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Reference: Richmond upon Thames College, Langhorn Drive, Twickenham, TW2 7SJ
Project No: 2221244

Dear Jake,

Re: Planning Condition U0151217:

The following is provided as evidence in relation to Planning Condition U0151217 (App: 21/3136/FUL) in respect to decision notice of 28.02.23 from the London Borough of Richmond upon Thames.

This specific condition requires a scheme to be submitted and approved, and final commissioning evidence of compliance to the Council. This letter report from Sharps Redmore (SR) addresses the first part of the condition.

1.0 Background & Planning Condition

1.1 The scheme is a group of six residential blocks and a residential townhouse terrace on land decanted from adjacent college buildings. The site is within the London Borough of Richmond and forms part of the wider Richmond College redevelopment site.

Planning Condition

1.2 The relevant planning condition (U0151217) states:

a) Before any mechanical services plant including heating, ventilation and air conditioning (HVAC) and kitchen extraction plant to which the application refers is used at the premises, a scheme shall be submitted to and approved in writing by the local planning authority which demonstrates that the following noise design requirements can be complied with and shall thereafter be retained as approved.

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b) The cumulative measured or calculated rating level of noise emitted from the mechanical services plant including heating, ventilation and air conditioning (HVAC) and kitchen extraction plant to which the application refers, shall be 5dB(A) below the existing background noise level, at all times that the mechanical system etc operates. The measured or calculated noise levels shall be determined at the boundary of the nearest ground floor noise sensitive premises or 1 meter from the facade of the nearest first floor (or higher) noise sensitive premises, and in accordance to the latest British Standard 4142; An alternative position for assessment /measurement may be used to allow ease of access, this must be shown on a map and noise propagation calculations detailed to show how the design criteria is achieved.

c) The plant shall be isolated so as to ensure that vibration amplitudes which causes reradiated noise not to exceed the limits detailed in table 4 detailed in section 7.7.2 of BS8233:2014 Guidance on sound insulation and noise reduction for buildings "

d) The plant shall be supported on adequate proprietary anti-vibration mounts to prevent the structural transmission of vibration and regenerated noise within adjacent or adjoining premises, and these shall be so maintained thereafter

e) A commissioning acoustic test and report shall be undertaken within 2 weeks of mechanical services commissioning, in order to demonstrate that parts a, b and c above have been achieved. The results of the test shall be submitted to and approved in writing by the Local Planning Authority.

REASON: In order to safeguard the amenities of neighbouring residents.

2.0 Design Criteria for Compliance

2.1 The reference criteria within the condition is a BS 4142 assessment, (latest version BS 4142:2014+A1:2019) "Methods for rating and assessing industrial and commercial sound". The requirement sought under the condition is a rating level, L_{Ar} , 5 dB below the background noise level, L_{A90} at the noise sensitive receptors, which in this case is mainly the residential properties which form the scheme, with some more distance existing premises.

National Guidance (BS 4142:2014 + A1 (2019)

2.2 The significance of sound impact in respect to fixed plant noise to noise sensitive neighbours is to be determined according to the following summary BS 4142 process:

- i) Determine the background sound levels, in terms of the noise parameter L_{A90} at the noise sensitive receptor locations of interest. This is normally outside an existing noise sensitive window or equivalent location for future development.

- ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.
- iii) Apply a rating level, L_{Ar} , *acoustic feature correction* if the source sound has tonality, intermittency, impulsiveness, or other characteristics which attract attention.
 - *Tonality*: 2, 4 & 6 dB addition being just, clearly and highly perceptible respectively.
 - *Intermittency*: 3 dB where readily distinctive against the residual acoustic environment.
 - *Impulsivity*: 3, 6 & 9 dB addition being just, clearly and highly perceptible respectively.
- iv) Comparison of the resultant rating sound level, L_{Ar} , with the background sound level, L_{Ar} at the receptor. The greater the difference between the two, the higher the likelihood of adverse impact.
- v) A difference (rating, L_{Ar} – background, L_{A90}) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

