Paragon
Acoustic Consultants

Project:	17 Boscastle Road, London, NW5 1EE.			
Client:	Max and Julia Biagosch			
Report Title:	Environmental Noise Assessment			
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Contents

1.0 Introduction

It is proposed to locate a new external condenser on brackets along the flank wall at first floor level of the semi-detached property of address 17 Boscastle Road, London, NW5 1EE

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.

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

The possibility of 24-hour operation for the proposed condenser has been considered.

2.0 Site Description and Proposed Plant Location

2.1 Site Description

The site under consideration is situated at 17 Boscastle Road, London, NW5 1EE, within The London Borough of Camden.

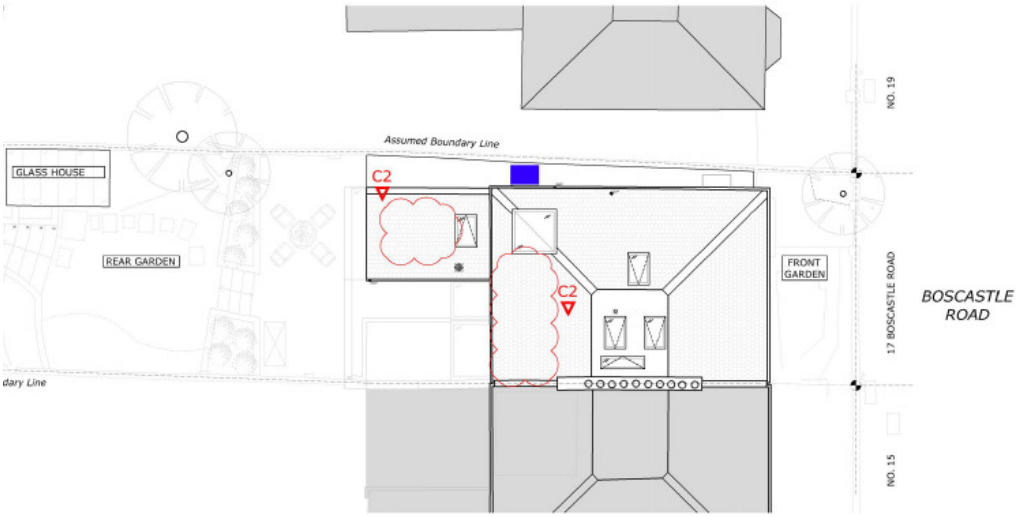
The site comprises a semi-detached property of three storeys in height and lies with its frontage on Boscastle Road. To the rear of the site lie gardens. To the north east lies the neighbouring property of number 19 Boscastle Road. The south eastern façade of this property is a blind wall that faces Number 17 Boscastle Road. To the north east lies the Boscastle Road, beyond which are located similar residential properties. The adjuring semi-detached property of Number 15 Boscastle Road abuts the site to the south east, this building being of the same height as the site under consideration. To the south west are the gardens associated with 17 Boscastle Road, these extending to approximately 25m to the south west.

The site is illustrated by plan in Appendix A.

2.2 Proposed Plant Location

It is proposed to locate a condenser on brackets along the flank wall of the semi-detached property, at first floor level over the side return, the location of which is marked in blue on the following site plan.

Figure 1: Proposed Plant Location



3.0 Existing Noise Climate

3.1 Road Traffic

Noise emanating from vehicular road traffic was deemed to provide a significant contribution to the ambient noise climate proximal to the nearest affected residential premises. The overall noise comprises both individual “event” type emissions from vehicles passing along local roads, and also continuous low frequency “rumble” due to middle distance traffic flows.

3.2 Rail Traffic

Rail traffic was not observed during the manned period at the start and end of the survey.

3.3 Aircraft

Aircraft over flights were observed sporadically during the manned survey at the start and end of the period. Their contribution to the background noise climate will have been included within the measurements taken.

3.4 Mechanical Noise Sources

No mechanical noise sources were observed at the site.

3.5 Construction Noise Sources

Intermittent construction noise was noted during the survey. It is considered likely that the construction associated noise will be limited to the hours typically works in the construction industry, i.e., between the hours of 08:00 – 05:00

4.0 Environmental Noise Survey

4.1 Measurements

The noise monitoring took place between the following dates / times:

- Start : 09/09/2019 at 10:56 hours

- End : 12/05/2019 at 09:26 hours

The noise monitoring was generally un-manned and was undertaken at the location as described below

- **MP1**: 1st floor scaffolding at rear of 117 Boscastle Road, adjacent to the 119 Boscastle Road property

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 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 Weather during survey period

The weather conditions at the start of the manned period of the survey were dry and warm with a slight breeze. At the end of the survey the weather conditions were similar. The weather forecast did not indicate that adverse weather conditions would occur for the survey duration.

