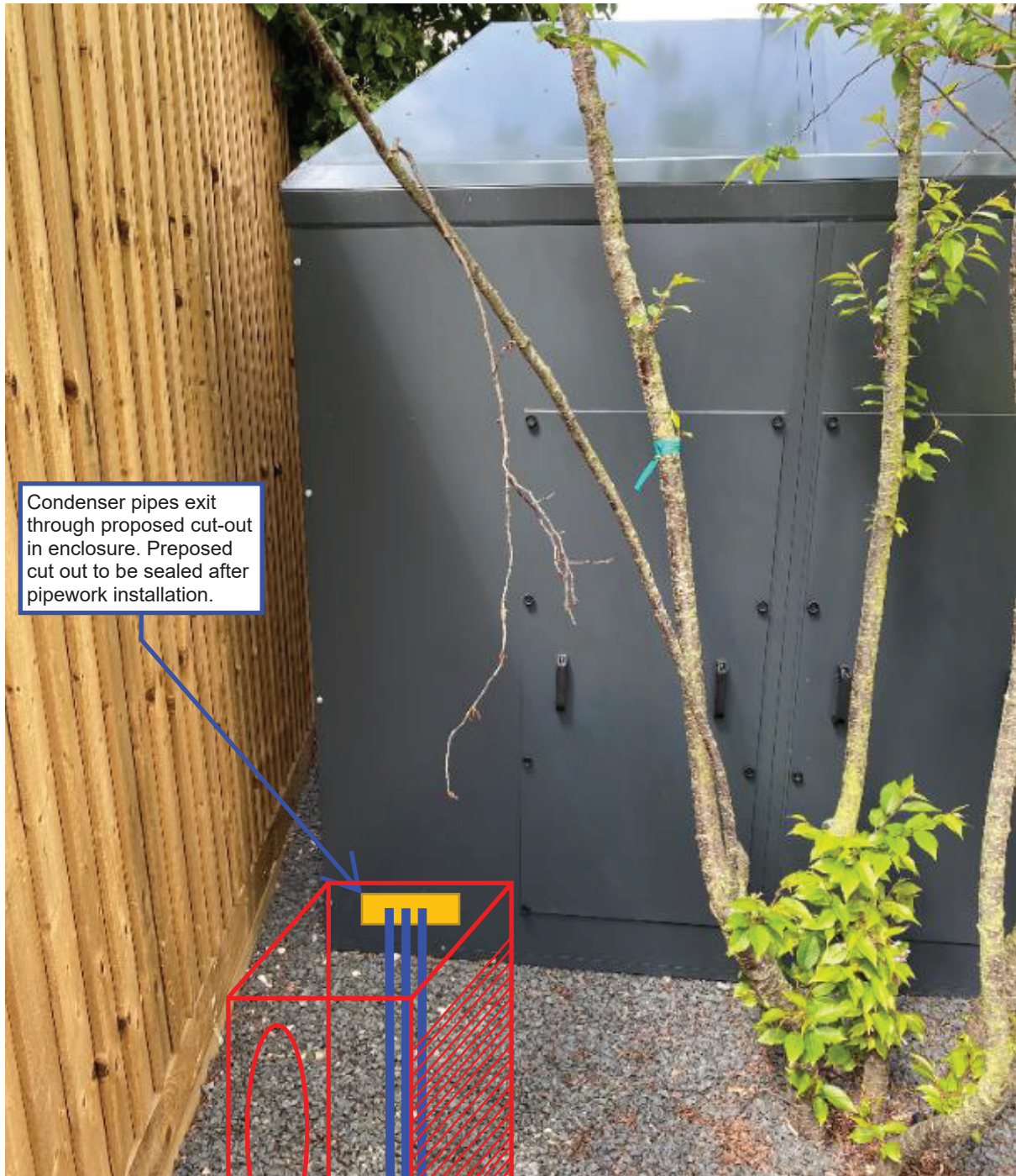
Site Logistics Plan

Ground Floor

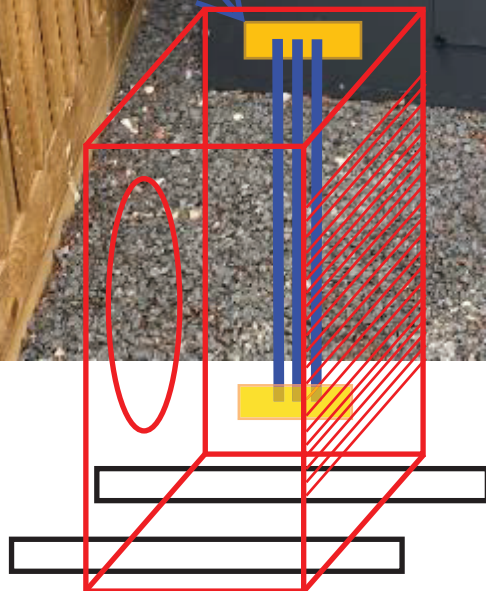
Client:  
Eccentric Investments LLP

Site Address:  
Unit 1  
2 Centric Close  
London  
NW1 7EP

ON DISCOVERING A FIRE	ON HEARING THE ALARM	FIRE ASSEMBLY POINT	FIRE PLAN LEGEND
<p>Raise the alarm by using the nearest fire alarm call point.</p> <p>Leave by the nearest fire exit.</p> <p>Proceed directly to your assembly point.</p>	<p>Leave by the nearest fire exit.</p> <p>Proceed directly to your assembly point.</p> <p><b>DO NOT</b> stop to collect personal belongings.</p>	<p>In the car park by the exit</p>	<div>  Fire Exit </div> <div>  Fire Extinguisher &amp; Call Point </div> <div>  Fire Escape Route </div>



Condenser pipes exit through proposed cut-out in enclosure. Preposed cut out to be sealed after pipework installation.



Condenser pipes entering through existing cut-out in enclosure.







# Air Conditioning Technical Data

VRV IV heat recovery



EEDEN14-200\_4

REYQ-T

## 2 Specifications

2-1 Technical Specifications				REYQ8T	REYQ10T	REYQ12T	REYQ14T	REYQ16T	REYQ18T	REYQ20T	
