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REPORT AS7755.140714.NIA

1 MABLEDON PLACE, LONDON

NOISE IMPACT ASSESSMENT

Prepared: 14 July 2014

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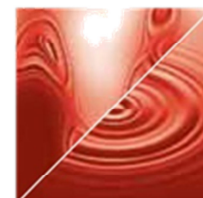
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1. INTRODUCTION

Planning approval is being sought for the installation of new plant at 1 Mabledon Place, London.

Clarke Saunders Associates has been commissioned by Taylor Project Services to undertake assess the new plant installation against the planning requirements of Camden Council for daytime and night-time plant noise emission limits. The assessment will be based on the Arup Acoustics background noise report undertaken previously for the site, which is attached in Appendix A.

Please refer to Appendix B for details of the acoustic terminology used throughout this report.

2. RESULTS

The background noise climate at nearby properties is determined by road traffic noise in the surrounding streets.

Measured minimum background noise levels from Appendix A are shown in Table 2.1 below for the two most affected receivers.

| Monitoring period | Minimum $L_{A90,10mins}$ | |
|---------------------|--------------------------|-------------|
| | Novotel | Mabel's Pub |
| 07:00 - 23:00 hours | 67 dB | 53 dB |
| 23:00 - 07:00 hours | 54 dB | 44 dB |
| 24 hours | 54 dB | 44 dB |

Table 2.1 - Minimum measured background and average noise levels [dB ref. 20 μ Pa]

3. DESIGN CRITERIA

Camden Council's standard noise control requirement is shown below, requiring new plant to be 5dB below the background level.

Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (L_{A90}), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby

permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the L_{A90} , expressed in dB(A).

It is understood that emergency plant should be limited to 10dB above background noise levels.

It is not expected that tonal noise will be generated by the proposed plant units and so the plant noise emissions criteria that should not be exceeded at the nearest noise sensitive receiver should be set to the proposed levels detailed in Table 3.1.

| Receiver | Daytime (07:00 – 23:00 hours) | Night-time (23:00 – 07:00 hours) | Emergency Plant |
|----------------|----------------------------------|-------------------------------------|-----------------|
| Novotel | L_{Aeq} 62 dB | L_{Aeq} 49 dB | L_{Aeq} 64 dB |
| Mabel's Tavern | L_{Aeq} 48 dB | L_{Aeq} 39 dB | L_{Aeq} 54 dB |

Table 3.1 - Proposed design noise criteria

[dB ref. 20µPa]

3.2 BS8233:2014 Guidance on sound insulation and noise reduction for buildings

The guidance in this document indicates suitable noise levels for various activities within residential and commercial buildings.

| Activity | Location | 07:00 to 23:00 | 23:00 to 07:00 |
|----------------------------|-------------|---------------------------|--------------------------|
| Resting | Living Room | 35 dB L_{Aeq} , 16 hour | - |
| Dining | Dining Room | 40 dB L_{Aeq} , 16 hour | - |
| Sleeping (daytime resting) | Bedroom | 35 dB L_{Aeq} , 16 hour | 30 dB L_{Aeq} , 8 hour |

Table 3.2 - Excerpt from BS8233: 2014

[dB ref. 20µPa]

4. PREDICTED NOISE IMPACT

4.1 Proposed plant

The selected plant has been confirmed as:

- 1 no. Climaventa chiller units type TECS2/SL-CA 0512
- 3 no. Stulz condensing units type KSV045A21p
- 1 no. Diesel rotary UPS for emergency purposes only

The approximate location of the plant to be installed is shown in site plan AS7755/SP1.

Noise levels generated by the plant to be installed have been confirmed by the manufacturer as follows:

| Freq (Hz) | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|---------------|----|-----|-----|-----|------|------|------|------|-------|
| Lp @ 10m (dB) | 62 | 54 | 54 | 50 | 47 | 42 | 35 | 30 | 52 |

Table 4.1 - Source noise data for the Climaventa chiller

[dB ref. 20µPa]

| Freq (Hz) | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|---------------|----|-----|-----|-----|------|------|------|------|-------|
| Lp @ 10m (dB) | 65 | 57 | 57 | 53 | 50 | 45 | 38 | 33 | 55 |

Table 4.2 - Source noise data for the Stulz condenser

[dB ref. 20µPa]

| Freq (Hz) | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|--------------|-----|-----|-----|-----|------|------|------|------|-------|
| Lp @ 3m (dB) | 105 | 99 | 82 | 79 | 78 | 73 | 70 | 62 | 86 |

Table 4.3 - Source noise data for the diesel rotary UPS

[dB ref. 20µPa]

4.2 Predicted noise levels

Following an inspection of the site, it was established that the most affected noise sensitive receivers are situated to the north at the Novotel, and to the south at Mabel's Tavern, as shown on the indicative site plan AS7755/SP1.