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:

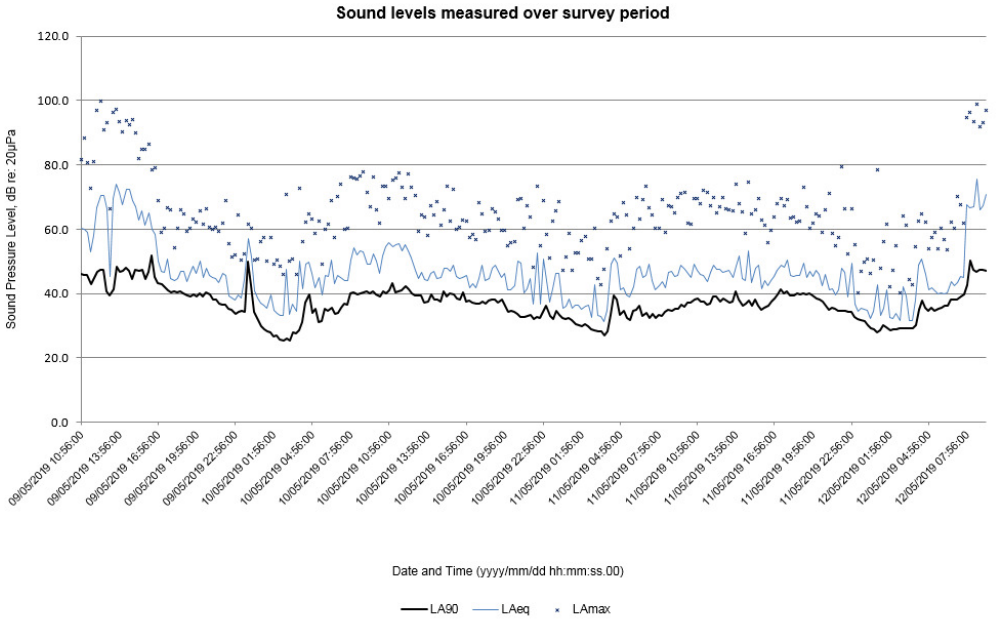
- SVAN 971 Sound level meter serial number 56213, pre-amplifier type SV18 serial number 57308, and type 7052E ½" microphone serial number 65483.

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. Broadband sound pressure level data over the survey period (L_{A90} background levels, L_{Aeq} and L_{Amax} measurements) are shown graphically below:

Figure 2: Graphical Survey Data



The L_{A90} background noise levels have been statistically assessed for daytime/evening and night-time periods in order to determine the values of the "Typically Lowest Existing Representative Background Noise Level".

The following graphs show the results of the statistical assessment of L_{A90} background noise levels for the 15 minute sampling periods:

Figure 3: L90 distribution for Daytime and Evening periods over the survey duration

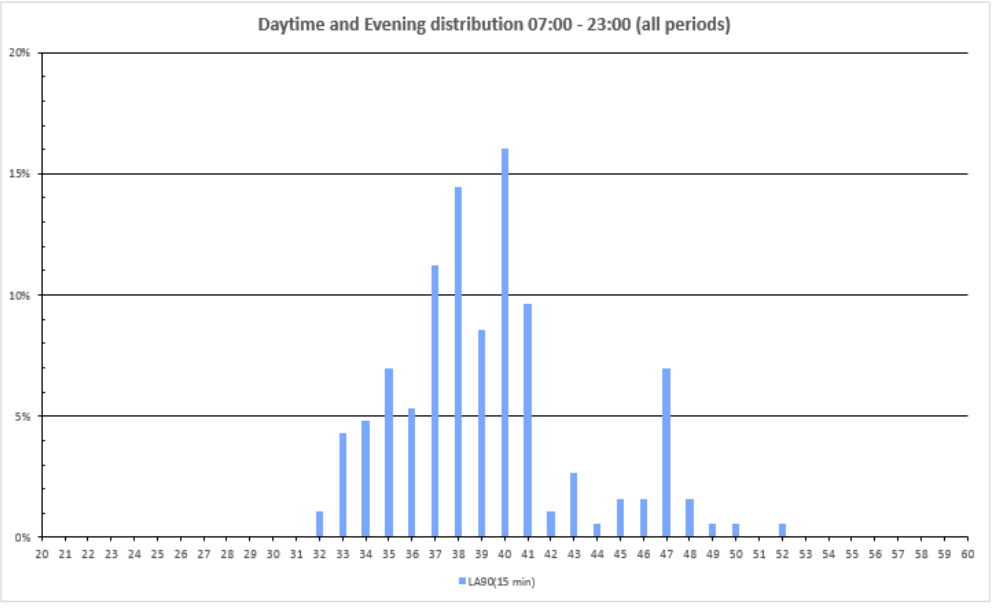
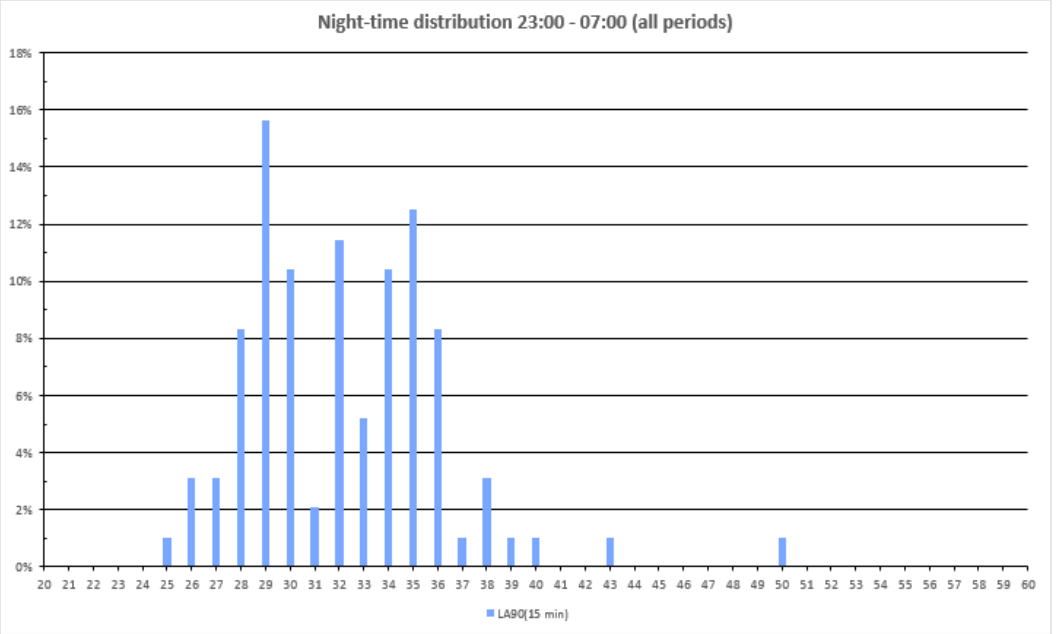


