Paragon
Acoustic Consultants

Project:	15 Macklin Street, London WC2B 5NG			
Client:	Peldon Rose Ltd			
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1.0 Introduction

It is proposed that a number of new items of air conditioning plant be installed at the site known as 15 Macklin Street, London, WC2B 5NG.

Paragon Acoustic Consultants Ltd has been commissioned to conduct an environmental noise survey to obtain statistical noise data to characterise the existing local background and ambient noise climate at the site and to derive noise limits to atmosphere based on Local Authority Noise Policy and other relevant guideline documents. This information is used to determine if the proposed new mechanical plant selections will meet with the derived noise limits.

If deemed necessary, effective mitigation measures shall be introduced as necessary to achieve the Local Authority Noise Policy requirements.

This practice has received email communication indicating that the proposed mechanical plant is expected to operate between the hours of 08:00 – 19:00, Monday – Friday.

2.0 Site Description and Proposed Plant Location

2.1 Site Description

The site under consideration is situated at 15 Macklin Street, London, WC2B 5NG, within The London Borough of Camden.

The site lies with its frontage on Macklin Street and is 4 storeys in height. On the roof of the top floor is an existing plant compound containing numerous items of operational plant including a packaged air handling unit and several condenser units.

To the south-east lies the highway of Macklin Street. On the opposite side of the street is the building of 10-14 Macklin Street. The Council Tax valuation list indicates the presence of residential property at Number 10, although it was not possible to positively identify the existence of residential windows which face the site. The rest of the building of 10-14 Macklin Street is given over to commercial interests. Adjacent to this property lie the residential buildings known as Powis House. These buildings contain windows which face the site, however they are situated approximately 2 storeys lower than the existing roof plant area. Beyond Powis House is the new residential development situated on Parker Street known as Parker House. These properties are estimated to be at least 35 metres from the existing plant area.

To the south-west lies the boundary wall and roof of the adjacent property of 13 Macklin Street.

To the north-east lies the adjacent commercial property of 17 Macklin Street, and the St Giles in the Fields Almshouses at 17A Macklin Street. These properties are significantly lower in height than the site and have no windows with a view towards the plant area. The residential property of 19 Macklin Street lies approximately 24 metres from the existing plant area, and is similar in height to the site. 19 Macklin Street does contain windows which face the site, albeit these appear to be serving staircases. Residential balconies with windows are present at the front and the rear of the building.

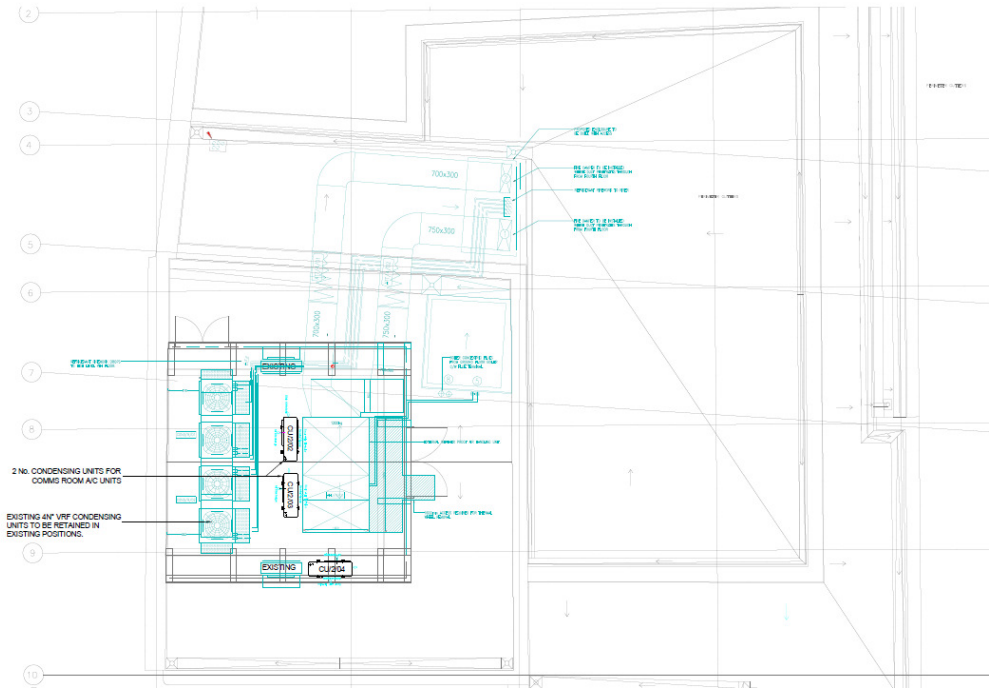
To the north-west lies the residential apartment building known as 16.5 Stukeley Street. The nearest exposed window in this direction is situated approximately 12 metres from the existing plant compound.