An assessment of current noise levels from the previously installed two chillers has been undertaken, followed by a cumulative assessment of the new plant in addition to the existing chiller at the nearest noise sensitive receiver has been assessed according to the guidelines set out in BS4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas* as guidance, using the noise data above. Screening losses afforded by the existing plant barrier have been included in the prediction of the cumulative plant noise level at the nearest receiver.

| Receiver | Criterion | Predicted noise level 1m from receiver | |
|----------------|-----------|--|---------------------------|
| | | Current (2 chillers) | Cumulative with new plant |
| Novotel | 49 dB(A) | 37 dB(A) | 46 dB(A) |
| Mabel's Tavern | 39 dB(A) | 20 dB(A) | 30 dB(A) |

Table 4.4 - Predicted noise level and criteria at noise sensitive locations

[dB ref. 20 µPa]

Table 4.5 shows predicted noise levels at the receivers due to the emergency diesel rotary UPS.

| Receiver | Criterion | Predicted noise level 1m from receiver |
|----------------|-----------|--|
| Novotel | 55 dB(A) | 64 dB(A) |
| Mabel's Tavern | 41 dB(A) | 59 dB(A) |

Table 4.5 – Emergency plant noise level and criteria at noise sensitive locations [dB ref. 20 µPa]

A summary of the calculations are shown in Appendices C and D.

All other air handling and extract plant will be fitted with acoustically specified splitter silencers in order that the cumulative noise level does not exceed the 24-hour design noise criterion.

5. CONCLUSION

An assessment of plant noise levels has been undertaken at 1 Mabledon Place, London by Clarke Saunders Associates.

Previous measurements have been made to establish the current background noise climate. This has enabled a 24-hour design criterion to be set for the control of plant noise emissions to noise sensitive properties, in accordance with Camden Council's requirements.

Data for the new plant have been used to predict the noise impact of the new plant on neighbouring residential properties.

Compliance with the noise emission design criterion has been demonstrated. No further mitigation measures are, therefore, required for external noise emissions.


Jamie Duncan (Jul 14, 2014)

Jamie Duncan MIOA

CLARKE SAUNDERS ASSOCIATES

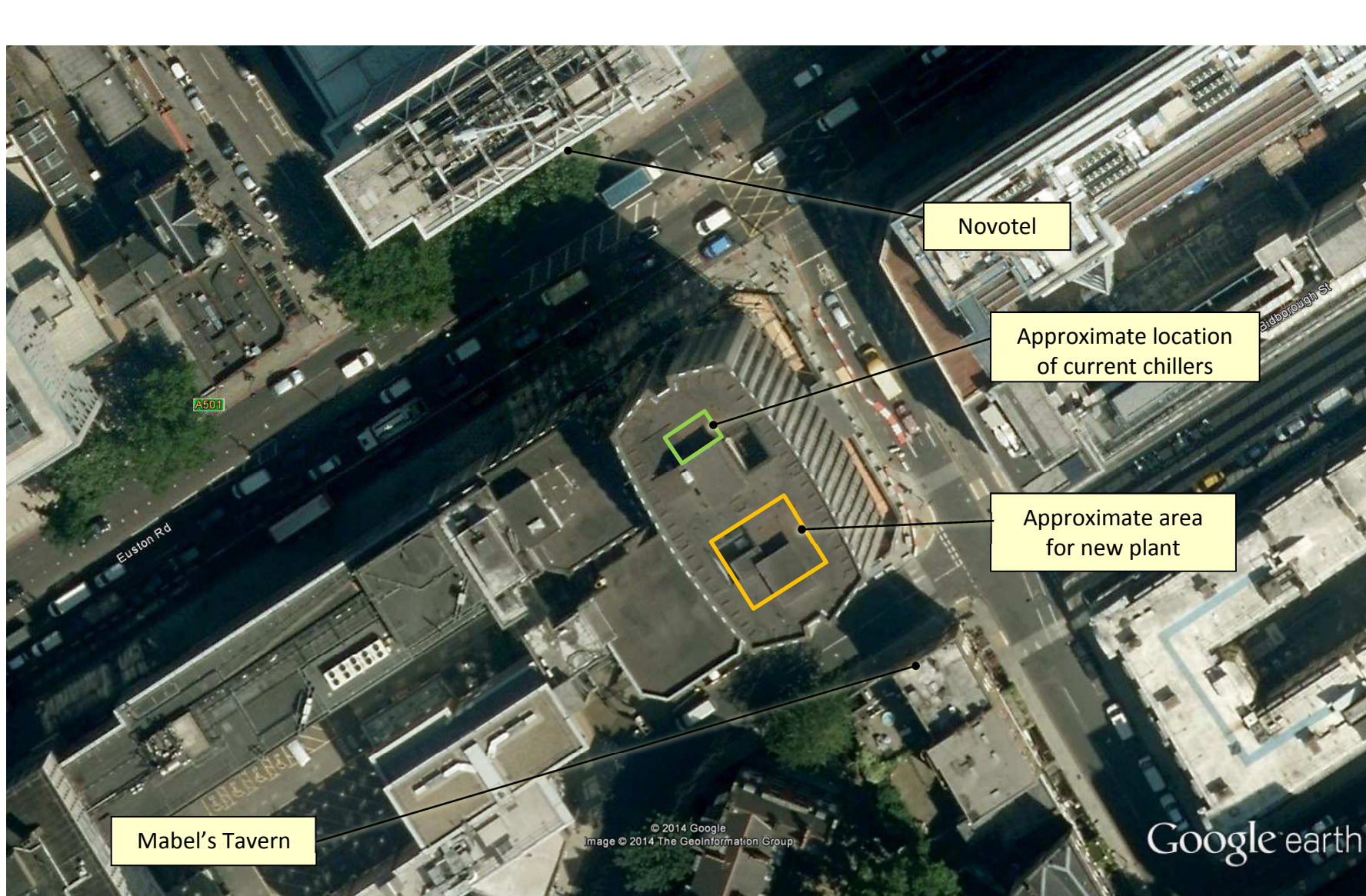


Figure AS7755/SP1

STANHOPE



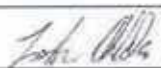

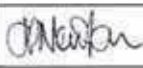



One Mabledon Place Noise Impact Assessment

August 2011

Planning Application Submission

Document Verification

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Appendices

Appendix A

Glossary of Acoustic Terminology

Appendix B

Detailed Noise Survey Results

Executive Summary

It is proposed that the existing office building located at One Mabledon Place will be refurbished. This will include installation of new plant to a rooftop plant area and louvres to the south and west facades of the building.