Figure 4: L90 distribution for Night time periods over the survey duration



For this distribution of data, the typically lowest existing representative background noise levels are considered to be as follows:

Table 1: Typically Lowest Existing Representative Background Noise Level

Measurement Position	**Daytime / Evening 07:00-23:00 $L_{A90,(15\ min)}$**	**Night-time 23:00-07:00 $L_{A90,(15\ min)}$**
MP1 measurement position	37 dB	29 dB

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. It is apparent that the Local Authority reference to a "Rating level" is based on methods used in BS4142.

However, this practice contacted the Local Authority to discuss the potential noise limits due to the fact that the noise levels were low, especially during the night time. On 15/05/2019 this practice received an e-mail that advised the following as a response from the Technical Officer:

> **"British standard 4142:2014 states that:**
>
> ***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.***
>
> **Based on 4142, where background sound levels are low it might be more appropriate to use absolute levels. If typical background sound levels fall below 30dBA the plant noise limit could be set to be the same as the existing background sound level or 30dBA, whichever is higher."**

On this basis it is advised that the night time noise levels and subsequent rating level are considered to be low and as such, an absolute noise levels of 30dB shall be used as the noise limit.

5.2 External Noise Criteria

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

Table 2: Limiting Noise Criteria applicable at the affected premises

Plant Location	Receptor	Daytime / Evening 07:00-23:00 L_{ArT}	Night-time 23:00-07:00 L_{ArT}
Any Location on the site	Day – Gardens used for main amenity, outside living and dining and bedroom windows (façade). Night time – Outside bedroom windows (façade). [3]	27 dB [1] [2]	30 dB [1] [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.

[3] Note: Levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

6.0 Review of Proposed Plant

6.1 Introduction

The new plant will comprise an Air conditioning unit, being a Daikin Model 3MXM-N.

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 used in the assessment.

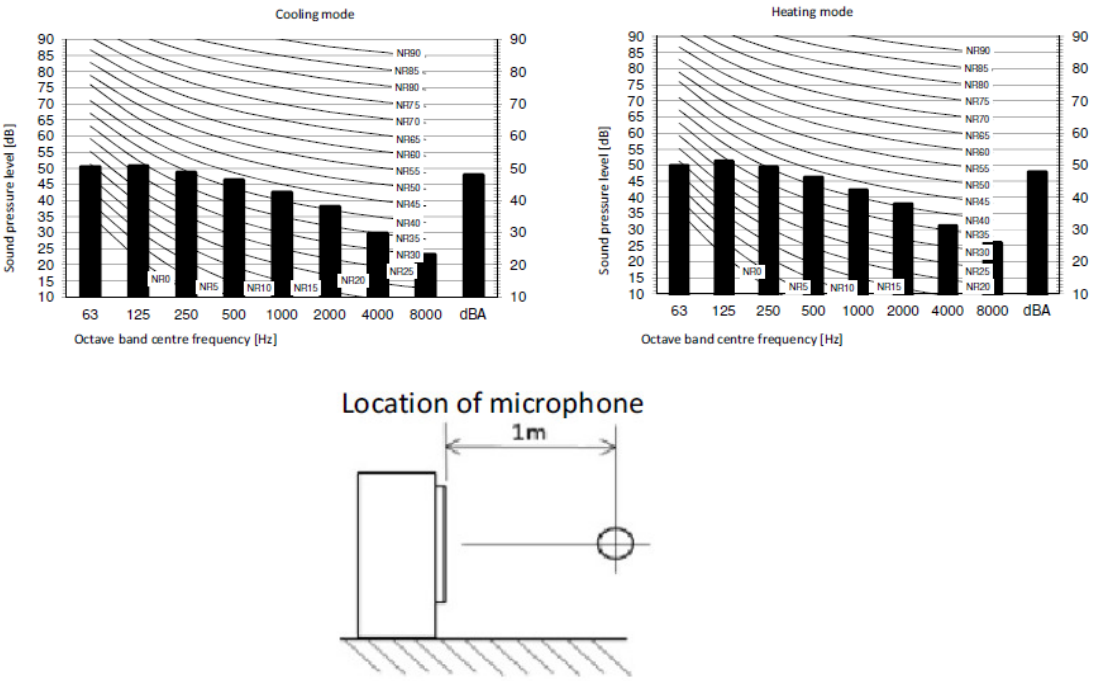
The following sections provide a record of the proposed new plant, the operational sound levels used as the basis for this assessment, and a specification for noise mitigation treatments.

