

Project:	23 Kings Road, Reading	Date:	31/05/2019
Client:	Quadrant Design Ltd	Ref:	4454



Project:	23 Kings Road, Reading		
Client:	Quadrant Design Ltd,		
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Author:	F Zeolla MIOA	Date:	31/05/2019
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Paragon Acoustic Consultants Ltd
Unit 12b Southview Business Park, Caversham,
Reading RG4 5AF
Tel: 0118 944 8444



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1.0 Introduction

It is proposed that a new external condenser unit be located on an external wall at the rear of the ground floor office property of address 23 Kings Road, Reading.

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 requirements and other relevant guideline documents where considered appropriate. 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 been advised that the operational period of the proposed mechanical plant will be daytime: 08:00-18:00.

2.0 Site Description and Proposed Plant Location

2.1 Site Description

The plant under consideration is situated at the rear of 23 Kings Road, Reading, within the jurisdiction of Reading Borough Council. The proposed plant will be located at ground floor on the north elevation of the building.

At first floor directly above the proposed plant location lie residential flats, these being the nearest residential properties to the proposed plant. At a distance of approximately 2m to the west of the proposed plant location lie windows associated with Reading Library.

To the north of the plant space lie car parking yard, beyond which is the Holy Brook within a cutting. Abbey Baptist Church is situated to the north of the Holy Brook. To the east and abutting the church is St Lawrence House, presently undergoing construction works.

To the east of the plant location are car parking areas, with residential flats at 1st floor and above on the rear façade of the building.

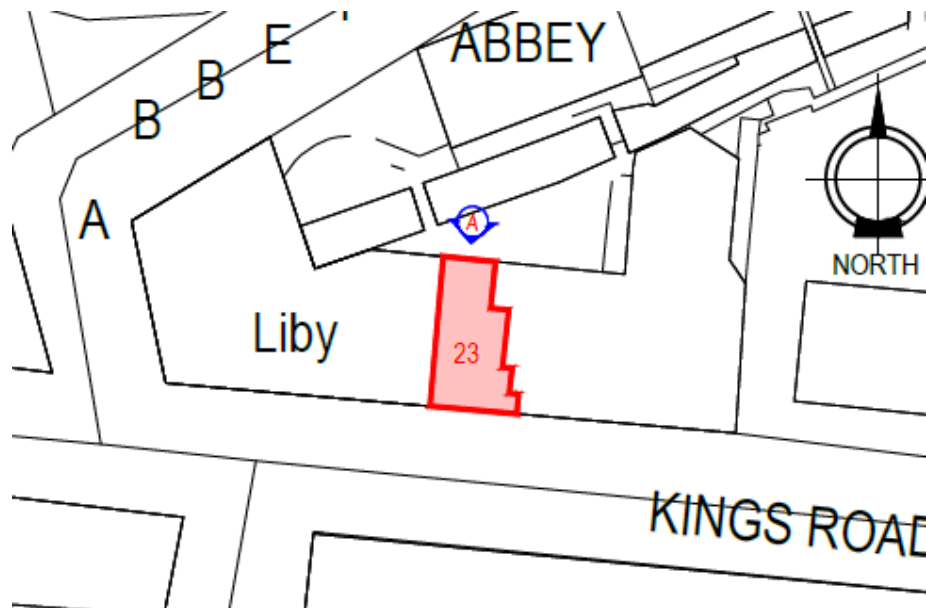
The site is illustrated by plan in Appendix A.

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2.2 Proposed Plant Location

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

Figure 1: Proposed Plant Location



View on Arrow A



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3.0 Existing Noise Climate

3.1 Road Traffic

The rear of 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

Medium / high altitude aircraft overflights were observed and their contribution to the overall noise climate will be included within the measurements taken.

