

Reference: Data Centre, 1-5 & 12 JVC Business Park & JVC House, Priestley Way, London NW2

Project No: 2019541

Brent Council Application No: 20/1828

Date: 5th May 2021

FAO: John Henry Looney (jh.looney@sustainabledirection.com)

Re: Planning Condition 4 - Plant Noise Emissions (*Emissions Assessment*)

The following is a specific update of Sharps Redmore's planning assessment of Condition 4 from 15th December 2020, in relation to noise emissions from the standby generators.

The report remains unaltered apart from that section related to the standby generators. For ease all altered sections are shown in italics.

The following is provided for the discharge of Planning Condition 4 in respect to the control of atmospheric building services plant noise emissions from the consented new data centre off Priestley Way.

Consent to the Application 20/1828, submitted 23.06.20 was granted on 02.10.20 by London Borough of Brent Council.

1.0 Planning Condition & Interpretation

1.1 Planning Condition 4 states:

Any plant shall be installed, together with any associated ancillary equipment, so as to prevent the transmission of noise and vibration to the nearest residential units. The rated noise level from all the plant and ancillary equipment shall be 10 dB(A) below the measured background noise level (or lowest practical levels) when measured at the nearest noise sensitive premises. An assessment of the expected noise levels shall be carried out in accordance with BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' and any mitigation measures necessary to achieve the above required noise levels shall be submitted to the Local Planning Authority in writing for approval. The plant shall thereafter be installed and maintained in accordance with the approved details.

1.2 This requires the rated level of the noise to be 10 dB *below* the background noise level at the nearest residential units, and as low as practical at general noise sensitive premises.

1.3 Of note:

Head Office

Sharps Redmore The White House, London Road, Copdock, Ipswich, IP8 3JH

T 01473 730073 **E** contact@sharpsredmore.co.uk **W** sharpsredmore.co.uk

Regional Locations South England (Head Office), South West England, North England, Wales, Scotland

Sharps Redmore Partnership Limited Registered in England No. 2593855

Directors RD Sullivan BA(Hons), PhD, CEng, MIOA, MAAS, MASA; DE Barke MSc, MIOA; KJ Metcalfe BSc(Hons), MIOA; N Durup BSc(Hons), MSc, PhD, CEng, FIOA, MinstP, MASA, MAES

Company Consultant TL Redmore BEng, MSc, PhD, MIOA

- The condition is not a pre-commencement condition, hence work has started on the development.
- There is some variation in noise environment at the two nearest relevant noise sensitive residential receivers, by both location and time of day.
- The condition states 'or lowest practical' which allows some flexibility of view where issues arise.
- The referenced standard BS 4142 allows *content* and *absolute* levels to be considered, which aid in this regard.

1.4 Importantly verbal communications with the Brent environmental health officer (Ketan Joshi) on 12 & 14.10.20, clarified how the condition would be interpreted. This included:

- A practical view can be taken where needed. There is not an expectation of noise character (rating penalty) being a concern at these distances in this environment, and 10 dB below the background noise level is not necessarily sought if it cannot be practically achieved.

SR Post Comment 1: The noise limit is stated as a 'rated' noise level. Rating can make the noise limit stricter still, if at the residences they retain a sound character, such as impulsiveness, intermittency or tonality i.e. -3 – 5 dB etc. SR would argue and this seems to be concurred with here, that should be no rating penalty if one is designing typically 10 dB below and considering the locations, distance and the combination of noise sources here. We would consider no rating penalty is needed in this specific context.

SR Post Comment 2: Further, from the data for the plant no strong tonal character in the octave bands for the dry air coolers is seen. For the chiller pumps there is some low frequency character though this is not the dominant frequency.

- The reference to noise sensitive premises has been specifically included for offices/commercial premises, such as found on this scheme within the site boundary, so this need to be considered and is so ahead. Here the adjacent offices are circa 12-15 metres to the north marginally overlooking the roof of the data centre. We understand this is not expected to need to be considered against the planning condition criteria to residences, but a view taken based on the absolute levels within the offices.
- Generators are only for standby/emergency use, hence a noise limit was discussed on this basis and outlined ahead.