Capacity range			HP	8	10	12	14	16	18	20	
Cooling capacity	Nom.		kW	22.4 (1)	28.0 (1)	33.5 (1)	40.0 (1)	45.0 (1)	50.4 (1)	56.0 (1)	
Heating capacity	Nom.		kW	22.4 (1)	28.0 (1)	33.5 (1)	40.0 (1)	45.0 (1)	50.4 (1)	56.0 (1)	
	Max.		kW	25.0 (1)	31.5 (1)	37.5 (1)	45.0 (1)	50.0 (1)	56.5 (1)	63.0 (1)	
Power input - 50Hz	Cooling	Nom.	kW	5.31	7.15	9.23	10.7	12.8	15.2	18.6	
	Heating	Nom.	kW	4.75	6.29	8.05	9.60	11.2	12.3	14.9	
		Max.	kW	5.51	7.38	9.43	11.3	12.9	14.3	17.5	
EER				4.22	3.92	3.63	3.74	3.52	3.32	3.01	
Maximum number of connectable indoor units				64 (1)							
Indoor index connection	Min.			100	125	150	175	200	225	250	
	Nom.			200	250	300	350	400	450	500	
	Max.			260	325	390	455	520	585	650	
COP - Max.				4.54	4.27	3.98		3.88	3.95	3.60	
COP - Nom.				4.72	4.45	4.16	4.17	4.02	4.10	3.76	
ESEER - Automatic				7.41	7.37	6.84	7.05	6.63	6.26	5.68	
Dimensions	Unit	Height	mm	1,685							
		Width	mm	930			1,240				
		Depth	mm	765							
	Packed unit	Height	mm	1,820							
		Width	mm	1,000			1,310				
		Depth	mm	835							
Weight	Unit	kg	210	218		304	305	337			
	Packed unit	kg	226	234		320	321	353			
Packing	Material			Carton							