This report sets out noise level requirements for nearby noise sensitive receivers in accordance with BS4142: 1997 '*Method for Rating Industrial Noise in Mixed Residential and Industrial Areas*' and Camden Council's requirements. A daytime, evening and night time survey was undertaken to establish typical background noise levels at receivers around the site.

In order to meet the requirements at these receivers, design noise criteria have been set for each side of the rooftop plant area based on the nearest receiver locations and measured background noise levels. Likewise, AHU intake and exhaust louvre criteria have also been set. These will be used by the design team to derive individual plant noise specifications as the design develops.

Camden Council has also been consulted in regards to a proposed emergency generator, in which equivalent limits for testing and usage have been set in accordance with the council's requirements.

1 Introduction

Arup Acoustics (AAc) has been asked by Stanhope (Mabledon) Limited to provide an external plant noise assessment to support the refurbishment and extension of One Mabledon Place, London.

The occupier UNISON has now relocated its headquarters to new premises on the north side of Euston Road. However, it will continue to occupy part of the building for meetings and overflow space, until work on the proposed refurbishment begins.

It is proposed that the existing plant is replaced with:

- air cooled chillers to a rooftop plant area
- chilled and heating water pumps and boilers to a new rooftop plant room
- bespoke floor-by-floor air handling units

Individual air handling units will be located on each floor, with louvres intaking and exhausting from the south and west façades of the building.

Figure 1 below shows the anticipated layout for the rooftop plant area.

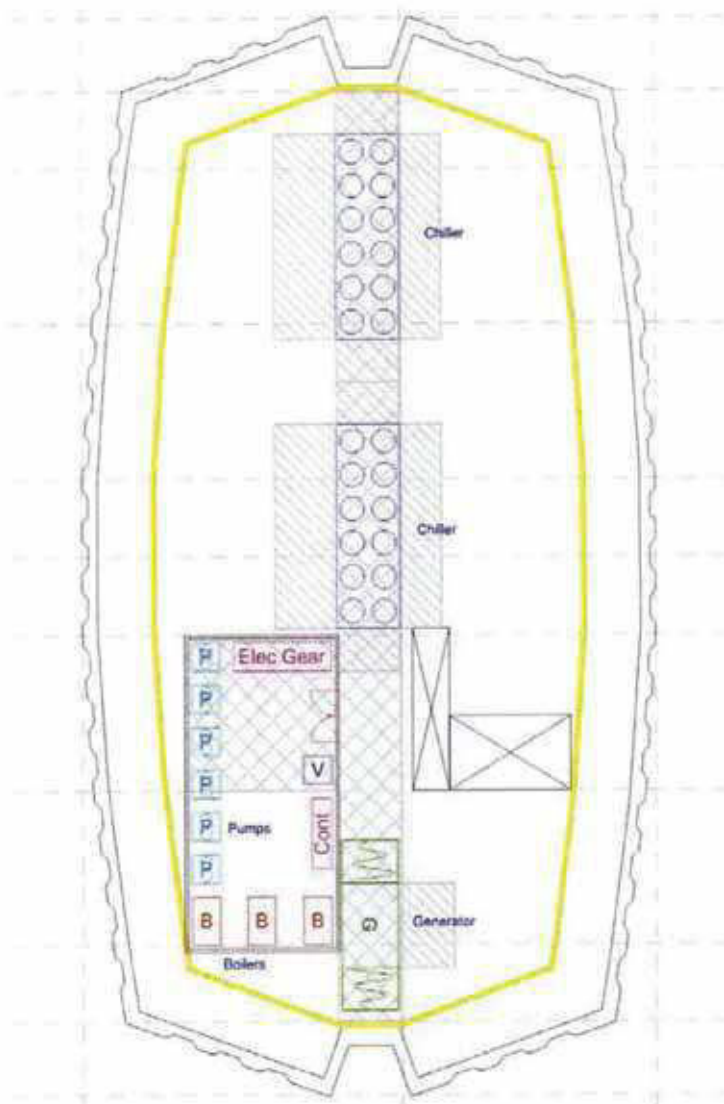


Figure 1 Plan of the proposed new rooftop plant area
Camden Council has stipulated that;

Noise levels at a point 1 metre external to sensitive façades shall be at least 5dB(A) less than the existing background measurement (L_{A90}), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the L_{A90} , expressed in dB(A).

A noise survey has been conducted in the vicinity of the proposed development in order to determine baseline noise conditions in the area.

The predicted noise impact of the new mechanical services plant upon existing dwellings has been assessed in accordance with BS4142: 1997 'Method for Rating Industrial Noise in Mixed Residential and Industrial Areas'.

A glossary of acoustic terminology is presented in Appendix A. Full noise survey results are shown in Appendix B.

2 Noise survey

2.1 General

One Mabledon Place is bounded to the north by Euston Road, to the east by Mabledon Place, to the south by Flaxman Terrace and to the west by various commercial properties.