3.4 Mechanical Noise Sources

Noise from mechanical plant was audible, however, the exact source could not be identified. At the far side of the Holy Brook there is a louvered ventilation opening extending approximately 3 m wide by 2.5m high with four oval ducts above. It is possible that plant noise is emanating from this arrangement, although this could not be confirmed.

3.5 Construction Noise

Construction noise was clearly audible, emanating from the building works to the north east of the site.

4.0 Environmental Noise Survey

4.1 Measurements

The noise measurement survey took place on Wednesday 29th May 2019 between 15:30 – 18:30 hours.

The noise measurement was manned, and undertaken at the location as described below.

- **MP1:** At the rear of the premises (north) approx. 2 - 2.5m from the building facade

The measurement location is illustrated on the site layout drawing in Appendix A.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval $T_m = 15$ 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

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4.2 Weather during survey period

The weather conditions during the survey were dry and warm (approximately 16°C) with slight cloud cover and little breeze. It is considered that the data obtained provided sufficient data to give the lowest likely background noise level for the proposed plant operational period.

4.3 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 31663
- Norsonic Type 1225 ½" microphone

The sound level analyser was mounted on a tripod set to provide a measurement height of 1.5 metres above ground level.

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.

4.4 Results

The recorded survey data is shown within Appendix B.

It can be seen that the lowest background sound level (rounded to the nearest integer) obtained was observed to be 50 dB (L_{A90,15min}).

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

5.1.1 Local Authority advice

This practice has been informed that Reading Borough Council (RBC) has requested the following:

1. Noise and Vibration impact assessment

The proposed ventilation and air conditioning system on the ground floor of the building in office use would be considered a potentially noise generating development, as such, a noise and vibration impact assessment would be required in accordance with part 15 of the volition checklist.

Noise Assessments should be prepared by suitably qualified acousticians. They should usually outline the existing noise environment, the potential noise sources from the development, or the noise sources likely to affect the development, together with any mitigation measures. Advice should be sought from the council's Public Protection Service for individual requirements. (BS4142). The assessment should include information about: the sound power level and the likely resultant noise level of equipment at the site boundary for all noise-producing machinery such as extract ventilation systems, refrigeration equipment etc. that is likely to be installed; where any noise-generating plant

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or equipment will be located and installed so as to reduce noise impacts on neighbouring properties.

In line with the above guidance, this practice has attempted to obtain advice from RBC Public Protection Service to establish if there are any individual requirements. At the time of writing the report this practice has not been issued with a reply providing answers to the question raised in the e-mail issued by this practice to themselves.

In the absence of Local Authority advice regarding any individual requirements, this practice has considered the RBC paper headed "Local Plan Background Paper" "Information to support the Submission Draft Reading Borough Local Plan" dated March 2018. This paper includes the following details:

4.26 Noise Generating Equipment (EN17)

4.26.1 Key Considerations

- *The NPPF states that the planning system should prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution (paragraph 109). Paragraph 123 further states that planning policies should avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development.*

- *A Noise Policy Statement for England was produced in 2010 by DEFRA, which contains the following vision:*

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

The NPSE aims are as follows:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*

- *The Council receives numerous planning applications for the introduction of new noise generating industrial and commercial equipment such as air conditioning; refrigeration plant and kitchen extraction. This equipment is often installed in close proximity to residential properties and has the potential to cause significant annoyance and/or sleep disturbance to residents or other businesses, and have a negative impact on residential amenity.*

- *Planning applications for noisy mechanical plant are already required to be accompanied by a noise assessment which compares the noise level produced by the equipment against the existing background noise level using the British Standard 'Methods for rating and assessing industrial and commercial sound' (BS4142:2014). Whilst the BS4142:2014 method gives some guidance on assessing whether the level of noise may have an adverse impact, its recent update has made this guidance more ambiguous and crucially it does not set a noise limit for new plant.*

- *The Environmental Protection team for some years has required that the noise level from new mechanical plant be at least 10 dB below the background noise level in order to prevent 'background creep' (see draft policy for an explanation). However, this does not have the weight of policy behind it.*

- *Although general principles for noise were set out in policy CS34 of the Core Strategy (PP004), no specific noise levels are referenced in existing policy.*

4.26.2 Policy Options

The following options have been considered and have been subject to Sustainability Appraisal. Where rejected, the reasons are summarised below.