2.0 Building Proposals & Noise Data of Sources

2.1 The approved scheme for a data centre is built within and atop the existing JVC Warehouse shown in Appendix A.

2.2 The scheme locates:

- Upon its new roof - 32 No. dry air coolers in two rows of 16. At the end of each dry air cooler is a chiller unit. These are the main noise sources and the subject of this report.
- A selection of smaller a/c units for individual rooms are not considered a noise concern at the distances to residences. They will predominantly be within the bounds of the larger units, and hence not add to the noise environment.
- There are a small number of air handling units which can be noise controlled with in-duct attenuation and a noise limit given. Again these are not key to the discharge of the condition.
- 16 No. standby generators are located in the yard against the building to the north double stacked.

2.3 The noise data for the dry air coolers and the chillers have provided by a supplier, Uniflair, with the most reliable information available utilising the raw data of the original factory tests. This data has been used for the analysis and is given as follows:

Dry air cooler:

Day-time: 90.3 dB L_{WA} (sound power level) – based on higher fan deck, with pads and 70% fan running speed.

Night-time: 85.4 dB L_{WA} (sound power level) – based on higher fan deck, with pads and 50% fan running speed.

Chiller: 89.4 dB L_{WA} (sound power level) at all times.

Octave band data for 70% dry air cooler and for chiller are given in the footnote¹.

Standby Generators: *See Section 5.12 ahead.*

Air handling Units: Noise limited to no more than 59 dB L_{pA} at 10 metres.

¹ Dry air cooler: 69.0 L_{WA} [63 Hz], 77.8 L_{WA} [125 Hz], 81.6 L_{WA} [250 Hz], 84.2 L_{WA} [500 Hz], 84.9 L_{WA} [1kHz], 82.3 L_{WA} [2kHz], 78.7 L_{WA} [4kHz], 74.4 L_{WA} [8kHz]
Chiller: 64.5 L_{WA} [63 Hz], 51.7 L_{WA} [125 Hz], 75.3 L_{WA} [250 Hz], 81.7 L_{WA} [500 Hz], 85.8 L_{WA} [1kHz], 83.2 L_{WA} [2kHz], 79.5 L_{WA} [4kHz], 72.7 L_{WA} [8kHz]

3.0 Noise Sensitive Receivers

3.1 The nearest noise sensitive residential receivers are to the North and South of the data centre.

■ North - Woolmead Avenue (Location A)

■ South - Junction of Coles Green Road & Kelceda Close (Location B)

3.2 Both locations are blocks of flats. The flats to the south are marginally higher as the land rises. Both are subject to noticeable road traffic noise from the North Circular (A406) and the M1 & A5 to varying degrees.

3.3 These locations are shown on the aerial view in Section 4, and are both circa 300 metres from the data centre.

3.4 The office building within the site boundary is 12-15 metres from the roof edge, and marginally tall, with small sealed double glazed windows.