An environmental noise survey was undertaken during the day time and evening of Wednesday 3 August 2011 and the early hours of the following morning.

2.2 Measurement locations

The baseline noise measurement locations are shown in Figure 2.



Figure 2 Site plan showing the location of baseline noise measurements

Measurements were taken during day, evening and night periods in order to obtain representative background noise levels around the development site during different parts of the day. All measurements were conducted in acoustically free-field conditions.

The dominant noise sources in the vicinity of the development were traffic along Euston Road and less-frequent traffic along Mabledon Place. Distant building services noise was also audible (particularly during the night) along with noise from nearby pedestrians.

2.3 Noise sensitive receivers

Noise sensitive receptor locations were selected based upon existing residential properties as well as possible future development plots. The closest noise sensitive receivers that were identified are listed below:

- Hotels along Euston Road to the north and west of the site (the nearest being represented by locations 1 and 5);
- Hotel and residential dwelling above the public house along Mabledon Place to the south of the site (location 2);

- Residential dwellings along Flaxman Terrace and Cartwright Gardens to the south of the site (locations 3 and 4, respectively).

2.1 Measurement results

The detailed results of the baseline noise survey are presented in Appendix B and are summarised in Table 1.

| Noise monitoring location (see Figure 2) | Measured background noise | | |
|---|--|--|--|
| | Daytime (07:00 – 19:00) dBL _{A90} , 15 mins | Evening (19:00 – 23:00) dBL _{A90} , 15 mins | Night-time (23:00 – 07:00) dBL _{A90} , 5 mins |
| 1 | 67 – 68 | 67 | 54 – 61 |
| 2 | 54 – 55 | 53 – 54 | 44 – 47 |
| 3 | 51 | 49 – 50 | 44 – 45 |
| 4 | 53 | 51 | 45 |
| 5 | n/a | 56 | 54 |

Table 1 Summary of daytime noise measurement results

3 Plant noise assessment

3.1 Required noise level limits

It is common practice to assess and specify plant noise criteria with reference to the *Method for rating industrial noise in mixed residential and industrial areas* given in BS 4142: 1997, as reflected in Camden Council's requirements. This standard provides a method for rating external noise levels from factories, industrial premises or fixed installations of an industrial nature, such as building services plant, to determine the likelihood of complaints from occupants of nearby residential properties.

The method is based on the difference between the background noise level without the industrial noise source and the rating noise level of the industrial noise source at the receiver location. The noise level from the industrial noise source (called the specific noise level) is weighted by 5 dB where it displays an identifiable character (such as tonality, impulsiveness or intermittency). The resultant noise level then becomes the Rating Level. The background noise level is subtracted from the Rating Level and the difference used to assess the likelihood of complaints as shown in Table 2.

| Difference between Rating Level and background noise level | Assessment |
|--|--|
| 10dB or higher | Complaints likely |
| 5dB | Of marginal significance |
| -10dB | Positive indication that complaints are unlikely |

Table 2 Summary of BS4142 rating method

From the survey measurement results, noise limits have been calculated at each sensitive receiver, shown below in Table 3.

| Location | Cumulative noise limit for new plant dBLAeq, 5 mins (Based on the plant noise being steady in nature and free from intermittent, tonal or other perceptible characteristics as described in section 8.2 of BS4142) | | |
|------------------------|--|---------|-------|
| | Day | Evening | Night |
| 1 – Novotel | 62 | 62 | 49 |
| 2 - Mabel's Pub | 49 | 48 | 39 |
| 3 - Flaxman Terrace | 46 | 44 | 39 |
| 4 - Cartwright Gardens | 48 | 46 | 40 |
| 5 - Premier Inn | 51 | 51 | 49 |

Table 3 Noise level limits for new plant operating during day, evening and night

3.2 Design noise criteria

In order to meet the required cumulative limits at each noise-sensitive receiver, noise level criteria have been calculated which are intended as guidance for the engineers in specification of the plant.

The rooftop plant noise criteria are presented in Table 4 and are given in terms of a noise rating (NR) curve. These relate to an octave band sound *pressure* level spectrum within the rooftop plant area, measured along the dotted line given in Figure 3. These criteria include all contributions from both landlord and tenant plant.

