Appendix 9.5 Leisure Box Gym Acoustics

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Introduction

1.1. This appendix has been created by WSP to provide additional information on a flexible Use Class E shell and core space on the ground floor of the Leisure Box, which has been earmarked as a potential gym.

1.2. The noise levels produced by the future gym/leisure uses will depend on the tenant activities, which are unknown at this stage. Certain activities can generate high noise levels from sound systems and dropping weights etc. This could create noise issues for apartments above through two main paths:

- Airborne sound breaking through the floor; and
- Structure-borne noise and vibration generated by impacts on the gym floor e.g. free weights.

1.3. The design of the gym and the provision of suitable acoustic treatments to protect adjhacent apartments will be the responsibility of the tenant; however, it is considered necessary that the acoustic implications of locating a gym in a residential building are explored.

Airborne sound

1.4. Gyms often contain soundsystems which can generate substantial noise levels. These uses must comply with MCC's planning noise criteria for 'entertainment' noise in adjacent dwellings:

> *"Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB ($L_{eq,5min}$), respectively."*

1.5. The proposed 250mm in-situ poured concrete slab is expected to provide circa 45 dB sound reduction in the 63Hz and 125Hz octave centre frequency bands.

1.6. This corresponds to maximum noise levels in the gym of 92 dB and 86 dB in the 63Hz and 125Hz octave centre frequency bands respectively, without further upgrades to the floor. This noise level could readily be exceeded by gyms with substantial soundsystems and therefore there is a risk of MCC's noise limits being breached in flats directly above.

1.7. To protect against higher noise levels the following ceiling treatment could be installed as part of the tenant fit-out:

- 2no. layers 15mm British Gypsum SoundBloc; on
- Steel spring hangers; with
- 200mm cavity filled with mineral wool insulation.

1.8. When the above ceiling is combined with the proposed 250mm concrete slab (assuming concrete with a min. density of 2400 kg/m^3), noise levels of around 100 dB in the 63Hz and 125Hz octave centre frequency bands would be permissable. This is likely to be more representative of noise levels from a gym soundsystem.

1.9. There is also the potential for noise to break out of the gym windows, and into the apartment windows above; however, the apartment windows above are also those most affected by music noise from the Lion's Den and the Low Four Studio. An enhanced glazing specification for these windows has been provided. The level of noise breaking out of the gym will be lower than the noise levels from the two music venues (especially considering that the venues are currently single-glazed). Therefore, adequate protection should be provided to apartments from external gym noise.

1.10. During the detailed design phase, the glazing specification to the apartments can be investigated in greater detail. As suggested for entertainment venues, it may be more cost effective to provide upgrades at-source to the venues themselves, as this will reduce the glazing specification required for the apartments – this also applies to the gym.

1.11. Depending on the tenant activities it may be necessary to impose some degree of sound limiting on the gym sound system which can be applied with an automatic volume control system. The installed noise limiter should be capable of limiting noise at 1/1-octave band frequencies. An example system that may be appropriate is the Cesva LF010.

1.12. To see that any noise limiting equipment operates effectively, it is advised that the installation of such equipment should be overseen by an appropriately experienced noise consultant. Furthermore, due to the uncertainty of factors such as on-site workmanship, it is advised that the process of establishing acceptable limiting values for the system (i.e. values compliant with the Local Authority criteria) should be determined via in-situ testing of any sound systems.

Structure-borne noise and vibration from gyms

1.13. Impacts from activities such as running on treadmills and dropping weights can cause a building structure to vibrate, causing undesirable noise in adjacent spaces. A gym located below apartments will therefore require an acoustic floor system.

1.14. An example of a typical floating concrete floor specification for a free weights area of a gym is as follows:

- Gym floor finish
- 100 mm solid concrete slab
- 50 mm isolation springs

1.15. The most robust option is to provide floating floors to the entire gym floor area, to avoid the risk of free-weights being taken out of a designated zone. However, to minimise weight and cost it is typical to have an enhanced build-up to a designated free-weights zone only. If fitness studio areas are provided which have classes using weights (e.g. kettlebells, body pump) then an enhanced floor build-up may be required in these areas also.

1.16. If a floating floor is only provided in designated zones, a resilient layer is required throughout the remaining gym floor area. Cardio-vascular equipment (treadmills, etc) can be individually fitted with suitable isolation mounts. Resistance weights machines can be fitted with impact washers to limit structure borne noise and vibration when weights are released.

Compliance notes

1.17. As mentioned previously, suitable acoustic treatments to any future gym will be activity-specific. As future tenant activites and noise levels are not known, the provision of suitable acoustic treatments for the fit-out of the space will be the responsibility of the tenant. Indicative treatments for typical gym spaces which may be adopted by future tenants are provided above to demonstrate the principle of appropriate control.

1.18. The provision of suitable acoustic treatments to the gym space will be controlled through appropriate clauses in tenancy agreements.

1.19. Any installed upgrades to the base build will undergo acoustic testing before the tenant commences operations, to provide evidence that they are adequate.

1.20. It is a planning requirement of MCC to meet the entertainment noise limits stated above, and adherence to the noise limits is expected to be enforced by MCC through an appropriate planning condition.