The site is illustrated by plan in Appendix A.

2.2 Proposed Plant Location

An extract of drawing indicating the proposed plant location is shown below:

Figure 1: Proposed Plant Location



3.0 Existing Noise Climate

3.1 Road Traffic

The site is situated within a location that is shielded from major road vehicular traffic due to the surrounding buildings. Nonetheless, middle distance road traffic low frequency “rumble” and individual “event” type emissions were audible to the surveyor.

3.2 Rail Traffic

Rail traffic noise events were not observed during the survey period.

3.3 Aircraft

Aircraft overflights of varying altitude were observed, and their contribution to the overall noise climate will be included within the measurements taken.

3.4 Mechanical Noise Sources

Numerous items of mechanical plant items were observed that were associated with third party properties. It could not be established whether the items of plant were operating, however, it is assumed that their contribution to the overall noise climate will have been included within the readings measured. It is taken that all mechanical plant associated with third party premises is operating within legal noise limits and has planning permission.

4.0 Environmental Noise Survey

4.1 Measurements

Attended noise measurements were undertaken on Friday 21st June 2019, between the hours of 10:45 – 13:45.

The noise measurements were undertaken at the location as described below.

- **MP1**: On the north-eastern corner of the top floor terrace area, in the vicinity of the windows of the apartments of 16.5 Stukeley Street (overlooking Smart's Place).
- **MP2**: On the south-eastern corner of the top floor terrace area, overlooking Macklin Street.

The measurement locations are illustrated on the site layout drawing in Appendix A.

The measurement locations were chosen to minimise the direct influence of noise from plant on the site as far as practically possible.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval Tm = 15 minutes was used for sampling. Measurements of the percentile level $L_{A90,T}$ were made using time weighting F as per clause 3.4 of BS 4142:2014.

The quantities recorded included:

- **L_{Aeq}:** the equivalent continuous A-weighted sound pressure level over the measurement period
- **L_{Amax}:** the maximum A-weighted sound pressure level for the measurement period
- **L_{A10}:** the A-weighted sound pressure level exceeded for 10% of the measurement period
- **L_{A90}:** the A-weighted sound pressure level exceeded for 90% of the measurement period

4.2 Alternative Measurement Locations

BS4142:2014 states:

> *Where possible, measure the background sound level at the assessment location(s). If this is not possible measure at an alternative location where the residual sound is comparable to the assessment location(s).*

It was not possible to measure at 1 metre from all of the surrounding affected residential property windows, these being potential assessment locations. As such, the background sound levels were initially monitored at position MP1 on the roof of the building where it was presumed to be equivalent to the potential assessment locations. In order to discount possible adverse influence from plant noise, the noise monitoring was subsequently moved to position MP2.

It is considered reasonable that the monitoring locations would be representative, and therefore comparable to, the noise climate at the nearest potential assessment locations.

4.3 Weather during survey period

The weather conditions at the start of the manned period of the survey were dry and warm (approximately 16°C) and with a slight breeze (estimated at less than 5m/s). At the end of the survey the weather conditions were similar, although the temperature had increased to approximately 20°C. Variable cloud cover was observed, estimated at between 2 – 6 oktas.

4.4 Instrumentation

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of BS EN 60804, BS EN 60651, BS EN 60942, BS EN 61260, and BS EN 61672-1:

- Norsonic Type 118 Sound level analyser, serial number 31456
- Norsonic Type 1225 ½" microphone

Additionally, the following equipment was used:

- Tripod

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of BS EN 60942, calibration level 114.0 dB ± 0.3 dB, @ 1.0 kHz. All instrumentation carries a current manufacturer's certificate of conformance a copy of which is available upon request.

4.5 Results

The recorded survey data is shown within Appendix B.

The typically lowest existing representative background noise levels recorded were:

- **MP1: 49 dB $L_{A90,(15\ min)}$**
- **MP2: 50 dB $L_{A90,(15\ min)}$**

5.0 Evaluation of External Noise Criteria

The local vicinity contains properties of mixed usage, which must be given due consideration in terms of acceptable levels of noise exposure from the new plant.