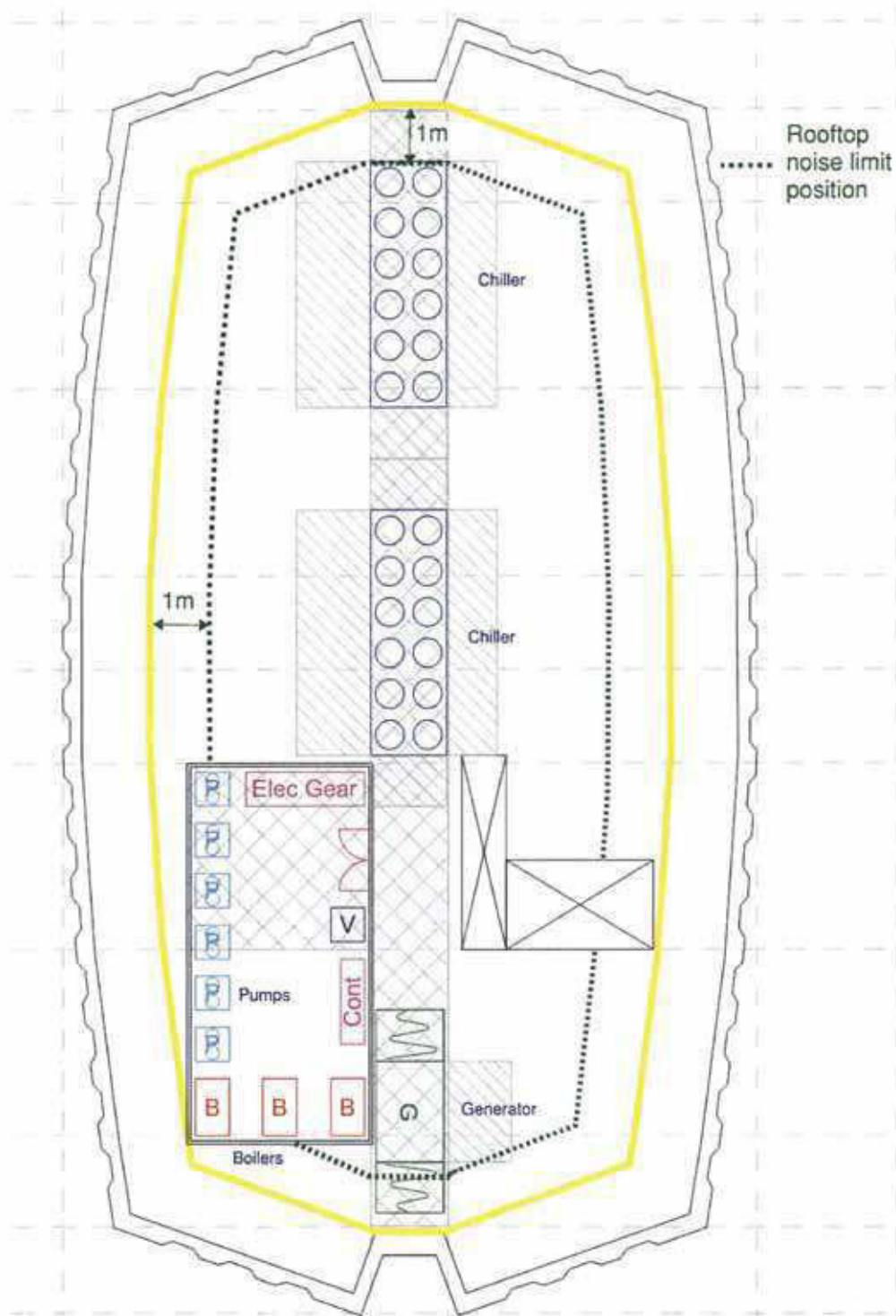


Figure 3 Plant layout indicating where the rooftop plant noise criteria apply

| Façade | Sound <i>pressure</i> level, noise rating (NR) limit (Based on the plant noise being steady in nature and free from intermittent, tonal or other perceptible characteristics as described in section 8.2 of BS4142) | | |
|-------------------------------------|--|---------|-------|
| | Day | Evening | Night |
| North 11 th floor façade | 72 | 72 | 59 |
| East 11 th floor façade | 74 | 72 | 66 |
| South 11 th floor façade | 74 | 72 | 66 |
| West 11 th floor façade | 74 | 72 | 66 |

Table 4 Rooftop sound *pressure* limits for Figure 3

For louvres at lower levels, Table 5 gives A-weighted sound *power* level criteria for the south and west façades of the building. These criteria have been set for day, evening and night periods so that the overall plant noise at the nearest noise sensitive receivers does not exceed the limits set previously in Table 3.

| Period of operation | AHU louvre sound <i>power</i> level to atmosphere, dB (Based on the louvre noise being steady in nature and free from intermittent, tonal or other perceptible characteristics as described in section 8.2 of BS4142) | |
|---------------------|--|------------------------------------|
| | South facade (one louvre per floor) | West facade (one louvre per floor) |
| Day | 60 | 63 |
| Evening | 59 | 62 |
| Night | 50 | 53 |

Table 5 Sound *power* level noise criteria for AHU louvres along the south façade (facing Flaxman Terrace)

3.3 Emergency plant

With regard to emergency plant, Camden Council has stipulated that;

Noise levels at a point 1 metre external to sensitive façades shall be a maximum of 10dB(A) above the lowest existing background measurement (L_{A90}) in a 24 hour period, expressed in dB(A). Testing is permitted for 1 hour per calendar month, during normal working hours (09:00 – 17:00, Monday to Friday), and that the emergency plant is only allowed for use during testing or an emergency situation.

It is proposed that an emergency generator is located in the rooftop plant area.

The associated noise limits during use of emergency equipment are set out in Table 6. These assume that noise emissions from the louvres (as per Table 5) will not increase.

| Façade | Sound <i>pressure</i> level, noise rating (NR) limit | | |
|-------------------------------------|--|---------|-------|
| | Day | Evening | Night |
| North 11 th floor façade | 82 | 82 | 69 |
| East 11 th floor façade | 84 | 82 | 76 |
| South 11 th floor façade | 84 | 82 | 76 |
| West 11 th floor façade | 84 | 82 | 76 |

Table 6 Emergency rooftop sound *pressure* limits for Figure 3

4 Conclusions

Arup Acoustics has carried out a noise impact assessment to support the planning application for the refurbishment and extension of One Mabledon Place.

As part of the refurbishment it is proposed to replace the existing plant in the top floor plant room with new units including chillers, boilers and an emergency generator. Air handling units will also be located on each floor, situated along the south and west facades.