4.0 Noise Surveys

First survey

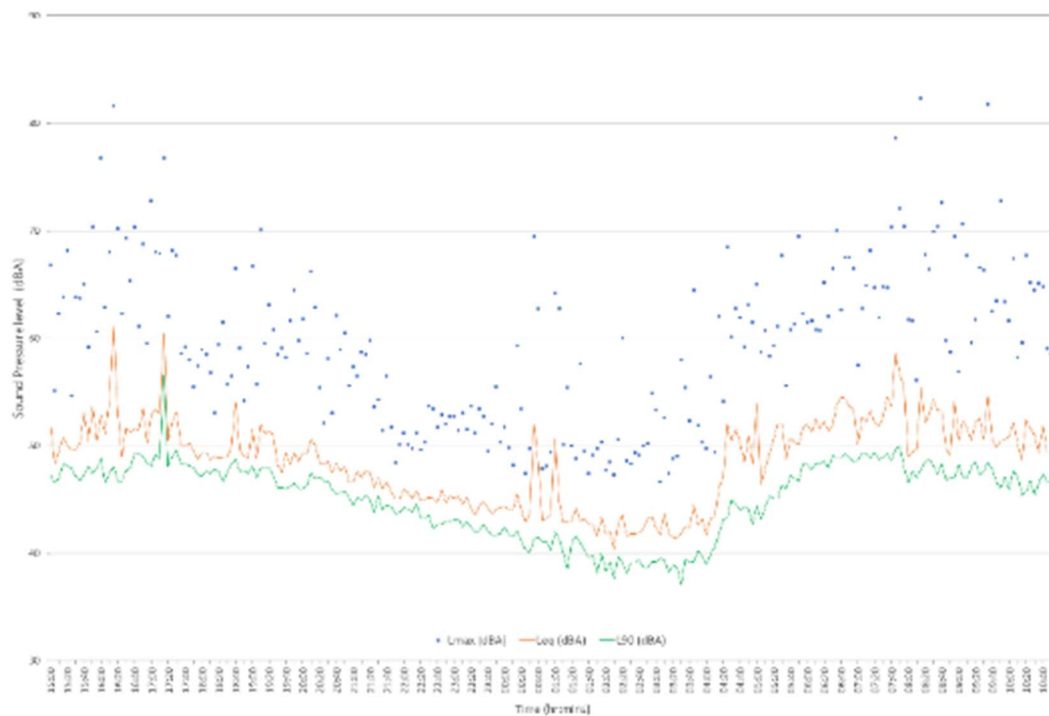
4.1 A noise survey was undertaken within the acoustic planning report, dated 12.06.20 as part of an original, now altered, scheme. This provides details of a noise survey undertaken between 18.05.20-19.05.20 (See footnote² for details).

■ During the day-time attended measurements were made at the northern boundary of the development site and at the residential receptor area of Woolmead Avenue to the North. The manned survey results and commentary were presented in the original acoustic planning report of 12.06.20.

■ No secure location was identified within the residential area for night-time measurements, and therefore the meter was established on the northern development site boundary (Location C). It was noted that the background sound levels (L_{A90}) during attended survey periods were very similar at the two locations, and therefore it was considered that the development site boundary data could be considered representative

² All measurements were taken in 5 minute sample periods using a Norsonic 118 Class 1 sound level meter. The meter was field-calibrated before and after the survey and showed no significant measurement drift. Weather conditions on 18th May were warm and dry with a temperature of approximately 20°C, and rising. There was a 20% light cloud cover and a gentle south-easterly breeze. Conditions are understood to have remained fine overnight. Upon collection of the equipment on 10.05.20 it was again warm, sunny and dry with a gentle east to south-easterly breeze.

of the residential receptor location to the north. The results of the noise logger is shown in the Table below.



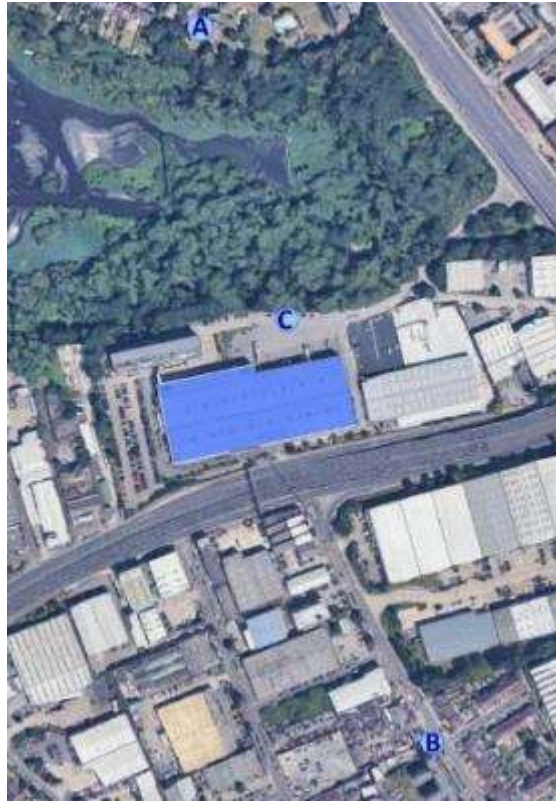
- 4.2 The charted night-time L_{A90} data indicates the dawn chorus raises sound levels from approximately 04:00hrs. There is however a significant period of the night where background sound levels are typically in the order of 40 dB L_{A90} .