2.3 BS 4142:2014 introduces the concept of ‘context’ to the process of identifying noise impact. Section 11 of BS 4142:2014 explains “*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs (our emphasis). An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context” (SR emphasis).*

2.4 There are many *context* points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound (See 2.6 ahead).
- The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;

- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;

2.5 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014+A1:2019 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

Absolute Criteria

2.6 In terms of absolute levels; these may need to be considered in respect to the wider context and noise environment under a BS 4142 assessment, and Section 11 commentary of the standard states:

For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

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. (SR emphasis)

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

Residential Receptors: BS 8233:2014

2.7 In respect to the impact to residential premises Table 4 of BS 8233:2014 ‘Guidance on sound insulation and noise reduction in buildings’ recommends the following internal ambient noise levels for steady external noises which do not have a strong character. These are stated as based on existing WHO guidelines assuming normal diurnal fluctuations in external noise. See table below.

BS8233:2014 Internal Noise Limits Guidance

Room	07:00-23:00 hrs.	23:00-07:00 hrs.
Living rooms	35 dB L _{Aeq, 16 hr}	-
Dining room/areas	40 dB L _{Aeq, 16 hr}	-

Bedrooms	35 dB L _{Aeq} , 16 hr	30 dB L _{Aeq} , 8 hr
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3.0 Noise Survey Summary & Design Limits

- 3.1 Noise surveys were completed for the scheme in 2021 and 2022, and have been utilised previously, and in respect to the discharge of other acoustically related planning conditions, alongside SoundPLAN™ acoustic modelling of ambient and maximum noise levels.
- 3.2 This condition relates primarily to the background noise levels, L_{A90}, from the survey data.
- A noise survey was undertaken between 5th – 11th July 2022. Auto-logging measurements were taken with two Norsonic 140 Class 1 sound level meters. These were calibrated before and after use with no significant drift. The measurement periods were 15 minutes samples. Manned measurements were also taken relative to the specific event/activity. Weather conditions were generally dry with light winds below 5 m/s
 - The measurement locations are indicated on the Appendix A plan view. The auto-logging Location A charted results are given in Appendix B.1 and the auto-logging Location B charted results in Appendix B.2.
- 3.3 In summary the 2022 logger data indicated the following in respect to background noise levels and proposed representative levels.
- *Location A (auto-logger) - Day-time:* Minimum background noise levels varied between 44-45 dB, with a representative minimum background level taken as 44 dB L_{A90}. *Night-time:* Minimum background noise levels varied between 43-44 dB L_{A90}, potentially controlled by existing plant.
 - *Location B (auto-logger) - Day-time:* Minimum background noise levels varied between 36-41 dB, with a representative minimum background level taken as 39 dB L_{A90}. *Night-time:* Minimum background noise levels varied between 30-35 dB, with a representative minimum background level taken as 32 dB L_{A90}.
- 3.4 On this basis and derived from our noise survey the following noise limits have been utilised and applied at the nearest noise sensitive residences, i.e. those within the blocks and to adjacent blocks and townhouses, and existing residences at further distances. These essentially come from Location B auto-logger, which was quieter than Location A (and not likely to have been potentially polluted by a temporary noise source).

- Day-time (07.00-23.00 hrs): 34 dB L_{Aeq}
- Night-time (23.00-07.00 hrs): 27 dB L_{Aeq}

3.5 These limits are based on 5 dB below a ‘representative’ background noise level during the day and night.

3.6 The planning condition refers to a ‘rated’ noise level from plant, which adds penalties for noise character as outlined in 2.2. No character penalty has been added for two reasons:

- We have multiple grouped plant items of similar noise spectra, with no dominant frequency, the units are equally if intermittent will likely overlap and therefore not indicate a strong dominance as may occur with a single unit.
- More importantly the required design limits are so low that context under BS 4142, and absolute levels are considered key. Both limits are below the day-time and night-time ‘internal’ criteria, when outside the windows. Hence based on a 10-13 dB reduction via partially openable windows the internal noise levels are significantly below absolute guidance criteria, and therefore considered acceptable without a character correction.