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 the building envelope to the clients' property. It is recommended that the client employ acoustic consultants to assess this aspect at the appropriate stage of the project.

6.2 Plant Noise Data

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

Figure 5: Noise data for Daikin Model 3MXM-N.



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 below:

Table 3: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted L_{Art}	Derived noise limits
Daikin Model 3MXM-N at location indicated in Figure 1	Residential property at 19 Boscastle Road.	4 m	Yes	45 dB	27 dB L_{Art}, 07:00-23:00 19 dB L_{Art} 23:00-07:00

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 properties, the proposed plant will not 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 to the condensers.

6.4 Noise mitigation to plant

An acoustic enclosure shall be used to house the condenser units. 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 4: Minimum insertion loss requirements for enclosure in all directions including to below

Quantity	1/1 octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Minimum insertion loss (dB)	9	13	19	27	25	21	20	18

The acoustic performance indicated is based on acoustic performance figures claimed by Messrs Environ Technologies Ltd. http://www.environ.co.uk Tel: +44 (0)870 383 3344. Simon Parker Mobile: 07974 428395

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 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.

6.5 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

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 5: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted L_{Art}	Derived noise limit
Daikin Model 3MXM-N at location indicated in Figure 1 within acoustic enclosure	Residential property windows of 19 Boscastle Road.	4 m	Yes	24 (+ 3 dB for potential intermittency) dB = 27	27 dB L_{Art}, 07:00-23:00 30 dB L_{Art} 23:00-07:00

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 17 Boscastle Road, London, NW5 1EE, where the positioning of new mechanical plant is proposed.

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 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.

Project:	17 Boscastle Road, London, NW5 1EE.	Date:	20/05/19
Client:	Max and Julia Biagosch	Ref:	4414

Appendix A: Site Plan

Red Line – approximate site area.