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• **EN17(i) No policy – REJECTED**

Whilst the Council would continue to usually seek the level set out in the proposed policy, without the benefit of policy it carries reduced weight. As such, it could lead to developments that have a detrimental effect on the quality of life and health of neighbours.

• **EN17(ii) New policy limiting noise level to at least 10dBA below the existing background level – PROPOSED OPTION**

This option would be a new policy, giving clarity to developers and applicants on the maximum level of background noise at the nearest sensitive receptor that will be acceptable. It will ensure that equipment does not have a detrimental effect on the health and quality of life of neighbours.

Based on the details of this document it does appear as though RBC will be continuing to require that the noise level from new mechanical plant be at least 10 dB below the background noise level. As such, the assessment shall consider this limit.

5.1.2 BS 4142:2014

BS 4142:2014: “*Methods for rating and assessing industrial and commercial sound*” describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations which comprise mechanical and electrical plant and equipment.

The methods described in the standard 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. The standard provides a method for correcting the specific sound levels so as to account for acoustic features that are present at the assessment location (scaled corrections up to +6 dB for tones and up to +9 dB for impulses, depending upon the prominence of the tones or impulses, as well as +3 dB corrections for other sound characteristics).

Where characteristics likely to affect perception and response are present in the specific sound within the same reference period; then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant, to the exclusion of the others, then it may be appropriate to apply a reduced, or even zero, correction to the minor characteristics.

Whereas the 1997 edition of BS4142 assess likelihood of complaints, the 2014 edition was revised to use assessment of adverse impacts. This change was introduced because the likelihood of complaints is not a particularly appropriate benchmark, especially when it is used in a planning context, and it also aligns the standard more closely with the type of language and benchmarks that are suitable for the assessment of sound at the planning stage, e.g., for new proposed development.

The 2014 edition of the standard continues to use the difference between the rating level and the background sound level:

- 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

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sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

In line with the Local Authority likely requirement, it is proposed to consider a target noise level whereby the rating level of the sound from the proposed new plant shall be at least 10 dB below the background noise level.

5.2 Commercial Properties

It is considered appropriate to assess noise emissions to commercial properties in line with the guidelines provided in BS 8233:2014.

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.

The proposed location of the plant is in the order 2.2m from windows of reading library. It will be seen that a Library has a design range of 40-50 dB L_{Aeq} as given in Table 6 of BS8233:2014, reproduced in Figure2. In view of the details presented above it is considered reasonable to adopt a noise criterion of 40 dB $L_{Aeq, T}$ for the internal spaces of a library.

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:

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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, $D_{1m;av/100-3150}$ of 15 dB
DoE Design Bulletin 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_{wv} 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 10 dB(A) loss through a partially open window.

This leads to a limiting noise criteria of 50 dB $L_{Aeq,T}$ at a position 1 metre outside the window of the library property.

This practice did enter the library and survey the windows in the vicinity of the plant. It was noted that the windows are secondary glazed and did not appear to be openable. Nonetheless, for the sake of robustness it is assumed that these windows can be opened.

6.0 Review of Proposed Plant

6.1 Introduction

The new plant will comprise an external condenser unit type Daikin model RXYSQ6T8Y

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.

