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# PALL MALL COURT M&E SERVICES AND EXTRACTION STATEMENT

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## 1. INTRODUCTION

This M&E Services and Extraction Statement has been prepared by Ramboll to support the planning application in relation to the Pall Mall Court, Manchester refurbishment project, located in the centre of the city of Manchester.

The development involves the refurbishment of a Grade II listed Office building which is bounded by King Street, Brown Street and Marsden Street.

## 2. DEVELOPMENT OF THE HVAC STRATEGY

Substantial consideration has been put into developing the heating, ventilation and air conditioning (HVAC) strategy for Pall Mall Court. This is partly due to the poor energy performance and fossil fuel reliant design of the existing building and services and partly due to the grade II listing of the building façade resulting in solutions which are centred around maintaining the building appearance.

The existing HVAC strategy is based around the following:

- Heating – the main heating strategy is based around gas fired boilers providing low temperature hot water (LTHW) which feed perimeter radiators on each of the floor plates.
- Cooling – air cooled chillers on the roof feed a series of fan coil units arranged around each of the office floor plates
- Ventilation – A mechanical ventilation strategy is adopted which is based on a centralised supply AHU with zonal extract fans on a floor by floor basis. As such, the system does not include heat recovery.
- Local Extract – Local mechanical extract fans are used for toilet cores and individual toilets to remove smells from the building.

### 2.1 Drivers

The main drivers for the HVAC strategy are based around the following:

- Improvements in the fabric (where possible under the listed status) to drive down energy demand
- Removal of reliance on fossil fuels and a move to an all-electric building
- Look to implement heat recovery, both in the ventilation systems and the heating and cooling systems to minimise the amount of wasted energy
- Look at possible HVAC strategies not only in terms of operational energy, but also in terms of embodied carbon and whole life, to help influence the most appropriate system over its lifetime.
- Ensure changes are done in a sympathetic way to maintain the building aesthetics and original architectural intent

### 2.2 Implementations to meet the HVAC drivers

In order to respond to the main drivers, the following proposals have been implemented.

#### 2.2.1 Fabric Improvements to drive down the demand for energy

The first element reviewed was to see what improvements could be implemented to the building fabric which would have a reasonable impact on the building energy consumption.

The main element identified was the glazing, which is currently single glazing and at end of its original design life. As such, it is proposed to upgrade this to a double glazing system with thermally broken frames, which will also help with improving the building air permeability. Due to ensuring that the appearance of the glazing system is maintained, there are limitations on the U-values that will be achieved by the improvement, with current predictions to be in the 1.8W/m<sup>2</sup>K to 2.1W/m<sup>2</sup>K region, which is generally to do with the number of joints/elements in the system. But this is a significant improvement on the existing single glazing system, which is predicted to be around the 5.7W/m<sup>2</sup>K region.

Please refer to the Options Matrix Appraisal and associated appendices for more information on the options to enhance the glazing system.

Due to the mosaic tiles on the building being part of the listing, and the tiles being both internal and external, it restricts the fabric improvements that can be made to the external walls.

Proposals include upgrading the roof elements to align with new build standards to help reduce energy consumption.

Where new elements (glazing/roof/walls) are being included as part of the small elements of extension to the building then these will be incorporated to modern standards in line with Part L of the building regulations.

### **2.2.2 Removal of Reliance on Fossil Fuels**

The existing HVAC design for the building is reliant on gas fired boilers for the heating inline with traditional methods. There is a drive towards net zero carbon, and an important part of that is to make a conscious shift away from fossil fuels, with a move to electricity with its ever decarbonising grid. As such, all heating and cooling systems will be based on using heat pumps to provide energy in an efficient manner. The introduction of such system does result in an increased level of roof plant mechanical equipment as heat pumps and external condensers work best and at their most efficient when they can discharge directly to atmosphere.

### **2.2.3 Maximising Heat Recovery**

The design of the HVAC systems is based around maximising heat recovery opportunities for the building. With regards to the ventilation systems, this means the incorporation of heat recovery (via thermal wheels) to pick up heat from the extract ventilation and convert it to the supply air stream.

