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| To |  | CC |  |
| Adam Greenhalghadam.greenhalgh@camden.gov.uk |  |  Christopher.Winters@camden.gov.uk>  |  |
|  |  |  |  |
| From |  | Date |  |
| Coco Pemberton  |  | 24 January 2023 |  |
|  |  |  |  |
| Subject |  |  |  |
| 30 Lincoln's Inn Field - Cooling Hierarchy response  |  |
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Dear Adam,

Thank you for your email of 31st October 2022 in which you passed on comments from your sustainability advisor to give commentary on the proposal in relation to the Camden’s ‘Cooling Hierarchy’. After the TM52 Assessment was carried out, it was deemed that for the current office type’s occupancy, lighting and office equipment, the incoming air has to cool down to be comfortable level for the building users and staff. The solution suggested was to provide a highly energy efficient VRF system using Air Source Heat Pump.

As further prompted by your sustainability officer and yourself, we have reviewed the cooling hierarchy further with discussions with our M&E engineer who undertook the initial overheating assessment, to assess our proposal and discuss the feasibility of other options that may have been suggested by the cooling hierarchy.

The approach has considered the full range of planning issues, and as you will appreciate, it is an existing building within a conservation area (so the ability to alter it with for example external louvres or reorientation is limited), the key objective being how to cool the building enough to be a comfortable temperature for the occupiers/staff that will use the building during office hours, and ensure that it has a long term future.

For the avoidance of doubt, I set out below the cooling hierarchy listed and our rationale under each point which we consider will address the requirements of the cooling hierarchy.

**1.Minimise internal heat generation through energy efficient design**

Designing changes to the layout or uses was deemed as not possible in this proposal as the proposal is to reduce heat to a existing office building that is will be in use.

The current LTHW (Low Temp Hot Water) system will be replaced with VRF system with fully insulated pipework carrying refrigerants (and not Low Temp Hot Water) to the internal units. This means there is no hot LTHW pipework which contributes internal heat gains to the office space. Also, the internal lighting will be energy efficient LED fittings and will produce much lesser heat gains than existing lighting system.

The proposed lighting system will also have photoelectric day light sensing throughout all the offices with external windows which will also help in reducing the internal heat gains in summer months where the advantage of the natural day light will be used. The new computers with LED screens will also contribute towards reducing internal heat gains.

The use of internal blinds would assist in cooling of the property and is recommended even with other cooling mechanisms such as active cooling, to reduce the internal cooling demand. However, the engineers identify from the heating assessment that relying completely on internal blinds with openable windows will not be able to achieve indoor comfort temperature. The blinds will only be able to halt some of the impact from the heat but will not provide substantial enough shade to mitigate the issue with trapped heat in the buildings existing thermal mass. Furthermore, the operation of the blinds will interfere with the opening and closing of windows and block air flow by opening of windows.

**2.Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.**

Again, the building is an existing structure and therefore opportunities to change orientation is not possible. Other measures such as using smaller windows on the south elevation and larger windows on the north are not possible due to existing structure which has a uniform façade that contributes the views from the surrounding area. The site sits within an open space that has existing trees and shrubbery that may contribute to the cooling of the area. The potential to change the building are therefore limited due to the conservation area and open space setting that the building lies in.Additionally, the suggestion of using external blinds was considered but ultimately deemed an unsuitable solution due to the change of external appearance it will create to the building, again potentially causing harm to heritage asset and open space setting.

The engineer concluded that the building adopting a completely new glazing system. The replacement glazing will be high performing, double glazing with Solar Heat Gain Transmittance (G value) of 0.4 or lower will reduce the existing solar heat gains. The details of the replacement windows were demonstrated in the Drawings elevations and window details (drawing no. 1409/06/001) were materials were carefully selected to ensure heat gain was avoided.

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

As this is an existing building, it was confirmed that thermal mass is in place within the building interior, however it was deemed ‘not feasible’ to change the existing ceiling heights without substantial construction works that may impact the external elevations due to repositioning of windows and the like.

**4. Provide passive ventilation and 5. Provide mechanical ventilation**

Evaporative cooling was considered however it is an old type of system with frequent requirement of maintenance in comparison to modern fully capacity controlled and energy efficient VRF system therefore was deemed not feasible. Also, the evaporative cooling will require further mechanisms installed to control the internal humidity due to relying on external air passing over running water to cool the external air and entering the room, creating further construction and financial costs that the client was unable to justify.

The existing building is currently provided with mechanical ventilation without heat recovery. Changes to ceilings as an option is not viable as it requires major structural changes to the existing envelope. The TM52 assessment that was issued in the initial submission (titled 3978 - OVERHEATING ASSESSMENT REPORT Rev A For Planning) used modelling to assess passive ventilation measures by providing models of various angle of openings windows- including to the best case scenario of 90 degrees. The study showed that even with openable windows, the study concluded that the building will overheat past a comfortable level.

With both opened windows at fully 90 degree angle or tempered air and closed windows, the study found that purely mechanical ventilation with would not be sufficient to achieve comfort temperature within the office environment. However, the proposed new ventilation system will be energy efficient in comparison to the existing ventilation system and also have heat recovery facility which will ultimately use less energy than current use.

Night Cooling was considered. Amendments such as separate vents above the existing windows, built in with automatic opening and closing mechanism were put forward for consideration for night time use. However, it was found that this would result in additional structural changes to the existing openings and building fabrics, all the while not guaranteeing an acceptable daytime internal comfort temperature, therefore the benefits of these changes would not be felt by the occupiers. Furthermore, the night hours opening of windows would also requires additional security measures to be put in place, creating further external changes through fixtures and screening, creating further harm to the heritage asset setting.

**6.Provide active cooling systems**

As set above, many of the options that were suggested would have resulted in substantial changes to the structure of the existing building or the works needed to install suggested changes would not be effective enough for desired outcome of cooling during the use of the property. Essentially, the works required would create minimal, if any at all, positive impact to operation and use of the building, creating a negative planning balance. The existing building is currently provided without any active cooling system at all but the proposal is to provide with highly energy efficient VRF system using Air Source Heat Pump to achieve internal comfort temperature. The client has sought out manufacturers with the lowest carbon option that will still be able to deliver the demands of cooling building. Therefore, we deem that the Air Heat Source Pumps will provide the needed cooling for the office building and occupiers.

**Summary**

Overall, the proposals increase the energy efficiency of the building and improve the quality of accommodation, so we consider that this is acceptable in cooling terms and represents an environmental improvement. We hope that the rationale listed has provided justification for our proposal for the air source heat pumps.