5.1 Noise Sensitive Properties

It is necessary to consider the requirements of the Local Authority. Recent correspondence from the London Borough of Camden advised the following:

"For the correct criterion, reference should be made the Noise Thresholds in Appendix 3 of the Local Plan 2017, specifically Table C/ the "Design Criterion of 10dB below background which increases to 15 dB if the noise source requires acoustic correction.

Table C of the Appendix 3 of the Local Plan 2017 *advises the following:*

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

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The document confirms that the 'Rating Level' shall be required to be 10 dB below the background and this should be increased to 15dB if the noise contains audible tonal elements.

The above document confirms that "*levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises"*. As such, the proposed noise limits for commercial premises are confirmed as follows:

5.2 Commercial Properties

The methods described in BS4142:2014 use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. It is considered reasonable that commercial properties not used for residential purposes be assessed in line with the guidelines provided in BS 8233:2014. BS 8233:2014 provides guideline noise levels for internal areas of buildings, reproduced as follows:

Figure 2: BS8233:2014 table of typical noise levels in non-domestic buildings

Table 6 **Typical noise levels in non-domestic buildings**

Activity	Location	Design range dB $L_{Aeq,\,T}$
Speech or telephone communications	Department store Cafeteria, canteen, kitchen	50 – 55
	Concourse Corridor, circulation space	45 – 55
Study and work requiring concentration	Library, gallery, museum	40 – 50
	Staff/meeting room, training room	35 – 45
	Executive office	35 – 40
Listening	Place of worship, counselling, meditation, relaxation	30 – 35

Figure 3: BS8233:2014 table of indoor ambient noise levels

Table 2 **Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important**

Objective	Typical situations	Design range $L_{Aeq,T}$ dB
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 – 55
	Open plan office	45 – 50
	Night club, public house	40 – 45
	Ballroom, banqueting hall	35 – 40
	Living room	35 – 40

NOTE See Noise control in building services [28] and BS EN ISO 3382.

In view of the details presented above it is considered reasonable to adopt a noise criterion of 40 dB $L_{Aeq,T}$ for commercial office space in the proximity of the site.

It is also reasonable to consider a noise criterion external to commercial property windows that takes account of the internal design range, plus the loss expected through an openable window. In a research study conducted for DEFRA NANR116: “Open/Closed Window Research”, numerous references are provided which quantify losses through open and partially open windows:

Figure 4: DEFRA NANR16 Summary of findings

Information Source	Summary of Findings
PPG 24 (1994) [2]	A reduction of 13 dB(A) from the facade level is assumed for an open window
WHO (1999) [4]	A reduction of 15 dB from the facade level is assumed for a partially open window. (no reference)
BS 8233 (1999) [5]	Windows providing rapid ventilation and summer cooling are assumed to provide 10 - 15 dB attenuation (no specific reference)
BRE Digest 338 (1988) [6]	A partly open window has an averaged level difference, $D_{1m,av100-3150}$ of 15 dB
DoE Design Bulleting 26 (1972) [7]	A reduction of 5 dB(A) with a window wide open
Nelson - Transportation Noise (1987) [8]	Sound insulation of an open single window is 5 – 15 dB. (theoretical)
Mackenzie & Williamson DoE Report (1972–73) [9],[10]	A vertical sliding sash window open 0.027 m^2 (summer night-time ventilation) and 0.36 m^2 (daytime summer ventilation) provided a sound level reduction of 16 and 11 dB(A) respectively. (Lab Study)
Kerry and Ford (1973 – 74) [11], [12]	A horizontal sliding sash window open 25 mm and 200 mm provided averaged sound reduction indices, R_{av} of 14 and 9 dB respectively. (Field Study)
Lawrence and Burgess (1982 – 83) [13][14]	A vertical sliding sash open 9% of the total façade provided a sound reduction index R_w 10 dB. (Field study)
Hopkins (2004) [15]	Road traffic noise reductions through window openings resulted in reductions of between $D_{2m,n,T}$ 8 and 14 dB. (Field Study)

Table 1.1 Summary of open-window acoustic transmission literature

The findings of the study are referenced in this report to substantiate the use of a 13dB(A) loss through a partially open window.