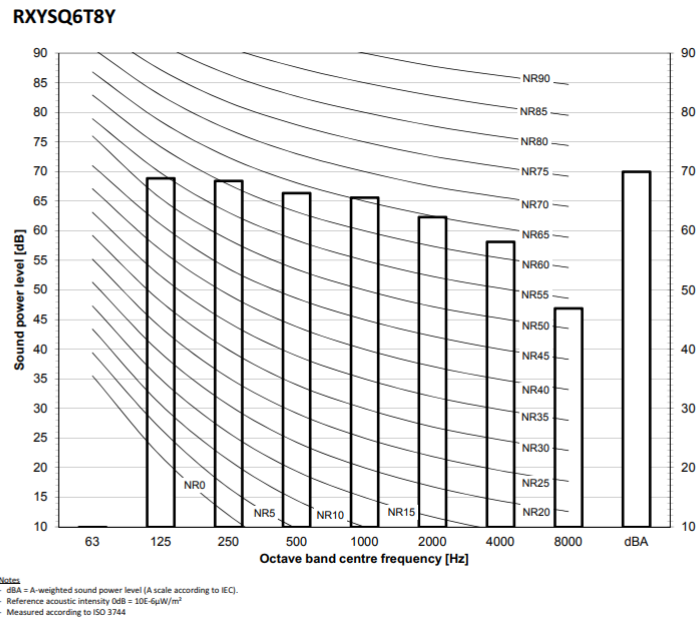
The following sections provide a record of the proposed new plant, the operational sound levels used as the basis for this assessment, and a specification for noise mitigation treatments.

6.2 Plant Noise Data

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

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Figure 5: Noise data for proposed Daikin model RXYSQ6T8Y



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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 for an unmitigated case are summarised below:

Table 1: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp	Proposed noise limit
condenser unit type Daikin model RXYSQ6T8Y	Residential property on 1 st floor above proposed location	3 m	Yes (if look over balcony)	59 dB LArT	40 dB LArT
	Library at 2.2m	1 m	Yes	65 dB LAeq	50 dB LAeq

Predictions are based on the plant operating normally at the noise levels detailed herein. It can be seen that for noise level external to the library, the predicted noise level of 65 dB will exceed the derived noise limit of 50 dB LAeq,T at a position 1 metre outside the window of the library property. For noise sensitive residential properties, the predicted noise level due to the plant operation will also exceed the derived noise limit.

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6.4 Assessment to BS4142:2014

Parameter	Value	Relevant clause	Comments
Specific sound level	$L_{Aeq,15\text{ min}} = 56\text{ dB}$	7.3.3	Determined by calculation
Acoustic feature correction	+3dB	9.2	Specific sound source is not expected to be tonal or impulsive, however it is likely that the plant shall operate intermittently.
Rating level	$L_{Ar,15\text{ min}} = 59\text{ dB}$		
Background sound level	$L_{A90,15\text{ min}} = 50\text{ dB}$	8	Corresponding to the proposed operational period of the new plant
Excess of rating level over background sound level	$(59 - 50) = 9\text{ dB}$	11	Assessment indicates likelihood of an adverse impact.
Uncertainty of assessment		10	The excess of the rating level over the background sound level is considered to be such that it will not have an impact on the outcome of the assessment.

The result of an initial BS4142:2014 assessment shows that noise mitigation measures are required in order to reduce the rating sound level to no more than the background sound level.

6.5 Noise mitigation to plant

An acoustic enclosure shall be used to house the condenser unit. The enclosure shall have suitably ventilated and attenuated airways and provide attenuation to all directions including to below. A specialist supplier shall provide a fit for purpose acoustic enclosure to provide the following minimum acoustic performance:

Table 2: Minimum insertion loss requirements for enclosure in all directions

Quantity	1/1 octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Minimum insertion loss (dB)	6	9	14	22	22	20	15	12

The insertion loss is hereby defined as the difference in sound pressure level with and without the enclosure in place. In order for this potential reduction in acoustic performance to be evaluated, the chosen enclosure supplier shall submit their product acoustic test data to Paragon Acoustic Consultants Limited prior to procurement / manufacture. Test data shall be provided for all of the proposed hardware products used in the construction of the enclosure and shall be obtained from an independent UKAS accredited test laboratory to provide proof that the foregoing acoustic performance will be maintained.