Appendix B: Recorded Survey Data

1st day	LAF(max)	LAeq	L10	L90
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
09/05/2019 10:56:00	81.58	60.28	63.70	46.10
09/05/2019 11:11:00	88.40	60.09	62.40	45.90
09/05/2019 11:26:00	80.54	59.17	62.90	45.70
09/05/2019 11:41:00	72.88	53.11	56.60	43.00
09/05/2019 11:56:00	80.95	57.97	59.60	45.00
09/05/2019 12:11:00	96.89	66.52	63.10	46.90
09/05/2019 12:26:00	99.88	70.59	66.00	47.50
09/05/2019 12:41:00	90.94	70.37	71.10	47.30
09/05/2019 12:56:00	93.09	66.51	63.70	40.70
09/05/2019 13:11:00	66.20	45.41	47.60	39.50
09/05/2019 13:26:00	96.37	69.54	66.90	41.30
09/05/2019 13:41:00	97.24	73.87	74.30	48.50
09/05/2019 13:56:00	93.35	71.37	70.30	46.90
09/05/2019 14:11:00	90.14	67.68	66.90	47.10
09/05/2019 14:26:00	93.80	72.51	71.00	48.00
09/05/2019 14:41:00	92.49	72.41	70.40	47.00
09/05/2019 14:56:00	94.22	68.87	66.00	44.40
09/05/2019 15:11:00	90.06	66.89	67.50	47.30
09/05/2019 15:26:00	82.00	62.79	64.80	47.20
09/05/2019 15:41:00	84.75	65.67	68.10	47.30
09/05/2019 15:56:00	84.94	61.35	62.70	44.60
09/05/2019 16:11:00	86.55	65.15	67.40	46.80
09/05/2019 16:26:00	78.49	60.04	60.60	51.90
09/05/2019 16:41:00	79.16	58.46	60.20	45.30
09/05/2019 16:56:00	68.84	50.11	53.10	43.20
09/05/2019 17:11:00	58.98	46.91	49.60	42.90
09/05/2019 17:26:00	60.21	46.58	49.80	42.00
09/05/2019 17:41:00	66.52	50.73	53.10	41.00
09/05/2019 17:56:00	66.10	44.77	47.60	40.30
09/05/2019 18:11:00	54.27	44.18	46.60	40.60
09/05/2019 18:26:00	60.35	44.53	47.10	40.40
09/05/2019 18:41:00	66.07	46.97	49.00	40.70
09/05/2019 18:56:00	64.61	46.77	47.60	40.20
09/05/2019 19:11:00	59.23	43.62	45.60	39.40
09/05/2019 19:26:00	60.29	46.13	49.20	39.10
09/05/2019 19:41:00	63.22	48.56	52.90	39.90
09/05/2019 19:56:00	62.17	46.27	49.30	39.20
09/05/2019 20:11:00	65.78	50.03	51.00	40.10
09/05/2019 20:26:00	61.61	45.10	47.40	39.20
09/05/2019 20:41:00	66.51	47.93	50.80	40.50
09/05/2019 20:56:00	60.56	45.65	48.90	39.60
09/05/2019 21:11:00	59.90	45.10	47.30	38.30
09/05/2019 21:26:00	60.55	44.67	46.10	38.10
09/05/2019 21:41:00	59.46	43.34	46.60	36.90
09/05/2019 21:56:00	61.76	46.40	48.70	36.70
09/05/2019 22:11:00	68.92	45.77	47.70	36.70
09/05/2019 22:26:00	55.64	39.19	40.30	35.20
09/05/2019 22:41:00	51.24	38.72	41.10	35.10
09/05/2019 22:56:00	51.88	38.10	40.40	33.70
09/05/2019 23:11:00	64.41	39.58	41.60	34.30
09/05/2019 23:26:00	50.54	38.51	41.00	34.70
09/05/2019 23:41:00	52.41	44.34	49.60	34.40
09/05/2019 23:56:00	61.53	56.96	59.60	49.80
10/05/2019 00:11:00	60.29	51.50	56.00	42.60
10/05/2019 00:26:00	50.27	40.91	44.30	34.30
10/05/2019 00:41:00	50.86	38.65	41.80	31.80
10/05/2019 00:56:00	56.30	36.96	40.00	30.00
10/05/2019 01:11:00	57.53	36.46	39.40	28.90
10/05/2019 01:26:00	49.97	35.32	38.40	28.30
10/05/2019 01:41:00	57.32	39.73	42.00	28.10
10/05/2019 01:56:00	49.01	34.89	37.90	26.80
10/05/2019 02:11:00	50.41	33.90	36.80	27.00
10/05/2019 02:26:00	48.40	33.32	36.80	25.60
10/05/2019 02:41:00	46.07	33.07	36.50	25.40
10/05/2019 02:56:00	70.95	47.55	42.60	26.00
10/05/2019 03:11:00	50.20	33.40	36.70	25.50
10/05/2019 03:26:00	50.80	36.88	40.70	28.10
10/05/2019 03:41:00	45.84	34.54	37.60	27.60
10/05/2019 03:56:00	72.74	50.18	44.80	28.70
10/05/2019 04:11:00	56.17	41.56	45.70	31.10
10/05/2019 04:26:00	62.34	49.02	52.50	37.20
10/05/2019 04:41:00	64.64	49.93	53.40	39.70
10/05/2019 04:56:00	63.14	46.14	47.50	34.00
10/05/2019 05:11:00	58.85	41.92	45.10	35.40
10/05/2019 05:26:00	62.54	44.90	44.20	31.30
10/05/2019 05:41:00	49.29	39.43	42.90	31.60
10/05/2019 05:56:00	59.98	45.51	49.60	35.40
10/05/2019 06:11:00	61.57	45.28	48.70	34.50
10/05/2019 06:26:00	68.75	50.52	50.30	35.70
10/05/2019 06:41:00	57.40	43.10	45.90	33.60