5.3 External Noise Criteria

The derived external noise criteria which the new building services plant shall be required to achieve are shown below:

Table 1: Limiting Noise Criteria applicable at the affected premises

Plant Location	Receptor	Daytime 08:00-19:00 $L_{Art,(15\ min)}$
Any Location on the site	Gardens used for main amenity, outside living and dining and bedroom windows (façade).	39 dB [1] [2]
	Commercial premises	53 dB L_{Aeq} [2]

[1] Note: Noise levels to be assessed in accordance with BS4142:2014. LArT is the "Rating" noise level that includes corrections for the character of the noise. A 5dB penalty shall be included where noise emitted from the proposed development will contain tones sufficient to attract attention at the receiver position/s.

[2] Note: The limiting noise levels are deemed to be considered at a position 1 metre outside the nearest affected premises.

General note: It is taken that the noise Criteria apply at the surrounding third party premises. Noise levels may be exceeded external to windows of the client's premises.

6.0 Review of Proposed Plant

6.1 Introduction

The new plant will comprise the following:

- Outdoor condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA
- Outdoor condensing unit CU/2/03 – Mitsubishi PUZ-M100VKA
- Outdoor condensing unit CU/2/04 – Mitsubishi PUMY-SP140VKM

Detailed calculations have been carried out in order to determine the likely level of airborne noise transmission outside the identified assessment locations due to the operation of the proposed new plant to be installed.

Section 2.2 details the plant location/s used in the assessment.

The following sections provide a record of the proposed new plant, the operational sound levels used as the basis for this assessment, and a specification for noise mitigation treatments.

At this stage, the scope of work herein is limited to the consideration of mechanical plant noise emissions to atmosphere and does not include evaluation of the transmission of noise via building envelopes to internal areas of nearby buildings.

6.2 Plant Noise Data

The noise levels / acoustic data for the proposed new plant items are shown below:

Figure 5: Noise data for Condensing Units CU/2/02 & CU/2/03

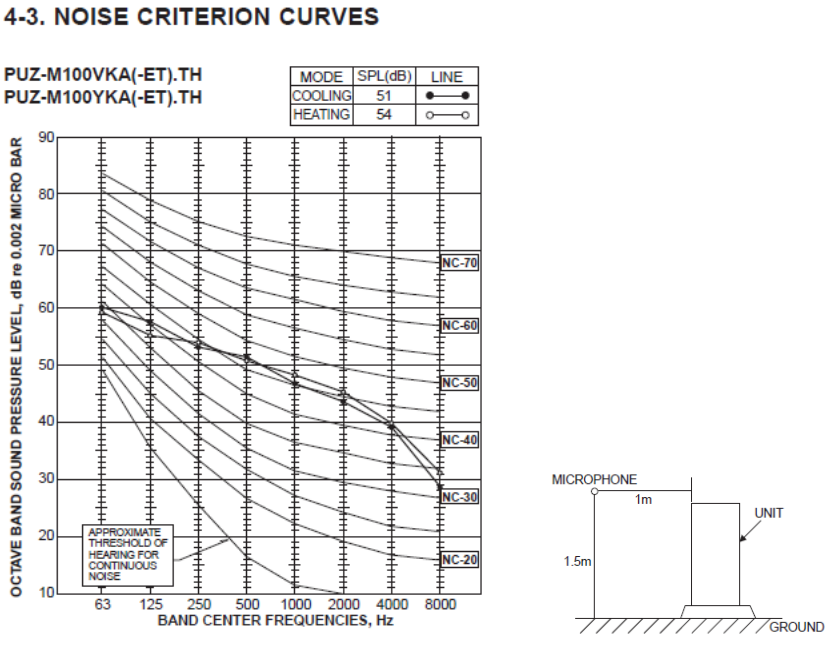
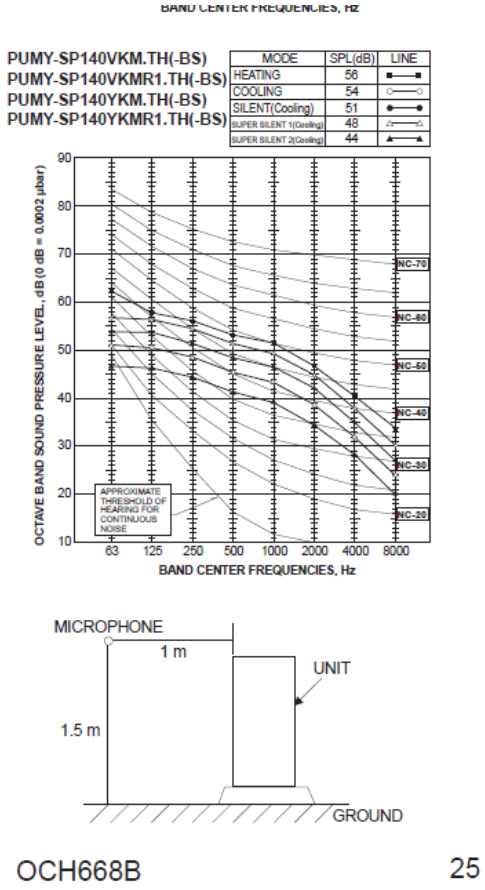