Second survey

- 4.3 On the night of 26.09.20 additional manned noise survey measurements were undertaken at both locations to the south and north, alongside boundary measurements during the day-time on 23.09.20³. Which indicated during the day at the boundary of the building with the A406 (1 metre from the building façade next to the footbridge), typical noise levels of 75 dB L_{Aeq} . On the rear side of the building where partially screened from the A406, noise levels reduce to around 55 dB L_{Aeq} .
- 4.4 The two noise sensitive residential receivers are A & B, with C as the original boundary measurement location. A summary of the noise levels are indicated below:

³ Measurements were taken with a Norsonic 140 sound level meter calibrated before and after use. The night survey was delayed in to the middle of the night to ensure wind levels were sufficiently low.

- A: (Woolmead Avenue) day-time background levels during the middle of the day are around 45 dB L_{A90} . At night this reduces to typically 40 dB L_{A90} .⁴
- B (Junction of Coles Green Road/Kelceda Cl.) background levels during the middle of the day are 50-54 dB L_{A90} . At night this reduces to typically 45 dB L_{A90} .
- C (north site boundary) background levels during the middle of the day are 44-48 dB L_{A90} . At night this reduces as low as 38 dBA but typically 40 dB L_{A90} .



⁴ 3.15 am L_{A90} 39.5 dB, L_{Amin} 38.1 dB, L_{Aeq} 45 dB.

5.0 Analysis

5.1 We have constructed a SoundPLAN model of the dry air cooler/chiller roof plant to the residential receivers some 300 metres away and to the adjacent office building on the site, located about 15 metre away from the façade of the building. Topographical data has been used to determine land heights, and typical floor heights. The receivers in both directions are flats and therefore the noise level have been predicted to the various floors, primarily focusing on the top floor. Noise levels at building facades are shown in Appendix B1 and B2.

5.2 For example, the adjacent photo shows the top of the 5 storey flats to the south (Delta Court) looking towards the data centre (far centre of picture). The flats to the north are of similar heights but slightly lower in relative angle.



5.3 After various screening configurations being considered the following has been designed for compliance with the criteria.

Dry-air coolers & Chillers

5.4 Our recommendations from our modelling are:

- The dry air coolers will include on the discharge side an *acoustic discharge shroud*, 0.95-1 metre high, which includes a lined plenum at lower level and short splitters at the top (see photo).
- The perimeter of the whole roof edge will include an acoustic screen around the data centre increased in height to match the height of the dry air coolers inclusive of the acoustic discharge shrouds. The acoustic screen is proposed as a 300 mm thick single bank acoustic louvre on the south and north sides (or equivalent), and can be reduced to 150 mm thick half bank louvres on the west and east side (or equivalent). These will break the line of sight to the top floor flats for much of the sources.
- For the Chillers on the end of each dry air cooler, their exposed lower half are recommended to be enclosed, accepting that some penetrations will be needed for pipework and for a small degree of cross-ventilation.