The dimensions of the enclosure are to be determined by the noise mitigation hardware supplier and agreed with the client.

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

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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 an enclosure will 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 supplier of close fitting enclosure and the mechanical services consultant shall guarantee that their enclosures 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 enclosures 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 each enclosure may require alteration to certain of the existing mechanical and electrical services in the vicinity of the proposed enclosure. In addition, the condensing units may require to be moved into close fitting enclosures. The client shall co-ordinate any such works.

Delivery and installation access: The enclosure supplier shall make appropriate arrangements for the delivery and installation of enclosures, including equipment such as cranes and scaffolding requirements.

Guarantees: The client shall obtain the necessary guarantees that the enclosure will meet the minimum insertion loss requirements as specified by this practice in the foregoing section. In addition, the client shall obtain all other guarantees as required.

Maintenance / repair / replacement: The enclosures shall allow maintenance / repair / replacement of the condensing unit equipment enclosed.

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 enclosures shall be submitted to Paragon Acoustic Consultants for comment prior to manufacture.

6.6 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 95% 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.

6.7 Predicted Plant Noise Levels Following Noise 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 herein. The predicted results are summarised below:

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Table 3: Predicted Noise Levels at nearest affected premises following noise mitigation

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp	Proposed noise limit
condenser unit type Daikin model RXYSQ6T8Y with noise mitigation as herein	Residential property on 1 st floor above proposed location	3 m	Yes (if look over balcony)	40 dB LArT	40 dB LArT
	Library at 2.2m	1 m	Yes	47 dB LAeq	50 dB LAeq

Predictions are based on the plant operating normally at the noise levels detailed herein.

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

6.1 Assessment to BS4142:2014 with Mitigation measures

A BS4142:2014 assessment has been undertaken based on the plant and noise mitigation measures confirmed herein, as follows:

Parameter	Value	Relevant clause	Comments
Specific sound level	L _{Aeq,15 min} = 37 dB	7.3.3	Determined by calculation
Acoustic feature correction	+3dB	9.2	Specific sound source is not expected to be tonal or impulsive, however it is likely that the plant shall operate intermittently.
Rating level	L _{Ar,15 min} = 40 dB		
Background sound level	L _{A90,15 min} = 50 dB	8	Corresponding to the proposed operational period of the new plant
Excess of rating level over background sound level	(40 – 50) = -10 dB	11	Assessment demonstrates that the rating level is expected to be 10 dB below the background sound level, and hence an indication of low impact due to plant noise at the receptor.
Uncertainty of assessment		10	The assessment is based on the lowest recorded background sound level corresponding to the plant operational period. It is therefore considered that the assessment described herein is robust, and should not present a significant level of uncertainty.

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7.0 Conclusions

A background noise survey has been undertaken to determine the noise climate likely to exist at noise sensitive properties at the rear of 23 Kings Road, Reading, where the positioning of an external air cooled condenser is proposed.