	Weight	kg		2.00			3.00				
Packing 2	Material			Wood							
	Weight	kg		17.00			18.50				
Packing 3	Material			Plastic							
	Weight	kg		0.50							
Casing	Colour			Daikin White							
	Material			Painted galvanized steel plate							
Heat exchanger	Type			Cross fin coil							
	Fin	Treatment		Anti-corrosion treatment							
ESEER - Standard				6.25	5.78	5.36	5.45	5.14	4.84	4.39	
Compressor	Quantity			1			2				
	Model			Inverter							
	Type			Hermetically sealed scroll compressor							
	Crankcase heater	W		33							
Compressor 2	Model			-			Inverter				
	Type			-			Hermetically sealed scroll compressor				
	Crankcase heater	W		-			33				
Fan	Type			Propeller fan							
	Quantity			1			2				
	Air flow rate	Cooling	Nom.	m³/min	162	175	185	223	260	251	261
	External static pressure	Max.	Pa		78						
	Discharge direction				Vertical						
Fan motor	Quantity			1			2				
	Model			Brushless DC motor							
	Output	W		750							
Fan motor 2	Model			-			Brushless DC motor				
	Output	W		-			750				
Sound power level	Cooling	Nom.	dBA	78	79	81		86		88	
Sound pressure level	Cooling	Nom.	dBA	58		61		64	65	66	