4.0 Plant Details & Locations

ASHPs

4.1 The primary atmospheric noise affecting the scheme are ASHPs on the roof of the various blocks of the scheme within the plant compounds. The isometric image below shows the general locations of compounds grouped on Blocks 1, 2, 3, 4, & 5.



- 4.2 The roof compounds have been consider to the closest and next distant noise sensitive receptors, which primarily are those of the nearest adjacent residential blocks and the block upon which the compounds sits, as illustrated below by the arrows.



- 4.3 The ASHPs are Mitsubishi CAHV-R450YA-HPB (-BS). These are vertical discharge twin fan units, with an inlet air through coils on two faces (long side and end). So the adjacent photo.



- 4.4 The noise data for the unit, is stated as 64 dBA at 1 metre from the side of the unit, 1.5 m above the base of the unit and has been confirmed as operating in COP mode under normal operation.

- 4.5 The octave band sound power levels and pressure levels for COP priority mode, are tabulated below.

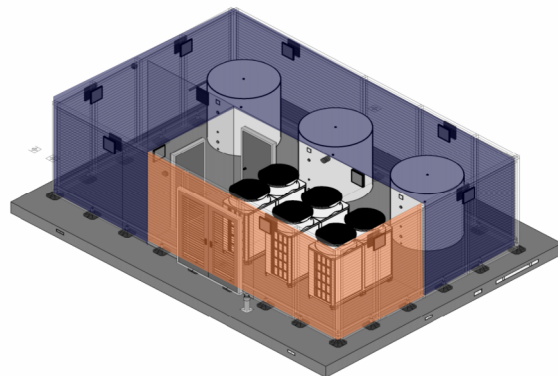
	1/1 Octave centre frequencies – Linear (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Lw (dB)	78	79	80	73	68	65	65	60	76
Lp (dB)	65	67	68	61	55	53	53	48	64

4.6 From the information forwarded the following number of twin fan ASHPs are shown for each block:

Blocks 1 & 2: 2 ASHPs

Blocks 3 & 4: 3 ASHPs

Block 5: 4 ASHPs



Noise Control Measures

4.7 In order, by design, to meet the Council’s requirements; the isometric image adjacent shows the enclosure of the roof plant compound arrangement for 3 sets of ASHPs. (The same arrangement applies whether 2 or 4). The compound details are:

- (Blue) A fully enclosed plant zone with no significant noise sources at least 0.5 m taller than ASHPs, acting as a solid and imperforate acoustic screen in two directions.
- (Orange) A single bank (300 mm deep) acoustic louvre at least 0.5 m taller than the installed ASHPs with the following minimum insertion loss performances.

Insertion loss (dB)	1/1 Octave centre frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
Single bank (300mm)	5	6	8	13	17	20	15	14

4.8 During the night-time (23.00-07.00 hrs) the ASHP are intended to be inverter limited, such that the fan speed reduces (circa 75 %) to offer approximately 4 dB reduction.

We trust that this correctly interprets your requirements, however please feel free to contact us should you wish to discuss any aspect further.