Figure 6: Noise data for Condensing Unit CU/2/04



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6.3 Predicted Plant Noise Levels

Calculations have been carried out using the data presented earlier within this report to predict the resultant sound pressure levels due to airborne transmitted noise outside the nearest exposed noise assessment position, and corresponding to the quietest period of plant operation. The predicted results are summarised in Table 2 as follows:

Table 2: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp	Derived noise limit
Condenser units CU/2/02, 03 & 04	Residential property at 16.5 Stukeley St	13 m	No	38 dB	39 dB
	Residential property at 19 Macklin Street	25 m	Yes	38 dB	39 dB
	Residential property at 10 Macklin Street	12 m	Yes	44 dB	39 dB
	Commercial property at 14 Macklin Street	12 m	Yes	44 dB	53 dB

Predictions are based on the plant operating normally at the noise levels detailed herein, and it is considered that the noise emitted from the proposed plant will not be intermittent, impulsive, contain tones or other characteristics sufficient to attract attention at the assessment locations.

It can be seen that:

- For affected third party noise sensitive residential dwellings, the proposed plant will not maintain the derived noise limit.
- For affected third party commercial properties, the proposed plant will maintain the derived noise limit.

It is unlikely that significantly quieter equipment is available for equipment of similar capacity and it is understood that other locations are not available for the plant. As such, it is considered appropriate to propose noise mitigation measures.

6.4 Principles of Noise Mitigation

The results of the initial analysis have shown that airborne noise transmission from the proposed new outdoor condenser units would exceed the residential noise design targets set out in Table 1 for property situated along Macklin Street. It is therefore necessary to introduce noise mitigation measures to these properties.

The boundary of the existing plant compound is formed by a “hit and miss” timber arrangement. On the north-west elevation, the plant compound wall is arranged with timber slats on both sides of vertical support posts, effectively eliminating line of sight through the screening (see Figure 7 as follows):

Figure 7: Existing plant compound screening (north-west elevation)

On the north-east and south-east elevations, the existing plant compound is significantly more open with timber slats on one side only of vertical support posts, resulting in clear line of sight from the plant compound to properties beyond:

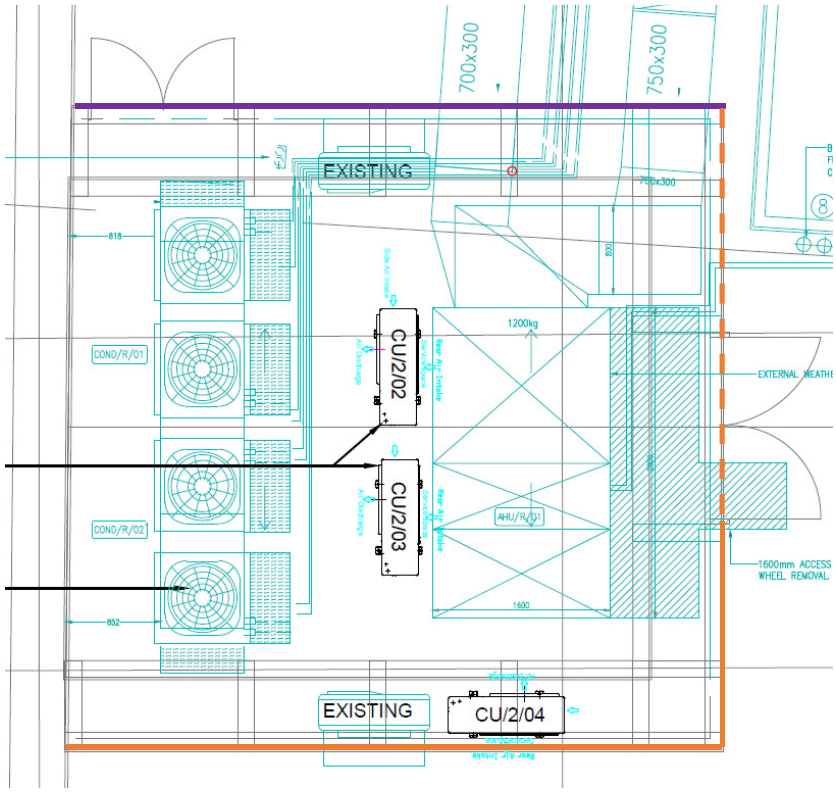
Figure 8: Existing plant compound screening (north-east and south-east elevation)