2nd day	LAF(max)	LAeq	L10	L90
10/05/2019 06:56:00	70.04	45.50	45.50	34.10
10/05/2019 07:11:00	74.02	44.95	45.30	35.70
10/05/2019 07:26:00	60.10	44.03	47.30	36.80
10/05/2019 07:41:00	60.39	44.16	47.10	36.70
10/05/2019 07:56:00	76.21	50.56	51.50	40.20
10/05/2019 08:11:00	76.02	54.35	55.60	40.30
10/05/2019 08:26:00	75.44	51.94	52.70	39.90
10/05/2019 08:41:00	76.47	53.39	52.30	40.00
10/05/2019 08:56:00	77.76	53.09	53.80	40.30
10/05/2019 09:11:00	71.50	49.23	51.40	40.60
10/05/2019 09:26:00	67.14	49.07	51.60	40.00
10/05/2019 09:41:00	76.13	52.41	55.10	40.80
10/05/2019 09:56:00	66.06	49.97	53.50	39.80
10/05/2019 10:11:00	61.82	46.23	50.60	39.10
10/05/2019 10:26:00	73.34	51.65	51.70	40.60
10/05/2019 10:41:00	73.46	54.61	55.90	40.00
10/05/2019 10:56:00	69.45	55.80	61.40	40.90
10/05/2019 11:11:00	75.43	54.43	57.60	43.40
10/05/2019 11:26:00	76.01	55.17	57.90	40.50
10/05/2019 11:41:00	77.47	55.67	59.30	40.60
10/05/2019 11:56:00	72.92	53.31	57.60	41.00
10/05/2019 12:11:00	69.60	55.18	60.50	42.40
10/05/2019 12:26:00	77.21	53.15	57.90	41.20
10/05/2019 12:41:00	73.20	51.11	54.30	40.20
10/05/2019 12:56:00	70.38	47.33	49.70	39.40
10/05/2019 13:11:00	59.49	44.64	47.80	39.50
10/05/2019 13:26:00	64.31	46.71	49.30	39.30
10/05/2019 13:41:00	63.74	44.51	47.10	37.30
10/05/2019 13:56:00	58.17	44.01	47.00	37.40
10/05/2019 14:11:00	67.23	46.42	49.60	39.60
10/05/2019 14:26:00	64.41	47.03	49.40	38.20
10/05/2019 14:41:00	68.60	44.78	47.50	38.30
10/05/2019 14:56:00	61.36	45.16	48.60	37.60
10/05/2019 15:11:00	65.91	47.85	50.10	40.60
10/05/2019 15:26:00	73.47	47.72	49.60	39.20
10/05/2019 15:41:00	62.56	46.83	49.70	40.00
10/05/2019 15:56:00	72.26	48.95	50.90	39.80
10/05/2019 16:11:00	60.10	45.46	48.50	38.60
10/05/2019 16:26:00	60.51	44.59	47.80	38.10
10/05/2019 16:41:00	62.83	45.15	47.70	40.30
10/05/2019 16:56:00	62.39	45.68	48.20	37.50
10/05/2019 17:11:00	57.35	41.91	44.30	37.70
10/05/2019 17:26:00	58.40	43.08	46.60	37.10
10/05/2019 17:41:00	56.72	41.73	44.10	37.00
10/05/2019 17:56:00	68.35	44.78	46.40	36.80
10/05/2019 18:11:00	64.92	48.98	53.20	37.60
10/05/2019 18:26:00	59.20	44.16	47.30	37.00
10/05/2019 18:41:00	59.77	44.72	48.00	37.80
10/05/2019 18:56:00	66.35	47.95	50.50	38.10
10/05/2019 19:11:00	65.43	48.86	52.70	38.30
10/05/2019 19:26:00	63.09	46.89	50.30	37.30
10/05/2019 19:41:00	59.69	45.05	48.60	38.30
10/05/2019 19:56:00	59.62	46.26	50.10	36.40
10/05/2019 20:11:00	54.83	41.31	45.00	34.40
10/05/2019 20:26:00	55.76	41.32	43.70	34.60
10/05/2019 20:41:00	56.07	42.32	45.70	34.30
10/05/2019 20:56:00	69.12	50.06	50.40	33.60
10/05/2019 21:11:00	69.70	49.39	49.60	32.60
10/05/2019 21:26:00	60.29	40.08	41.40	32.60
10/05/2019 21:41:00	67.37	41.51	40.80	33.20
10/05/2019 21:56:00	63.71	44.73	42.60	33.50
10/05/2019 22:11:00	48.22	36.82	39.70	32.10
10/05/2019 22:26:00	73.37	52.64	40.60	32.60
10/05/2019 22:41:00	54.80	36.73	38.30	32.50
10/05/2019 22:56:00	68.94	50.88	48.80	34.30
10/05/2019 23:11:00	58.46	43.91	47.30	36.40
10/05/2019 23:26:00	51.02	37.32	39.40	33.10
10/05/2019 23:41:00	62.59	41.62	39.20	32.00
10/05/2019 23:56:00	65.79	46.23	45.30	34.60
11/05/2019 00:11:00	68.43	46.18	41.40	33.30
11/05/2019 00:26:00	47.15	35.43	37.50	32.50
11/05/2019 00:41:00	51.33	35.95	38.00	32.20
11/05/2019 00:56:00	58.77	38.33	40.70	32.40
11/05/2019 01:11:00	47.37	35.45	37.80	31.80
11/05/2019 01:26:00	52.65	36.32	38.60	30.40
11/05/2019 01:41:00	52.52	36.47	39.70	30.30
11/05/2019 01:56:00	56.37	35.27	36.80	29.80
11/05/2019 02:11:00	57.86	36.17	37.50	30.40
11/05/2019 02:26:00	50.88	36.50	38.80	29.90
11/05/2019 02:41:00	50.68	32.56	35.10	29.00
11/05/2019 02:56:00	60.26	42.62	38.30	28.50
11/05/2019 03:11:00	44.66	33.35	36.50	28.40
11/05/2019 03:26:00	42.71	32.85	35.80	28.30
11/05/2019 03:41:00	47.46	31.42	33.90	27.10
11/05/2019 03:56:00	53.81	34.79	36.50	28.20
11/05/2019 04:11:00	62.40	49.17	53.30	33.50
11/05/2019 04:26:00	64.77	51.02	54.80	39.30
11/05/2019 04:41:00	63.88	49.49	53.10	38.30
11/05/2019 04:56:00	51.76	41.29	44.70	33.50
11/05/2019 05:11:00	68.35	41.71	43.90	34.50
11/05/2019 05:26:00	64.34	39.61	41.90	32.40
11/05/2019 05:41:00	53.82	38.86	42.50	31.70
11/05/2019 05:56:00	60.23	42.29	45.70	34.70
11/05/2019 06:11:00	69.87	47.59	50.50	34.90
11/05/2019 06:26:00	63.29	48.36	51.50	36.10
11/05/2019 06:41:00	69.19	45.11	46.40	33.20