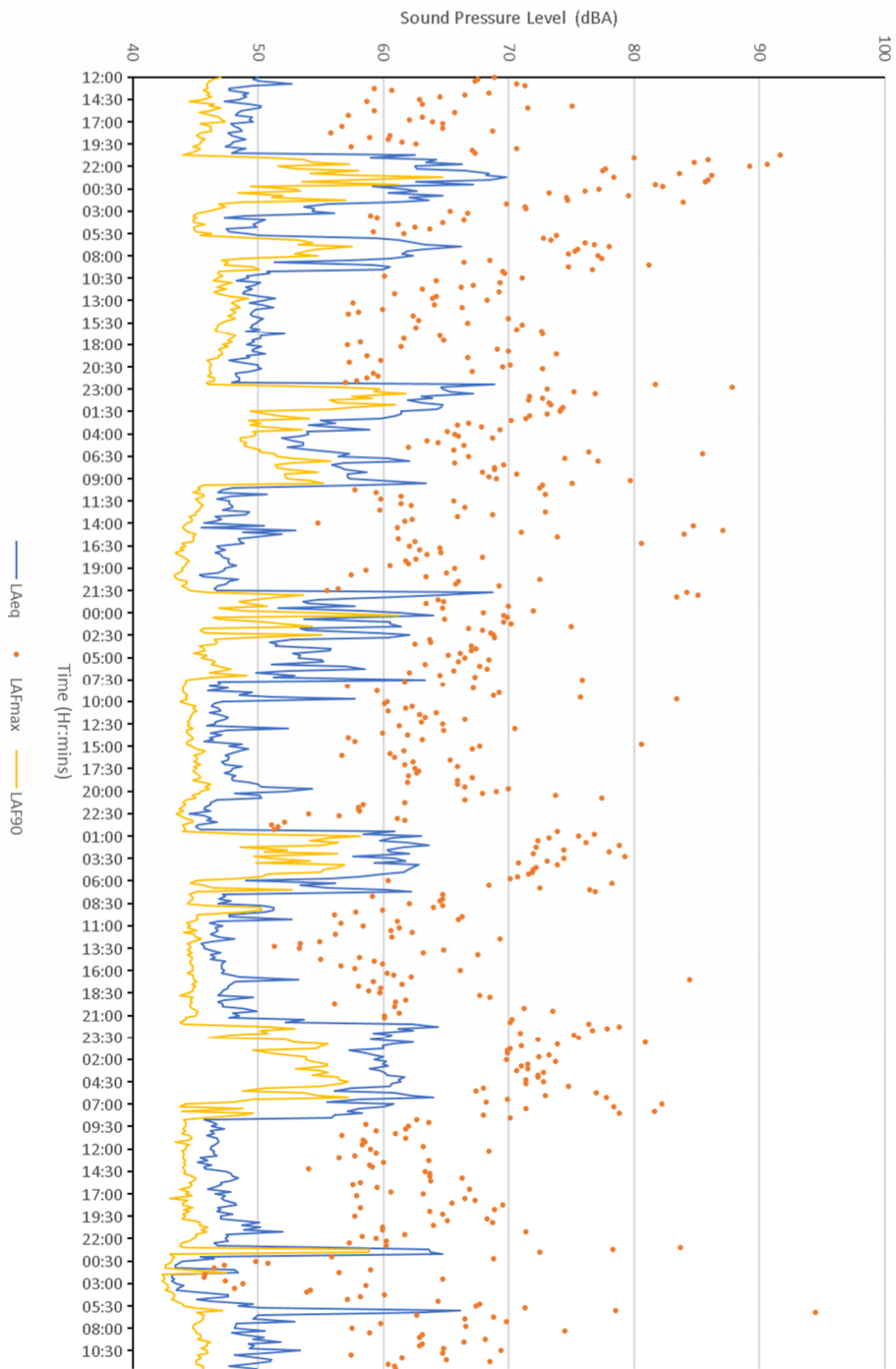
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Appendix A: Site location plan