Noise mitigation shall therefore be introduced as presented in Table 3 as follows:

Table 3: Specification for noise mitigation treatment

Extent	Minimum height	Construction	Acoustic Performance
Refer to Fig.9	From roof level to full height of the existing plant compound	Double wall timber cladding arranged generally as per the existing north-west elevation of plant compound	No definitive performance is specified. However, the design of the screening shall be such that line of sight through the screen to residential properties on Macklin Street is precluded. The thickness and density of new timber materials shall be not less than the existing timber cladding.
Note: In order to provide a consistent appearance to the screen, the client may wish to consider extending the noise mitigation treatment to the full extent of the north-east elevation of the plant compound. It is stressed however that only the minimum extent of treatment as shown on Figure 9 is required for compliance with the noise design targets.			

Figure 9: Extent of noise mitigation to plant compound screen



Existing double layer timber compound walls along north-west elevation of plant compound

Minimum extent of required noise mitigation to south-east and north-east elevations of plant compound

Suggested additional noise mitigation to north-east elevation of plant compound

Paragon Acoustic Consultants has considered the acoustic performance of the enclosure. The introduction of this type of structure has implications in other areas of design. As such, the client shall employ the services of other specialists to take responsibility for other areas of design associated with the introduction of such a structure. The following list is provided as an example of other areas to be considered as a minimum:

Airflow to and from condensing units: The installation of noise mitigation may restrict the airflow around the condensing units. This will potentially give rise to two adverse effects as follows:

- The resistance to airflow will increase
- Heated discharge air from the condenser coils may re-circulate back into the condenser coils

The client shall verify that the inclusion of noise mitigation treatments shall not adversely affect the performance of condensing units.

Structural: A suitably qualified consultant shall assess all structural loading as necessary.

Aesthetics: The visual appearance of the noise mitigation is to be agreed by the client's architect. The architect shall also consider all necessary statutory approvals and address design issues not covered by the relevant specialist consultant.

Alteration to existing services: The installation of noise mitigation may require alteration to certain of the existing mechanical and electrical services. The client shall co-ordinate any such works.

Delivery and installation access: The client shall make appropriate arrangements for the delivery and installation of hardware used for noise mitigation treatment, including equipment such as cranes and scaffolding requirements.

Guarantees: The client shall ensure that the noise mitigation complies with the requirements of this report.

Maintenance / repair / replacement: The noise mitigation measures shall allow maintenance / repair / replacement of the new condenser equipment.

Warrantees: The client shall ensure that the warrantees provided by the condensing unit supplier/manufacturer are not invalidated by the introduction of the noise mitigation works.

Submission of final enclosure designs: The final design of the noise mitigation measures shall be submitted to Paragon Acoustic Consultants for comment prior to procurement, manufacture or implementation.

6.5 Vibration

It is recommended that the client provisions for appropriate vibration isolation mountings for the proposed mechanical plant items. It is recommended that the plant be installed on vibration isolation mounts providing a minimum of 98% isolation efficiency at all forcing frequencies using an isolation mount system approved by the plant supplier. In addition, all pipework should be suitably isolated from the building structure.

6.6 Predicted Plant Noise Levels with mitigation

Calculations have been carried out to predict the noise levels at the nearest exposed noise assessment position including the insertion loss effect of the noise mitigation indicated previously. The predicted results are summarised below:

Table 4: Predicted Noise Levels with mitigation

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp	Derived noise limit
Condenser units CU/2/02, 03 & 04	Residential property at 16.5 Stukeley St	13 m	No	38 dB	39 dB
	Residential property at 19 Macklin Street	25 m	Yes	38 dB	39 dB
	Residential property at 10 Macklin Street	12 m	No	39 dB	39 dB
	Commercial property at 14 Macklin Street	12 m	No	39 dB	53 dB

It can be seen that the proposed plant, together with the noise mitigation measures detailed, **would** maintain the Local Authority Noise Policy requirements for third party noise sensitive properties, and also for third party commercial properties.