- In addition, via design with the MEP engineers and supplier, fan speed reductions will apply as 70% during the day and 50% during the middle of the night (i.e. midnight to around 5 am), which itself provides approximately 5 dB of noise reduction.
- 5.5 The measures outlined here are shown as a section in Appendix A. SoundPLAN noise maps (free field) of the facades of the residences to the north and south during the day and night are provided in Appendix B1 (day-time) & B2 (night-time).
- 5.6 The control measures predict free-field levels at the residential noise sensitive receivers as:
- North [Woolmead Avenue]: 34 dB L_{Aeq} (night-time) & 38 dB L_{Aeq} (day-time)
 - The night noise levels are at least 6 dB below the typical minimum background level, L_{A90} , and typically 7 dB below during the day-time. These are considered the practical maximum levels that can be achieved.
 - South [Coles Green Road] 36 dB L_{Aeq} (night-time) & 39-40 dB L_{Aeq} (day-time)
 - The noise level at night is 9 dB below the typical minimum background noise level, L_{A90} , and 10-11 dB below during the day-time.
- 5.7 From discussion with the EHO, this is the 'lowest practical levels' likely to be met, as outlined within the condition. Due to the extent of the plant and from the frequency spectra provided, there is no significant tonal qualities that will be noticeable at these distances to warrant an additional rating penalty. There is tonality potential from the chiller pumps, but their enclosure to aid the overall level, is expected to address this. This was verbally accepted as reasonable by the EHO.
- BS 4142:2014 allows consideration of context, and absolute levels.
 - The *context in this environment* is a dominance of road noise from the A406 north circular which separates the south receiver from the site, alongside the close proximity of the M1 and A5 to the north receiver.
 - In terms of *absolute levels*, we can also consider them against BS 8233:2014 Table 4, for which noise is generally considered without character or anonymous.

Table 4 Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

- A typical reduction for a partially open window can be taken as 13 dB⁵ from a free field level, which equates to internal noise levels at night of 21-23 dB L_{Aeq} and 25-27 dB L_{Aeq} during the day-time. All the levels of are at least 7-8 dB below the internal noise criteria for BS 8233.

Noise to commercial offices

- 5.8 Within the bounds of the site, as can be seen in Appendix A, there is an existing office building to the north within 12-15 metres of the data centre office building line, and marginally taller than the mansard of the plant deck. The noise predicted at the nearest windows are of the order of 64 dB L_{Aeq} .
- 5.9 This office can be tenanted to different users, but as can be seen from the adjacent photo the rear of the building has sealed double glazed narrow windows some of which are determined as offices/meeting rooms.
- 5.10 If we consider the recommended absolute level from external sources provided by the British Council of Offices (BCO 2019 Guide to Specification); this recommends maximum internal noise levels of NR35 L_{eq} for cellular offices/meeting rooms.
- 5.11 Taking a conservative view that the double glazed window offers of the order of 31 dB R_w and being no more than 1/3rd of the wall area which will be providing at least 49 dB R_w sound reduction, the predicted internal noise is just less than NR30. This is considered sufficient, as its 5 dB less than the BCO criteria.