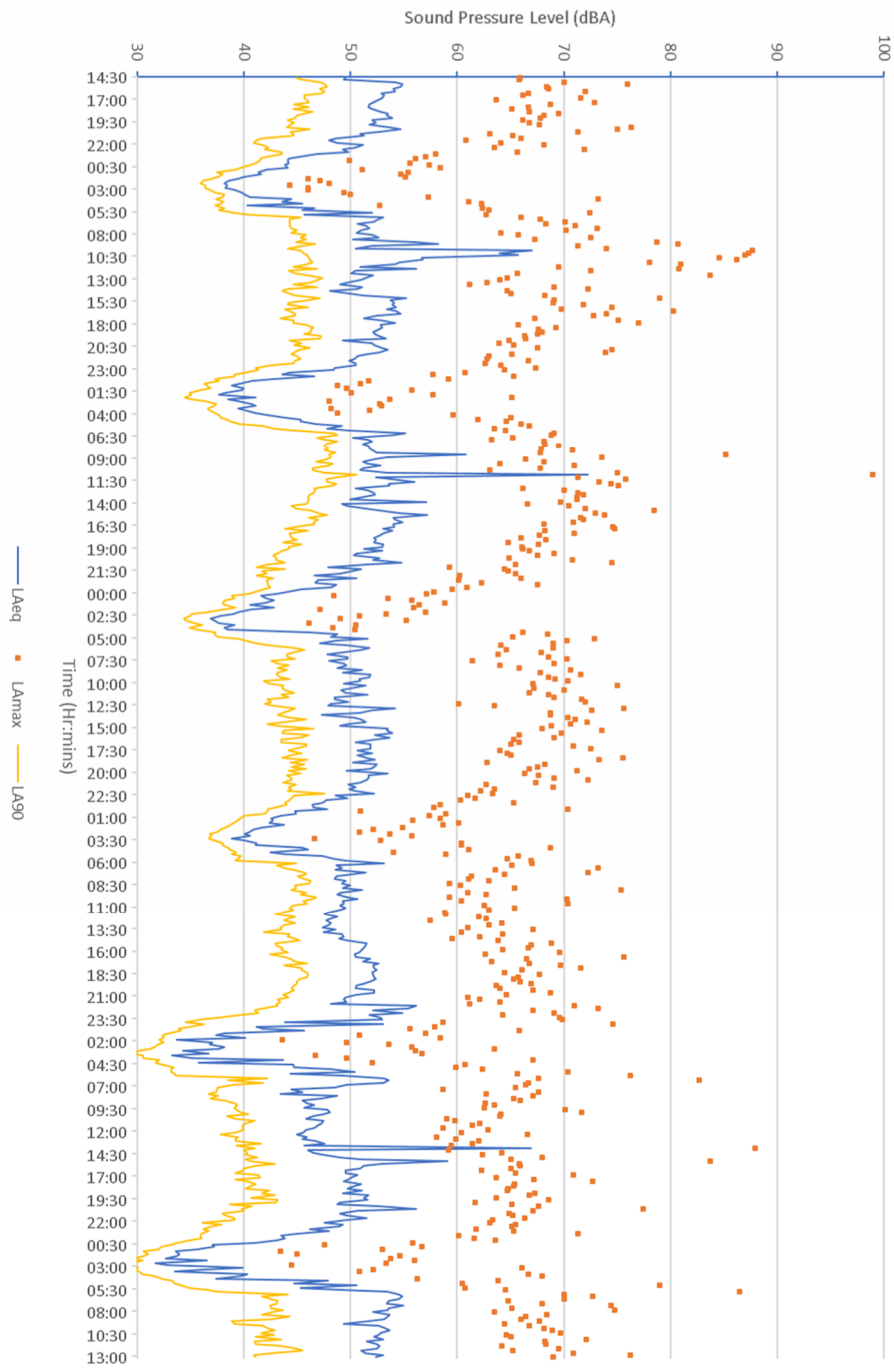


Appendix B: Noise Logger Charts

B.1: Chart of Auto-logging measurement: Location A.



B.2: Chart of Auto-logging measurement: Location B.



Appendix C: Common acoustic parameters for environmental surveys

C.1 These are the main noise indices in use in the UK:

- L_{A90} The sound level (in dBA) exceeded for 90% of the time. This unit gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the “background noise level” of an area.
- $L_{Aeq,T}$ The equivalent continuous sound level over a period of time, T. This unit may be described as “the notional steady noise level that would provide, over a period, the same energy as the varying noise in question”. In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as road traffic, aircraft and trains.
- L_{A10} The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.
- L_{A1} The sound level (in dBA) exceeded for 1% of the time. This unit can give an indication of a regular maximum noise level from such activities as dance music.
- SEL The sound exposure level, (often denoted LAE) is the noise level of an event, such as a train or aircraft event, normally expressed in a 1 second time period.
- L_{Amax} The maximum level of sound, i.e. the peak level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.