Copies of the calculation analysis sheets to the most exposed residential and commercial receivers are included in Appendix C for reference.

7.0 Conclusions

A background noise survey has been undertaken to determine the noise climate likely to exist in the vicinity of 15 Macklin Street London WC2B 5NG, where the positioning of new mechanical plant is proposed.

Appropriate external criteria have been identified on the basis of Local Authority noise policy, and predictions of the proposed mechanical plant noise emissions have been undertaken. Predictions indicate that the noise mitigation measures will be required in order to meet with the derived noise limits, and as such a specification for the noise mitigation measures has been provided herein.

Following implementation and achievement of the noise mitigation recommended, it is predicted that its noise emissions will meet the existing noise policy operated by London Borough of Camden. On this basis, reservations are not expected from the planning authority on the grounds of noise.

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Project:	15 Macklin Street, London WC2B 5NG	**Date:**	24/06/2019
Client:	Peldon Rose Ltd	**Ref:**	4476

Appendix A: Site Plan

Appendix B: Recorded Survey Data

File	Date	Duration	Position	LAeq	LAFmax	LAF,10%	LAF,90%
NOR118_7276246_190621_0001.NBF	(2019/06/21 10:47:30.00)	(0:15:0.0)	MP1	53.7	69.6	55.3	50.5
NOR118_7276246_190621_0002.NBF	(2019/06/21 11:02:31.00)	(0:15:0.0)	MP1	54.7	70.6	55.9	49.9
NOR118_7276246_190621_0003.NBF	(2019/06/21 11:17:33.00)	(0:15:0.0)	MP1	52.6	75.8	54	48.9
NOR118_7276246_190621_0004.NBF	(2019/06/21 11:32:34.00)	(0:15:0.0)	MP1	55.9	76.7	57.5	49.4
NOR118_7276246_190621_0005.NBF	(2019/06/21 11:47:35.00)	(0:15:0.0)	MP1	58.4	79.3	60.6	49.8
NOR118_7276246_190621_0006.NBF	(2019/06/21 12:02:37.00)	(0:15:0.0)	MP1	53	72.7	54.9	50.1
NOR118_7276246_190621_0008.NBF	(2019/06/21 12:24:05.00)	(0:15:0.0)	MP2	53.3	66.1	55.5	49.6
NOR118_7276246_190621_0009.NBF	(2019/06/21 12:39:06.00)	(0:15:0.0)	MP2	54.7	70.4	57	51.1
NOR118_7276246_190621_0011.NBF	(2019/06/21 12:56:09.00)	(0:15:0.0)	MP2	54.8	66.7	56.7	51.7
NOR118_7276246_190621_0012.NBF	(2019/06/21 13:11:10.00)	(0:15:0.0)	MP2	57.1	76.2	57	50.3

Appendix C: Calculation sheets

16.5 Stukeley Street Residential

project			15 Macklin Street, London WC2B 5NG								
date			24/06/2019								
Plant			External Condensers								
Frequency			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA			60	58	55	52	48	45	40	31	**54**
Condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA			60	58	55	52	48	45	40	31	**54**
Condensing unit CU/2/04 – Mitsubishi PUMY-SP140YKMR			62	58	56	54	52	47	41	34	**56**
Condenser sound pressure level at distance below			65.5	62.8	60.1	57.5	54.5	50.5	45.1	37.0	**60**
distance sound pressure level measured			1								
measurement condition			2	1=free field, 2=hemisphere							
Number of units of the same noise level if not added above			1	Number units							
distance to the receiver location			13								
Source situation correction			0	dB							
correction for propagation of sound			e	h=hemisphere, q=quarter sphere, e=eighth of a sphere							
acoustic barrier loss due to other buildings (enter as positive attenuation)			5	5	5	5	5	5	5	5	
Attenuation proposed - insertion loss (enter as positive attenuation)											
Un-attenuated condenser noise emissions											
Predicted noise levels			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condenser sound pressure level at	1	m	66	63	60	58	55	51	45	37	**60**
correction for propagation of noise into space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	13	m	-22	-22	-22	-22	-22	-22	-22	-22	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for units if not added at start of assessment	1	unit/s	0	0	0	0	0	0	0	0	
allowance for acoustic barrier loss due to other buildings			-5	-5	-5	-5	-5	-5	-5	-5	
Predicted noise level at receiver			44	42	39	36	33	29	24	16	**38**