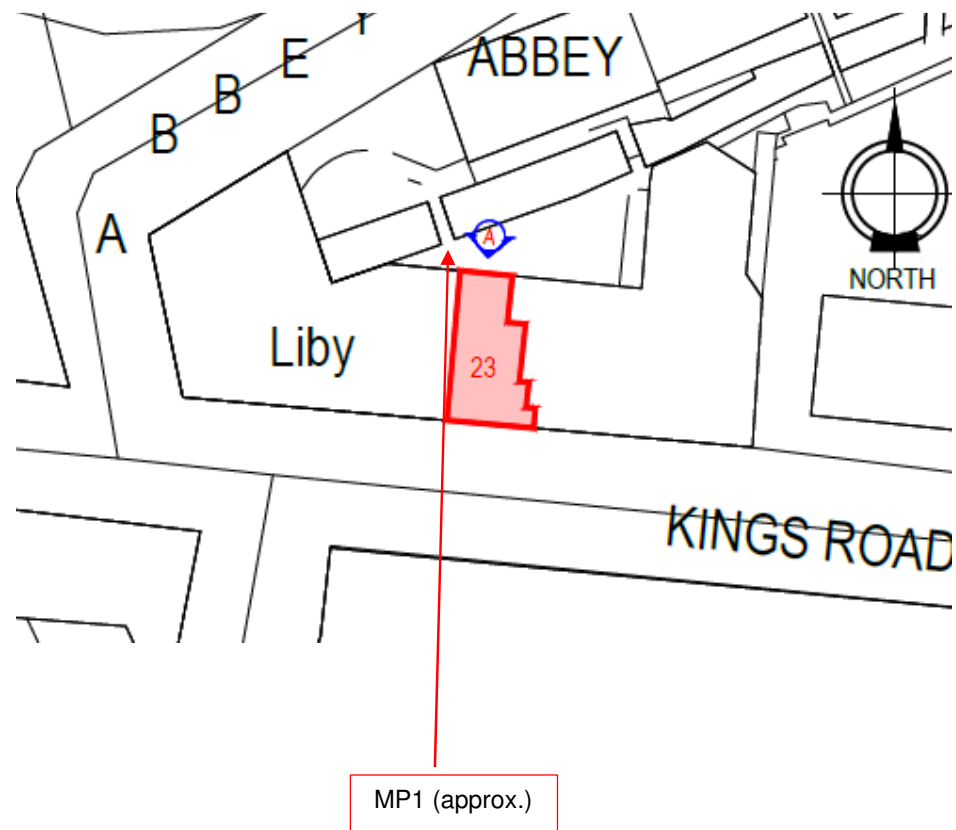
Appropriate external criteria have been identified on the basis of pre-planning advice provided by the Local Authority, and other industry standards, codes of practice and references.

Predictions indicate that noise mitigation measures will be required, and as such specification for the noise mitigation measures has been provided herein.

Following implementation and achievement of the noise mitigation recommended, it is predicted that noise emissions from the proposed new plant installation will meet the design criteria laid out within this report. On this basis, reservations are not expected from the planning authority on the grounds of noise.

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File	Date	LAeq	LAFmax	LA10	LA90
NOR118_7091284_190530_0001.NBF	Sample within period 15:00 - 16:00	56.1	70.9	58.4	51.6
NOR118_7091284_190530_0002.NBF	Sample within period 15:00 - 16:00	62.7	83.6	62.1	51.1
NOR118_7091284_190530_0003.NBF	Sample within period 16:00 - 17:00	53	62.9	54.6	50.9
NOR118_7091284_190530_0004.NBF	Sample within period 16:00 - 17:00	53.8	76.5	55.1	50.4
NOR118_7091284_190530_0005.NBF	Sample within period 17:00 - 18:00	56.4	71.8	56	50.3

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Client:	Quadrant Design Ltd	Ref:	4454