3rd day	LAF(max)	LAeq	L10	L90
11/05/2019 06:56:00	73.33	45.65	47.70	34.10
11/05/2019 07:11:00	66.76	48.99	45.80	32.50
11/05/2019 07:26:00	64.53	44.01	48.00	33.70
11/05/2019 07:41:00	60.46	41.09	44.70	32.30
11/05/2019 07:56:00	60.28	42.33	45.30	33.30
11/05/2019 08:11:00	69.07	43.62	44.30	33.00
11/05/2019 08:26:00	58.95	41.91	45.50	34.20
11/05/2019 08:41:00	67.25	46.62	47.50	34.90
11/05/2019 08:56:00	66.99	46.99	47.40	34.80
11/05/2019 09:11:00	65.14	45.38	49.00	35.20
11/05/2019 09:26:00	69.82	45.61	44.70	35.30
11/05/2019 09:41:00	71.23	48.81	49.00	36.50
11/05/2019 09:56:00	71.35	47.60	50.40	36.00
11/05/2019 10:11:00	61.81	46.41	49.60	37.20
11/05/2019 10:26:00	61.71	44.94	48.60	37.30
11/05/2019 10:41:00	69.65	49.18	51.30	38.30
11/05/2019 10:56:00	69.62	47.34	48.80	38.40
11/05/2019 11:11:00	67.86	46.00	48.90	37.60
11/05/2019 11:26:00	72.21	45.64	47.80	37.40
11/05/2019 11:41:00	71.59	43.87	45.40	36.70
11/05/2019 11:56:00	67.20	46.60	48.10	36.90
11/05/2019 12:11:00	69.83	48.94	52.10	39.10
11/05/2019 12:26:00	64.98	47.48	50.60	39.10
11/05/2019 12:41:00	66.93	47.63	50.80	37.60
11/05/2019 12:56:00	69.80	46.58	49.80	38.40
11/05/2019 13:11:00	66.40	46.86	49.60	37.70
11/05/2019 13:26:00	66.13	47.36	50.70	37.20
11/05/2019 13:41:00	65.61	44.91	46.90	37.40
11/05/2019 13:56:00	74.01	48.37	50.60	40.70
11/05/2019 14:11:00	68.02	51.59	55.40	38.30
11/05/2019 14:26:00	65.34	44.58	44.50	36.30
11/05/2019 14:41:00	58.73	44.14	47.60	37.00
11/05/2019 14:56:00	74.51	53.37	46.10	37.80
11/05/2019 15:11:00	64.63	43.30	45.80	36.40
11/05/2019 15:26:00	66.03	48.00	50.70	38.10
11/05/2019 15:41:00	69.60	48.78	48.70	36.20
11/05/2019 15:56:00	62.76	41.38	43.80	35.10
11/05/2019 16:11:00	61.25	43.92	46.40	35.50
11/05/2019 16:26:00	55.83	42.61	46.10	36.30
11/05/2019 16:41:00	59.59	43.99	47.50	37.50
11/05/2019 16:56:00	63.73	45.25	48.20	38.60
11/05/2019 17:11:00	67.92	47.09	48.80	39.90
11/05/2019 17:26:00	69.44	48.86	51.10	41.30
11/05/2019 17:41:00	67.20	48.20	50.80	40.20
11/05/2019 17:56:00	69.19	50.27	51.40	40.60
11/05/2019 18:11:00	63.47	45.79	48.40	39.40
11/05/2019 18:26:00	63.71	45.29	48.30	39.30
11/05/2019 18:41:00	62.12	45.63	48.30	40.00
11/05/2019 18:56:00	62.48	45.52	48.20	39.60
11/05/2019 19:11:00	73.14	49.32	50.50	40.20
11/05/2019 19:26:00	66.94	45.10	46.70	39.70
11/05/2019 19:41:00	60.17	46.81	50.60	40.10
11/05/2019 19:56:00	61.94	45.36	48.20	39.50
11/05/2019 20:11:00	64.88	47.17	47.90	38.60
11/05/2019 20:26:00	64.00	46.06	46.70	38.10
11/05/2019 20:41:00	59.05	42.44	44.50	37.50
11/05/2019 20:56:00	65.94	45.89	45.80	36.30
11/05/2019 21:11:00	71.26	41.13	40.90	35.10
11/05/2019 21:26:00	58.77	41.61	44.10	35.50
11/05/2019 21:41:00	54.96	39.56	41.30	35.30
11/05/2019 21:56:00	57.39	41.03	42.80	34.60
11/05/2019 22:11:00	79.38	47.96	47.10	34.70
11/05/2019 22:26:00	66.22	46.71	49.10	34.80
11/05/2019 22:41:00	52.42	38.95	41.10	34.20
11/05/2019 22:56:00	66.49	49.43	53.20	34.20
11/05/2019 23:11:00	55.20	36.67	37.90	32.70
11/05/2019 23:26:00	40.34	34.57	36.60	32.20
11/05/2019 23:41:00	46.98	35.40	37.60	31.70
11/05/2019 23:56:00	49.73	35.00	37.00	31.60
12/05/2019 00:11:00	50.88	34.96	36.60	30.20
12/05/2019 00:26:00	46.35	32.28	34.50	29.10
12/05/2019 00:41:00	50.40	34.60	37.50	29.00
12/05/2019 00:56:00	78.46	42.87	34.30	28.00
12/05/2019 01:11:00	47.96	33.30	35.60	28.70
12/05/2019 01:26:00	56.19	35.54	36.60	30.10
12/05/2019 01:41:00	61.49	41.10	36.60	29.50
12/05/2019 01:56:00	42.24	32.60	36.00	28.50
12/05/2019 02:11:00	47.20	32.36	34.60	29.00
12/05/2019 02:26:00	54.82	33.77	36.60	28.80
12/05/2019 02:41:00	40.20	31.70	34.00	29.20
12/05/2019 02:56:00	64.16	42.05	42.70	29.10
12/05/2019 03:11:00	61.12	39.35	37.90	29.10
12/05/2019 03:26:00	44.42	31.56	32.90	29.30
12/05/2019 03:41:00	42.70	31.72	33.80	29.30
12/05/2019 03:56:00	54.67	37.90	41.00	30.30
12/05/2019 04:11:00	62.46	48.87	52.80	35.10
12/05/2019 04:26:00	64.64	50.76	54.70	37.90
12/05/2019 04:41:00	62.18	45.82	48.90	35.60
12/05/2019 04:56:00	54.02	41.24	44.20	34.70
12/05/2019 05:11:00	57.43	41.88	44.40	35.60
12/05/2019 05:26:00	59.13	41.02	43.80	34.60
12/05/2019 05:41:00	53.91	39.94	42.40	35.40
12/05/2019 05:56:00	60.26	40.22	43.00	35.60
12/05/2019 06:11:00	56.75	39.88	41.70	36.10
12/05/2019 06:26:00	53.53	40.07	42.60	36.20
12/05/2019 06:41:00	62.26	43.62	45.90	38.30