19 Macklin Street residential

project			15 Macklin Street, London WC2B 5NG								
date			24/06/2019								
Plant			External Condensers								
Frequency			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA			60	58	55	52	48	45	40	31	**54**
Condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA			60	58	55	52	48	45	40	31	**54**
Condensing unit CU/2/04 – Mitsubishi PUMY-SP140YKMR			62	58	56	54	52	47	41	34	**56**
Condenser sound pressure level at distance below			65.5	62.8	60.1	57.5	54.5	50.5	45.1	37.0	**60**
distance sound pressure level measured			1								
measurement condition			2	1=free field, 2=hemisphere							
Number of units of the same noise level if not added above			1	Number units							
distance to the receiver location			25								
Source situation correction			0	dB							
correction for propagation of sound			e	h=hemisphere, q=quarter sphere, e=eighth of a sphere							
acoustic barrier loss due to other buildings (enter as positive attenuation)			0	0	0	0	0	0	0	0	
Attenuation proposed - insertion loss (enter as positive attenuation)											
Un-attenuated condenser noise emissions											
Predicted noise levels			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condenser sound pressure level at	1	m	66	63	60	58	55	51	45	37	**60**
correction for propagation of noise into space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	25	m	-28	-28	-28	-28	-28	-28	-28	-28	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for units if not added at start of assessment	1	unit/s	0	0	0	0	0	0	0	0	
allowance for acoustic barrier loss due to other buildings			0	0	0	0	0	0	0	0	
Predicted noise level at receiver			44	41	38	36	33	29	23	15	**38**

10-14 Macklin Street (Residential or Commercial)

project			15 Macklin Street, London WC2B 5NG								
date			24/06/2019								
Plant			External Condensers								
Frequency			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA			60	58	55	52	48	45	40	31	**54**
Condensing unit CU/2/02 – Mitsubishi PUZ-M100VKA			60	58	55	52	48	45	40	31	**54**
Condensing unit CU/2/04 – Mitsubishi PUMY-SP140YKMR			62	58	56	54	52	47	41	34	**56**
Condenser sound pressure level at distance below			65.5	62.8	60.1	57.5	54.5	50.5	45.1	37.0	**60**
distance sound pressure level measured			1								
measurement condition			2	1=free field, 2=hemisphere							
Number of units of the same noise level if not added above			1	Number units							
distance to the receiver location			12								
Source situation correction			0	dB							
correction for propagation of sound			e	h=hemisphere, q=quarter sphere, e=eighth of a sphere							
acoustic barrier loss due to other buildings (enter as positive attenuation)			0	0	0	0	0	0	0	0	
Attenuation proposed - insertion loss (enter as positive attenuation)			5	5	5	5	5	5	5	5	
Un-attenuated condenser noise emissions											
Predicted noise levels			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condenser sound pressure level at	1	m	66	63	60	58	55	51	45	37	**60**
correction for propagation of noise into space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	12	m	-22	-22	-22	-22	-22	-22	-22	-22	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for units if not added at start of assessment	1	unit/s	0	0	0	0	0	0	0	0	
allowance for acoustic barrier loss due to other buildings			0	0	0	0	0	0	0	0	
Predicted noise level at receiver			50	47	45	42	39	35	30	21	**44**
Condenser noise emissions after enclosure											
Predicted noise levels			**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condenser sound pressure level at	1	m	66	63	60	58	55	51	45	37	**60**
correction for propagation of noise into space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	12	m	-22	-22	-22	-22	-22	-22	-22	-22	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for units if not added at start of assessment	1	unit/s	0	0	0	0	0	0	0	0	
allowance for acoustic barrier loss due to other buildings			0	0	0	0	0	0	0	0	
Predicted noise level at receiver			50	47	45	42	39	35	30	21	
Attenuation proposed - insertion loss			-5	-5	-5	-5	-5	-5	-5	-5	
level after attenuation			45	42	40	37	34	30	25	16	**39**