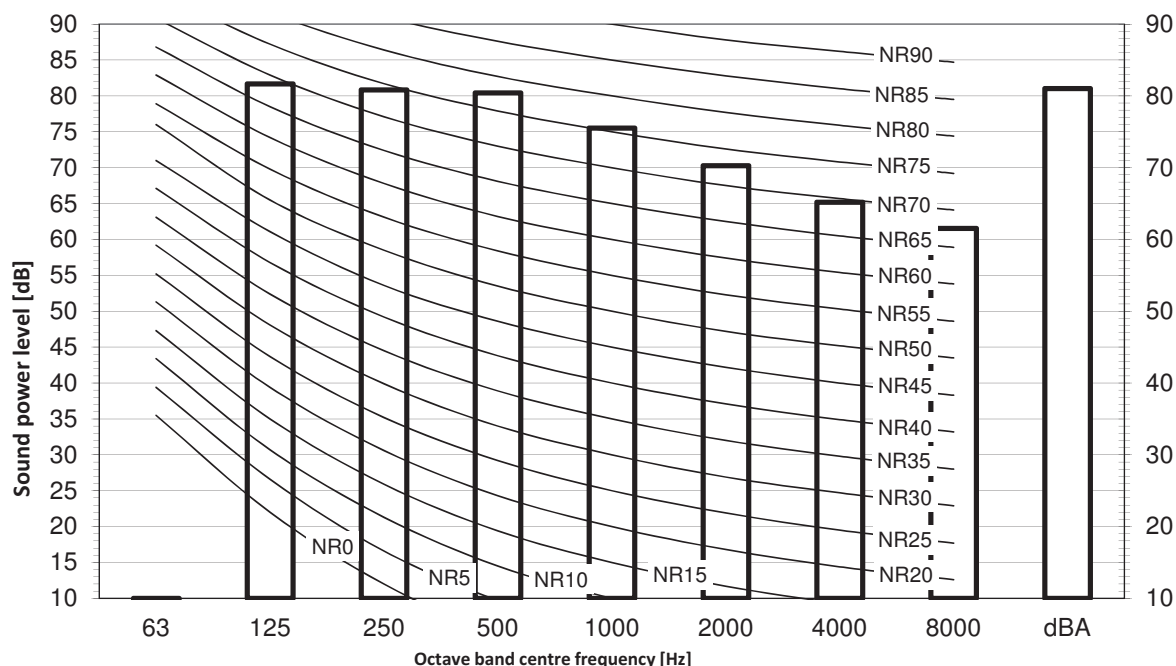


# 11 Sound data

## 11 - 1 Sound Power Spectrum

11

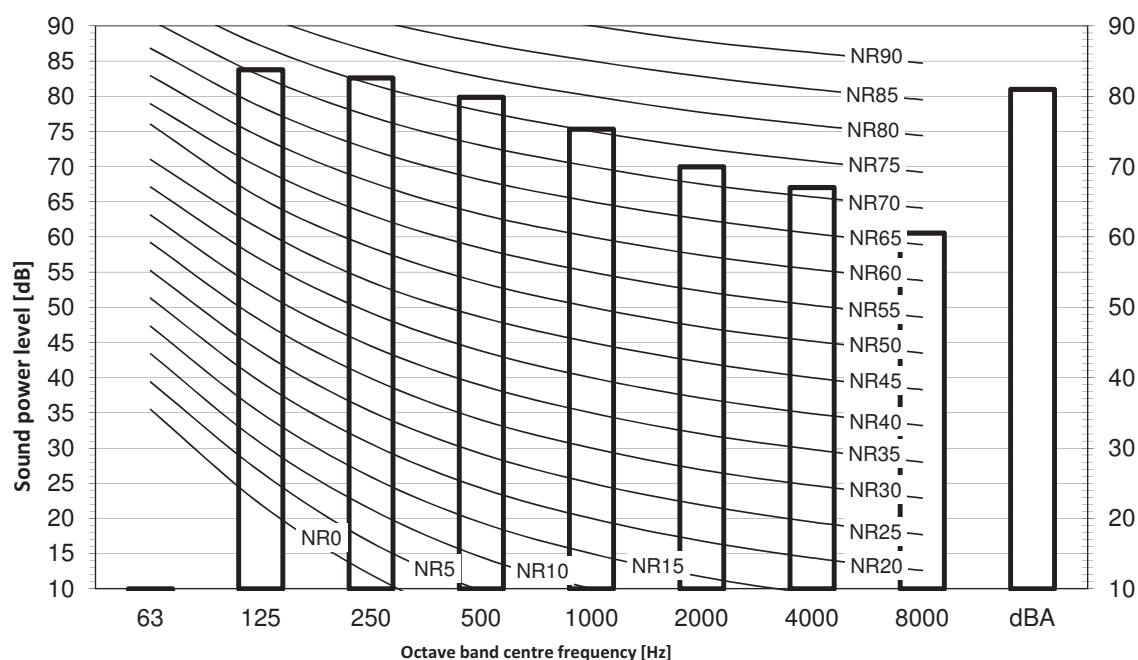
### REYQ12T



- Notes :
1. dBA = A-weighted sound power level (A scale according to IEC).
  2. Reference acoustic intensity 0dB =  $10^{-6}$  W/m<sup>2</sup>.
  3. Measured according to ISO 3744