4th day	LAF(max)	LAeq	L10	L90
12/05/2019 06:56:00	60.34	42.59	44.60	38.20
12/05/2019 07:11:00	70.32	43.48	44.90	38.10
12/05/2019 07:26:00	67.52	45.20	45.70	39.00
12/05/2019 07:41:00	61.95	44.96	47.40	39.60
12/05/2019 07:56:00	94.72	67.55	56.60	42.60
12/05/2019 08:11:00	96.23	66.66	63.60	50.30
12/05/2019 08:26:00	93.57	66.90	65.50	47.40
12/05/2019 08:41:00	98.90	75.47	66.40	46.70
12/05/2019 08:56:00	91.93	66.05	66.90	47.50
12/05/2019 09:11:00	93.20	67.35	67.80	47.30
12/05/2019 09:26:00	96.91	70.72	69.10	47.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
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00:00	0.00	0.00	0.00	0.00
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00:00	0.00	0.00	0.00	0.00
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00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
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00:00	0.00	0.00	0.00	0.00
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00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00
00:00	0.00	0.00	0.00	0.00

Project:	17 Boscastle Road, London, NW5 1EE.	**Date:**	20/05/19
Client:	Max and Julia Biagosch	**Ref:**	4414

Appendix C: Calculation sheets

project	17 Boscastle Road, London, NW5 1EE									
date	13/05/2019									
Plant	Daikin Model 3MXM-N									
Frequency	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Unit 1 sound pressure level at 1 metre Ref Daikin Model 3MXM-N. Heating	51	52	50	46	43	38	32	26	**48**
Unit 1 sound pressure level at 1 metre Ref Daikin Model 3MXM-N. Cooling	51	51	49	47	43	38	30	24	**48**
Maximum of the two	51	52	50	47	43	38	32	26	**49**
Combined Condenser sound pressure level at distance below	51	52	50	47	43	38	32	26	**49**
distance sound pressure level measured	1	metres							
Source measurement condition	1	1=free field, 2=hemisphere							
Number of units of same noise level if not added above	1	Number of units of the same noise level							
distance to the receiver location	4	metres							
Source situation correction	2.5	dB							
correction for propagation of sound	q	h=hemisphere, q=quarter sphere, e=eighth of a sphere							
acoustic barrier loss due to other buildings / screening (enter as positive attenuation)	0	0	0	0	0	0	0	0	
Additional Attenuation proposed (enter as positive attenuation)	9	13	19	27	25	21	20	18	

	Predicted noise levels WITHOUT additional attenuation								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condenser sound pressure level at 1 m	51	52	50	47	43	38	32	26	**49**
correction for propagation of noise into the space	6	6	6	6	6	6	6	6	
correction due to distance to receiver at 4 m	-12	-12	-12	-12	-12	-12	-12	-12	
Source situation correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Number of units of same noise level if not added above 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	47	48	46	43	39	34	28	22	**45**

	Predicted noise levels WITH additional attenuation								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
Condenser sound pressure level at 1 m	51	52	50	47	43	38	32	26	**49**
correction for propagation of noise into the space	6	6	6	6	6	6	6	6	
correction due to distance to receiver at 4 m	-12	-12	-12	-12	-12	-12	-12	-12	
Source situation correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Number of units of same noise level if not added above 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 excluding feature corrections	47	48	46	43	39	34	28	22	**45**
Attenuation proposed - insertion loss	-9	-13	-19	-27	-25	-21	-20	-18	
Predicted noise level at receiver including feature corrections after attenuation	38	35	27	16	14	13	8	4	**24**