Appendix C: Calculation sheets

project	Quadrant Design Ltd, 23 Kings Road, Reading, RG1 3AR										
date	30/05/2019										
Plant	Condenser to residential										
Frequency			63	125	250	500	1000	2000	4000	8000	dB(A)
Sound Power Level Unit 1 Ref Daikin RXYSQ6T8Y			0	69	68	67	66	63	58	47	70.3
Condenser sound power level combined			6	69	68	67	66	63	58	47	70
Number of units of the same noise level if not added above			1	Number units							
distance to the receiver location			3								
Source situation correction			0	dB							
correction for propagation of sound			q	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 (enter as positive attenuation)			6	9	14	22	22	20	15	12	
Correction for tonality			0	dB up to + 6							
Correction for impulsiveness			0	dB up to + 9							
Correction for intermittency			3	dB up to +3							
Predicted noise levels - unattenuated			63	125	250	500	1000	2000	4000	8000	dB(A)
Condenser sound power level			6	69	68	67	66	63	58	47	70
correction for propagation of noise into the space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	3	m	-21	-21	-21	-21	-21	-21	-21	-21	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for	1	unit/s	0	0	0	0	0	0	0	0	
Correction for tonality			0	0	0	0	0	0	0	0	
Correction for impulsiveness			0	0	0	0	0	0	0	0	
Correction for intermittency			3	3	3	3	3	3	3	3	
allowance for acoustic barrier loss due to other buildings			0	0	0	0	0	0	0	0	
Predicted noise level at receiver plus feature corrections			-6	57	56	55	54	51	46	35	59
Predicted noise levels - Attenuated			63	125	250	500	1000	2000	4000	8000	dB(A)
Condenser sound power level	0	0	6	69	68	67	66	63	58	47	70
correction for propagation of noise into the space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	3	m	-21	-21	-21	-21	-21	-21	-21	-21	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for	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 plus feature corrections			-6	57	56	55	54	51	46	35	59
Attenuation proposed - insertion loss			-6	-9	-14	-22	-22	-20	-15	-12	
Correction for tonality			0	0	0	0	0	0	0	0	
Correction for impulsiveness			0	0	0	0	0	0	0	0	
Correction for intermittency			3	3	3	3	3	3	3	3	
Predicted noise level at receiver plus feature corrections after attenuation			-12	48	42	33	32	31	31	23	40

Project:	23 Kings Road, Reading	Date:	31/05/2019
Client:	Quadrant Design Ltd	Ref:	4454

project			Quadrant Design Ltd, 23 Kings Road, Reading, RG1 3AR								
date			30/05/2019								
Plant			Condenser to library								
Frequency			63	125	250	500	1000	2000	4000	8000	dB(A)
Sound Power Level Unit 1 Ref Daikin RXYSQ6T8Y			0	69	68	67	66	63	58	47	70.3
Condenser sound power level combined			6	69	68	67	66	63	58	47	70
Number of units of the same noise level if not added above			1	Number units							
distance to the receiver location			1								
Source situation correction			0	dB							
correction for propagation of sound			q	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 (enter as positive attenuation)			6	9	14	22	22	20	15	12	
Correction for tonality			0	dB up to + 6							
Correction for impulsiveness			0	dB up to + 9							
Correction for intermittency			0	dB up to +3							
Predicted noise levels - unattenuated			63	125	250	500	1000	2000	4000	8000	dB(A)
Condenser sound power level			6	69	68	67	66	63	58	47	70
correction for propagation of noise into the space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	1	m	-11	-11	-11	-11	-11	-11	-11	-11	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for	1	unit/s	0	0	0	0	0	0	0	0	
Correction for tonality			0	0	0	0	0	0	0	0	
Correction for impulsiveness			0	0	0	0	0	0	0	0	
Correction for intermittency			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 plus feature corrections			1	64	63	62	61	58	53	42	65
Predicted noise levels - Attenuated			63	125	250	500	1000	2000	4000	8000	dB(A)
Condenser sound power level	0	0	6	69	68	67	66	63	58	47	70
correction for propagation of noise into the space			6	6	6	6	6	6	6	6	
correction due to distance to receiver at	1	m	-11	-11	-11	-11	-11	-11	-11	-11	
Source situation correction			0	0	0	0	0	0	0	0	
Correction for	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 plus feature corrections			1	64	63	62	61	58	53	42	65
Attenuation proposed - insertion loss			-6	-9	-14	-22	-22	-20	-15	-12	
Correction for tonality			0	0	0	0	0	0	0	0	
Correction for impulsiveness			0	0	0	0	0	0	0	0	
Correction for intermittency			0	0	0	0	0	0	0	0	
Predicted noise level at receiver plus feature corrections after attenuation			-5	55	49	40	39	38	38	30	47