3D079909B

### REYQ14T

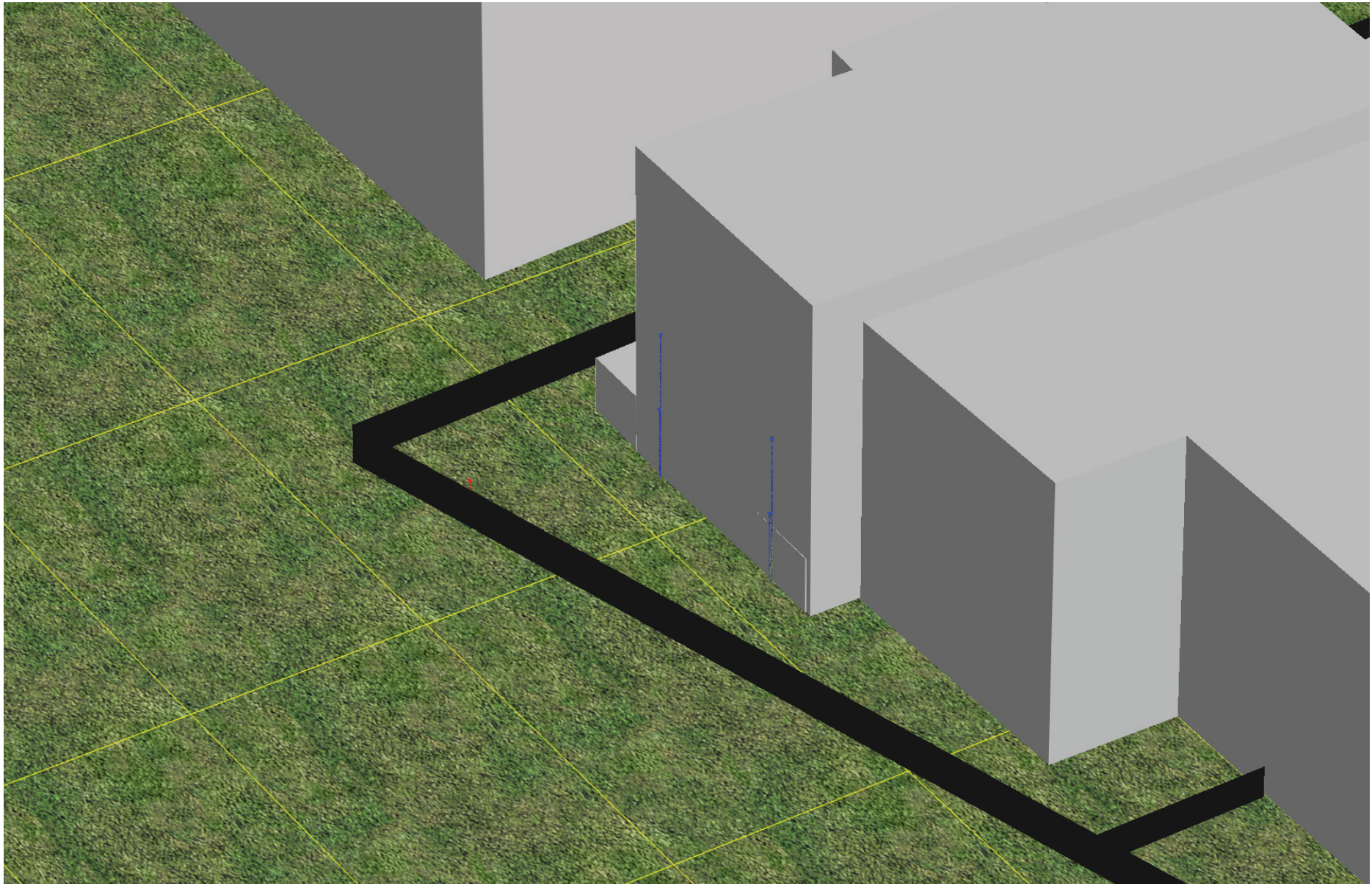


- Notes :
1. dBA = A-weighted sound power level (A scale according to IEC).
  2. Reference acoustic intensity 0dB =  $10^{-6}$  W/m<sup>2</sup>.
  3. Measured according to ISO 3744

