Britannia Street: Cooling Hierarchy Compliance Statement

This Statement has been prepared in support of proposals for replacement and new plant at 4-24 Britannia Street. This Statement has been prepared with input from Hulley & Kirkwood who are providing services advice on the project.

1. Cooling Hierarchy

1.1 London Plan

Policy SI 4 - Managing Heat Risk

Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

- Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
- Minimise internal heat generation through energy efficient design
- Manage the heat within the building through exposed internal thermal mass and high ceilings Provide passive ventilation
- Provide mechanical ventilation
- Provide active cooling systems

The policy requires that passive ventilation should be prioritised, taking into account external noise and air quality in determining the most appropriate solution. The increased use of air conditioning systems is not desirable as these have significant energy requirements and, under conventional operation, expel hot air, thereby adding to the urban heat island effect. If active cooling systems, such as air conditioning systems, are unavoidable, these should be designed to reuse the waste heat they produce.

1.2 Camden Council

The Local Plan states that:

- Active cooling (air conditioning) will only be permitted where its need is demonstrated and the steps in the cooling hierarchy are followed (Local Plan policy CC2).
- Development is expected to reduce overheating risk through following the steps in the cooling hierarchy. All new development should submit a statement demonstrating how the cooling hierarchy has been followed (Local Plan policy CC2).

- All developments should seek opportunities to make a positive contribution to green space provision or greening.

Cooling hierarchy

All developments should follow the cooling hierarchy outlined below, to reduce the risk of overheating and subsequent reliance on active cooling:

1. Minimise internal heat generation through energy efficient design, considering the following:
   - Layout and uses: locate any spaces that need to be kept cool or that generate heat on cooler sides of developments.
   - Reducing heat gains e.g. including low energy lighting.
   - Seal/ insulate heat generating processes.
   - Reduce the distance heat needs to travel and insulate pipework.
   - Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.
   - Consider evaporation cooling which cools air through the evaporation of water.
   - Consider 'free cooling' or 'night cooling', which uses the cooling capacity of ambient air to directly cool the space.

2. Reduce the amount of heat entering a building in summer:
   - Consider the angle of the sun and optimum daylight and solar gain balance.
   - Orientate and recess windows and openings to avoid excessive solar gain.
   - Consider low g-values and the proportion, size and location of windows.
   - Make use of shadowing from other buildings.
   - Include adequate insulation.
   - Design in shading: e.g. include internal courtyards, large shade-providing trees and vegetation, balconies, louvers, internal or external blinds, and shutters.
   - Make use of the albedo effect (use light coloured or reflective materials to reflect the sun's rays).
   - Include green infrastructure e.g. green wall, green/blue roofs and landscaping, to regulate temperatures.
   - Reduce the amount of heat entering a building in summer.

3. Manage the heat within the building through exposed internal thermal mass and high ceilings.

4. Passive ventilation:
   - Natural ventilation, openable windows, the 'stack effect' system
   - Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.
   - Consider evaporation cooling which cools air through the evaporation of water.
   - Consider 'free cooling' or 'night cooling' which uses the cooling capacity of ambient air to directly cool the space

5. Mechanical ventilation:
   - Ensuring the most efficient system possible.

- Consider mechanical ventilation with heat recovery

6. Active cooling:
   - Ensuring they are the lowest carbon options.
   - Ground Source Heat Pumps and Air Source Heat Pumps can be used in reverse to provide cooling to buildings.
   - Water based cooling systems also reduce the need for air conditioning by running cold water through pipes in the floor and/or ceiling to cool the air.

2. Britannia Street Design Compliance

The objective of this section is to demonstrate compliance of the proposed works for new plant equipment at Britannia Street with the policies presented above.

2.1 Cooling Hierarchy – Design Principles

The following is a summary of the passive design features applied to the building with the aim to minimise the need for cooling.

- Due to the site layout, the building has significant areas exposed to southern orientations.
- The application proposals relate to an existing building within the Conservation Area and opportunities to alter the levels of glazing to the building are minimal.
- The windows to Britannia Street will be openable allowing natural ventilation. However, due to the proximity to a busy road such as Farringdon Road there is potential for indoor air quality and acoustic issues associated with relying solely on natural ventilation to provide thermal comfort. Therefore, energy efficient air conditioning will be considered.
- In addition the building is largely single aspect, and although there are some openings onto Leeke Street, these are large roller shutter service entrances which are not suited to being left open for long periods of time for security reasons.
- The use of internal blinds will be included to reduce the effects of solar gains and heat transmission through the facade.
- The building fabric and air tightness shall be designed to achieve significant improvements against the requirements or Part L2A 2013.
- LED lighting and energy efficient services will be specified reducing the internal heat gains within the spaces.
- The implementation of the above energy improvements will reduce the existing cooling load within the building by 35%.

In order to maintain adequate comfort levels, acoustics and indoor air quality, all the spaces within the buildings are intended to be comfort cooled using a new high efficiency variable refrigerant

flow (VRF) air source heat pump system which will replace the existing inefficient chiller. Internal operating temperature ranges will be from 22-25oC as per CIBSE guidance.

3. Conclusion

The Cooling Hierarchy has been fully considered and all appropriate passive measures have been implemented to reduce the cooling demand before consideration has been given to energy efficient air conditioning.

Given the location of the building and in order to maintain adequate comfort levels, acoustics and indoor air quality, all the spaces within the buildings are intended to be comfort cooled to offset remaining heat gains using high efficient VRF system.