Noise level limits for day, evening and night plant operation have been set at nearby noise sensitive receivers in accordance with requirements set out by Camden Council and BS4142: 1997 - *'Method for Rating Industrial Noise in Mixed Residential and Industrial Areas'*.

Design criteria have been set for the allowable sound pressure level within the rooftop plant area and for sound power levels for AHU intake and exhaust louvres on the south and west sides of the building. As the design develops these criteria will be used to inform the design of individual plant items and any associated noise control required.

Appendix A

Glossary of Acoustic Terminology

The ratio of sound pressures which we can hear is a ratio of $10^6:1$ (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

Equivalent continuous sound level

Frequency

Noise rating (NR) curves

Sound power level

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source (analogous to its volume or mass), which is not affected by the environment within which the source is located.

Sound pressure level

The sound power emitted by a source results in pressure fluctuations in the air, which are heard as sound.

The sound pressure level (L_p) is 10 times the logarithm of the ratio of the measured sound pressure (detected by a microphone) to the reference level of 2×10^{-5} Pa (the threshold of hearing).

Thus L_p (dB) = $10 \log (P/P_{ref})^2$ where P_{ref} , the lowest pressure detectable by the ear, is 0.00002 Pascal (ie 2×10^{-5} Pa).

The threshold of hearing is 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB(A) or more and a change of 3dB is only just detectable. A change of 10dB is subjectively twice, or half, as loud.

Statistical noise levels

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{10} , the level exceeded for 10% of the time period under consideration, and can be used for the assessment of road traffic noise (note that L_{Aeq} is used in BS 8233 for assessing traffic noise). The L_{90} , the level exceeded for 90% of the time, has been adopted to represent the background noise level. The L_1 , the level exceeded for 1% of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted L_{A10} , $dB L_{A90}$ etc. The reference time period (T) is normally included, eg $dB L_{A10, 5min}$ or $dB L_{A90, 8hr}$.

Some typical dB(A) noise levels are given below:

| Noise Level dB(A) | Example |
|-------------------|---------------------------------------|
| 130 | Threshold of pain |
| 120 | Jet aircraft take-off at 100m |
| 110 | Chain saw at 1m |
| 100 | Inside disco |
| 90 | Heavy lorries at 5m |
| 80 | Kerbside of busy street |
| 70 | Loud radio (in typical domestic room) |
| 60 | Office or restaurant |
| 50 | Domestic fan heater at 1m |
| 40 | Living room |
| 30 | Theatre |
| 20 | Remote countryside on still night |
| 10 | Sound insulated test chamber |

Appendix B

Detailed Noise Survey Results

B1.1 Measurement locations

Attended measurements were undertaken around the development site at residential properties along Flaxman Terrace and Cartwright Gardens as well as nearby hotels along Euston Rd. The measurement locations can be seen in Figure 2. Attended measurements were all free-field and approximately 1.2 – 1.5m above the local ground level.

B1.2 Measurement times and duration

Attended measurements were made around the development site from 14:00 on Wednesday 3 August 2011 to 03:00 on Thursday 4 August 2011 over periods of 15 minutes during the day and 5 minutes at night.

B1.3 Measurement equipment

Measurements were carried out using the equipment detailed in Table B1. The sound level meters and microphones conform to BS EN 61672-2:2003 Type 1. The calibration of the sound level meters and microphones were verified before and after use to confirm that there was no significant drift in meter response at the calibrator frequency and level. The meters are regularly calibrated and this calibration is traceable to international standards.

The sound level meters used measured real time, octave band noise levels and provided analysis giving statistical noise levels. The meters were set to fast response and stored noise level data after each measurement period. A summary of the noise measurement equipment used can be found in Table B1.

| Noise Monitoring Equipment | Manufacturer | Type Number | Serial Number |
|--|--------------|-------------|---------------|
| Type 1 sound pressure calibrator | Rion | NC 74 | 35173566 |
| Precision grade sound level meter | Norsonic | 140 | 1403431 |
| ½" diameter pre-polarised condenser microphone | Norsonic | 1225 | 98540 |

Table B1 Details of noise monitoring equipment used

B1.4 Personnel and weather conditions

The survey was carried out by Josh Childs of Arup. Meteorological conditions during the attended survey measurements were dry and calm throughout.

B1.5 Noise survey results

B1.5.1 Location 1

| Date | Time | | Wind | | Noise Level, dB (A) | | | | Comments |
|------------|-------|--------|---------------|-----------|---------------------|-----------------|------------------|-----------------|--|
| | Start | Finish | Speed | Direction | L ₉₀ | L ₁₀ | L _{max} | L _{eq} | |
| 03-08-2011 | 14:05 | 14:20 | Still | - | 67.8 | 76 | 91 | 73.5 | Plant from building is permanently off, noise from Euston Road is the main source, plus distant construction noise and loud talking from frequent passing pedestrians. |
| 03-08-2011 | 15:20 | 15:35 | Still | - | 67.3 | 76.9 | 96.2 | 74.6 | Same sources as before but with infrequent nearby passing sirens. |
| 03-08-2011 | 19:59 | 20:14 | Still | - | 66.7 | 76.8 | 90.7 | 74.2 | Same sources with increased bus activity. |
| 03-08-2011 | 21:33 | 21:48 | Still | - | 66.6 | 76.8 | 93 | 74.7 | Same as before. |
| 04-08-2011 | 01:00 | 01:05 | Gentle breeze | W | 60.2 | 75.7 | 83.2 | 71.7 | Road traffic (with a high percentage of buses) along Euston Road is still dominant, while pedestrian traffic has decreased significantly. |
| 04-08-2011 | 01:29 | 01:34 | Gentle breeze | SW | 60.6 | 76.2 | 83.5 | 72.5 | Same sources as before. |
| 04-08-2011 | 02:08 | 02:13 | Still | - | 54.9 | 75.8 | 85.7 | 71.8 | Same sources as before. |
| 04-08-2011 | 02:38 | 02:43 | Still | - | 54.4 | 75.5 | 82.9 | 71.4 | Same sources as before. |

Table B2 Measured noise levels at location 1

The meter was positioned 5m from the curb of the road, in free-field conditions.