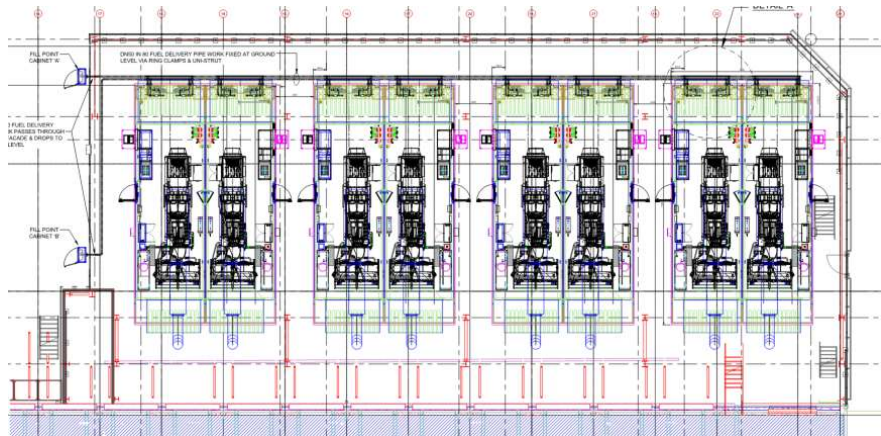
Standby Generators

- 5.12 The scheme also includes 16 packaged emergency standby generators located on the north side of the building.
- These are double stacked against the data centre on a grillage (see section sketch).
 - These package generators have 3 main noise sources (a horizontal inlet and vertical outlet) both of which are heavily attenuated with splitters, and an exhaust which includes one or two in line attenuators atop



⁵ Appendix B.10 of Acoustics Ventilation and Overheating Residential Design Guide (Rev 1) January 2020

the unit. The engine is contained within an acoustically insulated box, and is generally a negligible noise source



compared to the three ventilation paths. (See plan drawing).

5.13 The generator unit is an MTU SDS4000 which will be enclosed in a weatherproof acoustic enclosure/canopy 13 m x 4.5 m x 4.5 m, as a combined dual generator enclosure. The data forwarded indicates a design canopy to reduce the noise from the unit such that the 'extremity of the exterior of the unit' to no more than 75 dBA at 1 metre, 1.5 m above the ground with the generator running at 100%.

- The specific unit indicates a 2.7 m long inlet attenuator, and a 2.1 m long outlet attenuator, with the exhaust noise reduced from 85 dBA at 1 metre, to the overall criteria stated of 75 dBA at 1 metre. Based on the size of the enclosure and direction, the noise reduction to 10 metres is predicted to be 10 dB or less, therefore no more than 65 dBA at 10 metres.

5.14 The testing regime for the generators have been confirmed as typically:

- One hour / month of each generator for 10 months of the year.
- Four hours / month of each generator for the 2 months of the year.
- The timings of the generators can be adjusted if needed. It is common that generators are tested only during the day-time (normal working hours), not evenings or night-time to reduce the risk of disturbance, and this is understood to be the case here.

5.14 The noise limit from the generators proposed within the original Sharps Redmore planning report of 12.06.20 is 67 dBA at 10 metres (i.e. marginally higher than that estimated from the actual plant data). This would indicate that up to 4 units could be tested, without exceeding the background noise level at the nearest residential receivers some 260 metres to the north. If all 16 units were tested together it would be at most 5 dB above the background level. Such exceedances are normally acceptable to local authorities where up to a 10 dB exceedance during testing is not uncommon.

- *In this respect testing any number of the generators at this noise levels should be acceptable, and staggering the testing to say, no more than 4 at a time, would not be expected to be particularly noticeable at the neighbours.*