3D079910B

## **APPENDIX C**

Noise Prediction Model



## Centric Close, Camden

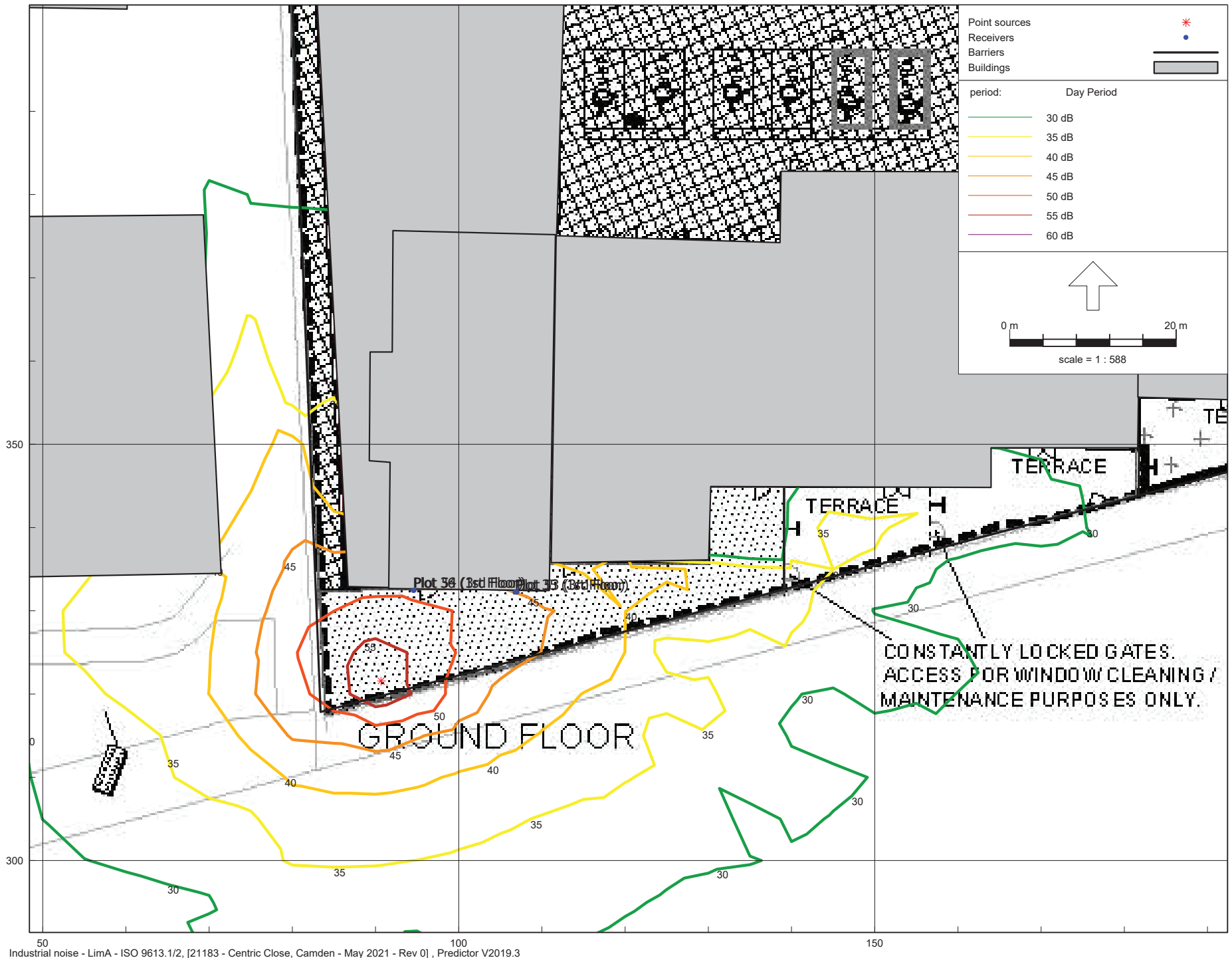
### Predicted Plant Noise Levels

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Report: Table of Results  
Model: May 2021 - Rev 0  
LAeq per octave: total results for receivers  
Group: (main group)  
Group Reduction: No

Name		Height	Day								
Receiver	Description		Total	63	125	250	500	1000	2000	4000	8000
_A	Plot 35 (1st Floor)	4.50	46	21	30	36	41	41	36	30	23
_A	Plot 36 (1st Floor)	4.50	49	24	32	40	45	44	39	34	28
_A	Plot 53 (3rd Floor)	9.50	42	19	27	33	38	38	33	27	20
_A	Plot 54 (3rd Floor)	9.50	46	23	31	37	42	41	36	31	24

All shown dB values are A-weighted



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