B1.5.3 Location 3

| Date | Time | | Wind | | Noise Level, dB (A) | | | | Comments |
|------------|-------|--------|---------------|-----------|---------------------|-----------------|------------------|-----------------|---|
| | Start | Finish | Speed | Direction | L ₉₀ | L ₁₀ | L _{max} | L _{eq} | |
| 03-08-2011 | 14:41 | 14:56 | Still | - | 50.9 | 57.3 | 77.4 | 56.0 | Plant noise from the dance school across the road is dominant and constant. Other noise present from frequent passing pedestrians and cyclists. Distant road traffic noise from Euston Road is barely audible while occasional traffic noise along Flaxman Terrace is present. Infrequent noise sources include distant church bells and nearby shouting. |
| 03-08-2011 | 15:57 | 16:12 | Gentle breeze | SW | 51.3 | 59.4 | 76.5 | 56.8 | Same sources as before, with additional distant sirens and aeroplane noise, as well as a nearby passing moped. |
| 03-08-2011 | 20:34 | 20:49 | Still | - | 50.4 | 54.6 | 90.2 | 55.9 | Same as before, with extra noise from the nearby pub and music from the dance school. Some low level noise from nearby residents. |
| 03-08-2011 | 22:07 | 22:22 | Still | - | 48.7 | 53.7 | 69.2 | 51.7 | Dance school plant is now off, and distant noise from Euston Road is dominant. There is additional noise from passing talking pedestrians, infrequent Flaxman Terrace traffic, distant siren and church bells. |
| 04-08-2011 | 01:14 | 01:19 | Gentle breeze | W | 45.4 | 50.2 | 61.3 | 49.0 | Distant road traffic noise from Euston Road dominant, while distant plant noise is audible to the north. |
| 04-08-2011 | 01:46 | 01:51 | Gentle breeze | SW | 44.6 | 48.9 | 68.7 | 47.9 | Dance school plant noise is on again and dominant. Euston Road traffic still audible. |
| 04-08-2011 | 02:16 | 02:21 | Still | - | 44.0 | 48.2 | 57.2 | 46.4 | Same sources as before. |
| 04-08-2011 | 02:47 | 02:52 | Still | - | 44.4 | 48.8 | 60.6 | 47.8 | Same sources as before. |

Table B4 Measured noise levels at location 3

The meter was positioned 3m from the road curb, in free-field conditions.

B1.5.4 Location 4

| Date | Time | | Wind | | Noise Level, dB (A) | | | | Comments |
|------------|-------|--------|---------------|-----------|---------------------|-----------------|------------------|-----------------|---|
| | Start | Finish | Speed | Direction | L ₉₀ | L ₁₀ | L _{max} | L _{eq} | |
| 03-08-2011 | 14:59 | 15:14 | Still | - | 52.6 | 62.6 | 76.4 | 58.9 | Road traffic along Mabledon Place is dominant, while distant traffic noise from Euston Road is audible. Additional noise sources include frequent nearby pedestrians and leaf rustle. |
| 03-08-2011 | 16:15 | 16:30 | Gentle breeze | W | 52.9 | 63 | 80.5 | 60.4 | Same sources as before with heavier pedestrian traffic and distant dog barking. |
| 03-08-2011 | 21:14 | 21:19 | Still | - | 51.3 | 62.1 | 80 | 59.2 | Same sources as before with distant noise from the pub and overhead helicopter. |
| 03-08-2011 | 22:24 | 22:39 | Still | - | 50.9 | 61.6 | 85.6 | 59.9 | Euston Road traffic noise is dominant, while noise is still audible from heavy pedestrian traffic. |
| 04-08-2011 | 01:21 | 01:26 | Gentle breeze | W | 45.2 | 54.8 | 74.5 | 54.3 | Traffic from Euston Road is dominant, while occasional noise audible from leaf rustle, distant sirens and faint plant noise from the east. |
| 04-08-2011 | 02:00 | 02:05 | Still | - | 44.5 | 54.3 | 69.5 | 52.2 | As before, with an occasional car along Mabledon Place. |
| 04-08-2011 | 02:30 | 02:35 | Still | - | 45.2 | 53.4 | 68.6 | 52 | Same sources as before. |
| 04-08-2011 | 03:00 | 03:05 | Still | - | 44.6 | 54.8 | 62.2 | 51.1 | Same sources as before. |

Table B5 Measured noise levels at location 4

The meter was positioned 4m away from the roadside curb, in free-field conditions.