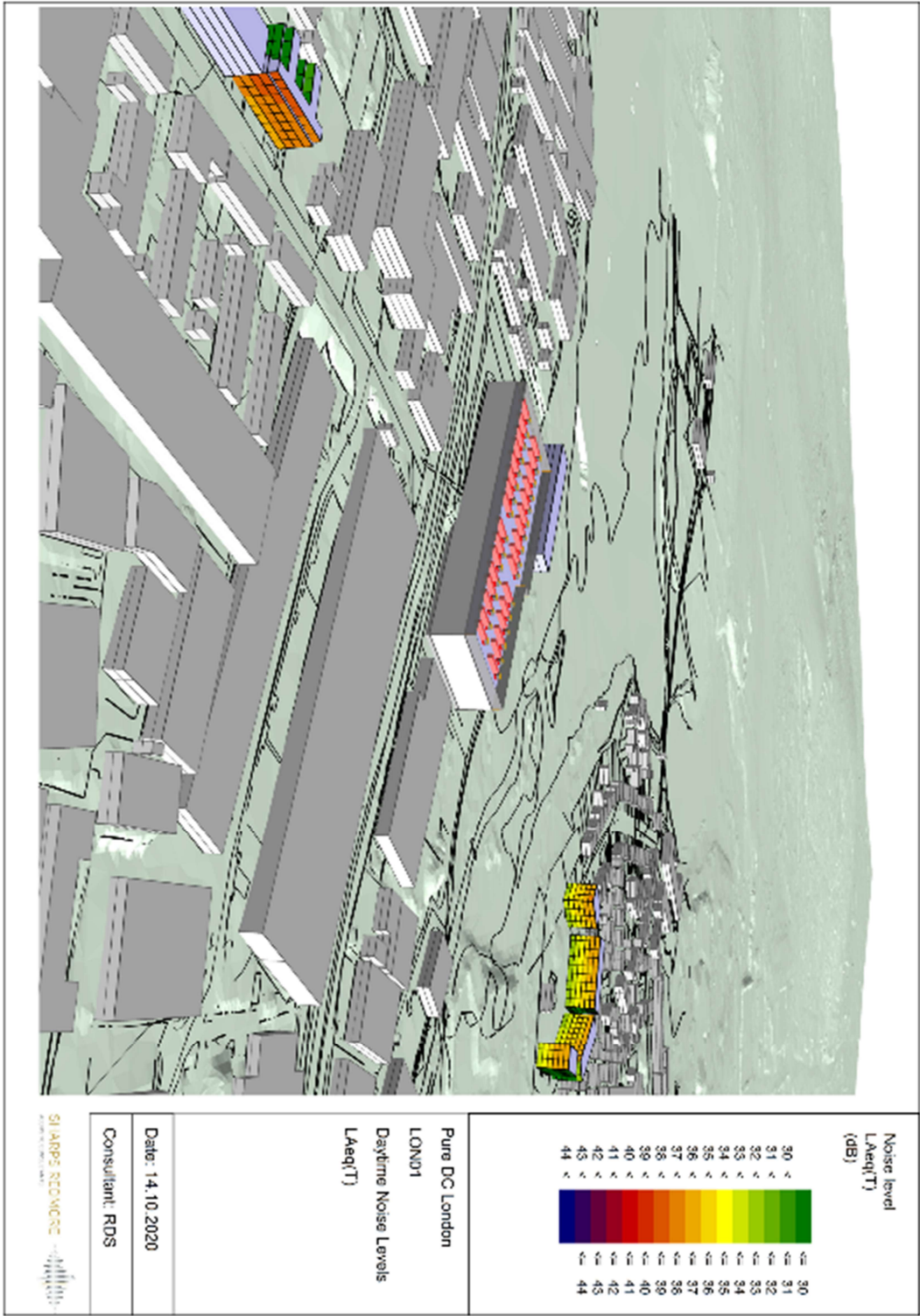
5.15 *As noted above if all the generators were to operate together during an outage, then the noise level would be of the order of 5 dB above the typical background noise level during the day and 10 dB at night at the northern residences. It is assumed reasonable that on the occasions when this may occur neighbours would close their windows, and internal noise levels would remain significantly within BS 8233 guidance for bedroom/living rooms, or with windows open less than 5 dB above the day-time criteria internally, which for a short term emergency scenario is considered reasonable.*

6.0 Concluding Remarks

- 6.1 The proposed approach is considered compliant with the requirements of planning condition 4 due to the extent of measures required and from useful feedback from the local authority EHO. If, for any reason, plant selections were to change, the same principles for compliance and same order of noise levels at receivers would be followed, to align with the condition as discharged.
- 6.2 It is considered this report shows sufficient compliance to consider the Condition discharged.
- 6.3 *The noise from the standby generators during both testing and an outage are such that they are anticipated to be acceptable for the purposes intended to the nearest noise sensitive residential receptors in this environment.*

Rory Sullivan BA(Hons) PhD CEng MIOA MAAS MASA
 rory@sharpsredmore.co.uk

Appendix B.1: Noise Map (day-time – free field) to Residences



Appendix B.2: Noise Map (night-time – free field) to Residences