B1.5.5 Location 5

| Date | Time | | Wind | | Noise Level, dB (A) | | | | Comments |
|------------|-------|--------|-------|-----------|---------------------|-----------------|------------------|-----------------|---|
| | Start | Finish | Speed | Direction | L ₉₀ | L ₁₀ | L _{max} | L _{eq} | |
| 03-08-2011 | 20:52 | 21:07 | Still | - | 55.9 | 60.8 | 72.2 | 59.0 | Plant noise is dominant, with plant noise from every side of the car park enclosure. Occasional shouting audible from dance school. |
| 04-08-2011 | 01:38 | 01:43 | Still | - | 54.4 | 55.4 | 59.8 | 54.9 | Plant noise is still dominant – no other sources audible. |

Table B6 Measured noise levels at location 5

Measurements were taken in the car park of the Premier Inn hotel, in free-field conditions.

APPENDIX C

EXTERNAL PLANT NOISE EMISSIONS CALCULATIONS - NOVOTEL

Calculation 1: Current situation

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|-----------------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Climaventa TECS2/SL-CA 0512 | Lp | 10 m | 62 | 54 | 54 | 50 | 47 | 42 | 35 | 30 | 52 |
| Number of units | | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Distance Loss | | 38 m | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Screening | | | -5 | -5 | -5 | -6 | -7 | -8 | -10 | -12 | |
| Level At Receiver | | | 48 | 40 | 40 | 35 | 31 | 25 | 16 | 9 | 37 |

Criteria 49 dB(A)

Calculation 2: New chillers

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|-----------------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Climaventa TECS2/SL-CA 0512 | Lp | 10 m | 62 | 54 | 54 | 50 | 47 | 42 | 35 | 30 | 52 |
| Number of units | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Distance Loss | | 60 m | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Level At Receiver | | | 46 | 38 | 38 | 34 | 31 | 26 | 19 | 14 | 36 |

Calculation 3: New condensers

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|-------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Stulz KSV045A21p | Lp | 10 m | 65 | 57 | 57 | 53 | 50 | 45 | 38 | 33 | 55 |
| Number of units | | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| Distance Loss | | 60 m | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Level At Receiver | | | 54 | 46 | 46 | 42 | 39 | 34 | 27 | 22 | 44 |

Cumulative plant noise at receiver (Calcs 1 + 2 + 3) 46 dB(A)

Criteria 49 dB(A)

Calculation 4: Emergency plant

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|----------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Diesel rotary UPS | Lp | 3 m | 105 | 99 | 82 | 79 | 78 | 73 | 70 | 62 | 86 |
| Silencers 900mm, 50% | | | -2 | -4 | -9 | -15 | -17 | -14 | -10 | -8 | |
| Distance Loss | | 60 m | -26 | -26 | -26 | -26 | -26 | -26 | -26 | -26 | |
| Level At Receiver | | | 77 | 69 | 47 | 38 | 35 | 33 | 34 | 28 | 55 |

Emergency Plant Noise Criterion 64dB(A)

APPENDIX D

EXTERNAL PLANT NOISE EMISSIONS CALCULATIONS - MABEL'S TAVERN

Calculation 1: Current situation

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|-----------------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Climaventa TECS2/SL-CA 0512 | Lp | 10 m | 62 | 54 | 54 | 50 | 47 | 42 | 35 | 30 | 52 |
| Number of units | | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Distance Loss | | 70 m | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 | |
| Screening* | | | -18 | -18 | -18 | -18 | -18 | -18 | -18 | -18 | |
| Level At Receiver | | | 30 | 22 | 22 | 18 | 15 | 10 | 3 | -2 | 20 |

* Screening limited to -18dB

Criteria 49 dB(A)

Calculation 2: New chillers

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|-----------------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Climaventa TECS2/SL-CA 0512 | Lp | 10 m | 62 | 54 | 54 | 50 | 47 | 42 | 35 | 30 | 52 |
| Number of units | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Distance Loss | | 48 m | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Screening* | | | -15 | -17 | -18 | -18 | -18 | -18 | -18 | -18 | |
| Level At Receiver | | | 33 | 23 | 22 | 18 | 15 | 10 | 3 | -2 | 20 |

* Screening limited to -18dB

Calculation 3: New condensers

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|-------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Stulz KSV045A21p | Lp | 10 m | 65 | 57 | 57 | 53 | 50 | 45 | 38 | 33 | 55 |
| Number of units | | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| Distance Loss | | 48 m | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Screening* | | | -16 | -18 | -18 | -18 | -18 | -18 | -18 | -18 | |
| Level At Receiver | | | 40 | 30 | 30 | 26 | 23 | 18 | 11 | 6 | 28 |

* Screening limited to -18dB

Cumulative plant noise at receiver (Calcs 1 + 2 + 3) 30 dB(A)

Criteria 49 dB(A)

Calculation 4: Emergency plant

| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) |
|----------------------|----|------|-----|-----|-----|-----|------|------|------|------|-------|
| Diesel rotary UPS | Lp | 3 m | 105 | 99 | 82 | 79 | 78 | 73 | 70 | 62 | 86 |
| Silencers 900mm, 50% | | | -2 | -4 | -9 | -15 | -17 | -14 | -10 | -8 | |
| Distance Loss | | 48 m | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | |
| Screening* | | | -15 | -17 | -18 | -18 | -18 | -18 | -18 | -18 | |
| Level At Receiver | | | 64 | 54 | 31 | 22 | 19 | 17 | 18 | 12 | 41 |

* Screening limited to -18dB

Emergency Plant Noise Criterion 59dB(A)