With regards to the heating and cooling system, the use of a Hybrid VRF system using a low Global Warming Potential (GWP) refrigerant and then a water based system to emitters is proposed. This system will allow for emitters within a zone to recovery heating or cooling for use in other spaces within the zone. i.e. if an area of the zone requires heating, it can use the heat rejected from a space which is being cooled as part of its heating load, helping to establish good levels of heat recovery.

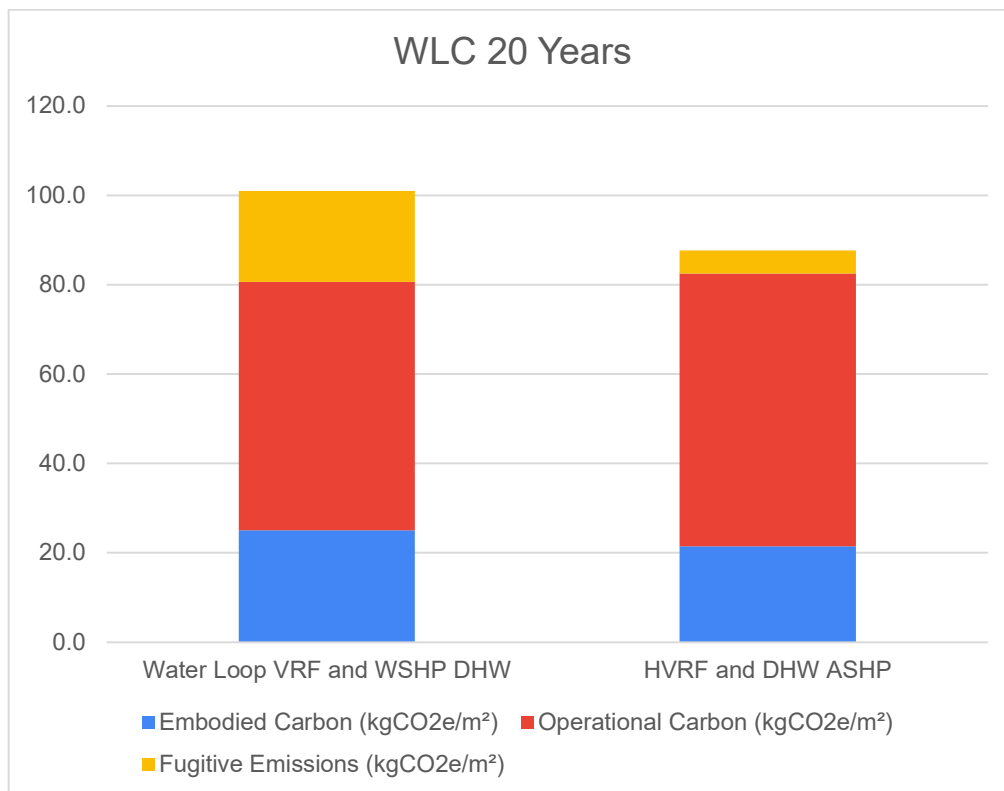
With the drive towards a low carbon society, Bruntwood have set stringent targets for energy efficiency and that includes high efficiency fans. Therefore, efficiencies of air handling plant will be better than those required for compliance purposes.

### **2.2.4 Heating and Cooling strategy Comparisons**

To ensure the lowest emission system is selected, whole life carbon assessments have been carried out on the two most appropriate systems. From early reviews of plant areas available, the most appropriate heating and cooling systems which maximised heat recycling were either:

- Hybrid VRF solution
- Ambient loop with water cooled VRF

As such, a whole life carbon assessment of these options was undertaken and the results can be seen below:



As expected, when looking at the ambient loop with water cooled VRF option, this posed the better operation carbon (as it had a building wide level of heat recycling), but a higher embodied carbon due to additional plant requirements, but still posed the better embodied and operational solution. However, when fugitive emissions, those associated with refrigerant leakage, are included then this has a significant impact on the overall carbon impact of the solution. The HVRF option uses a lower GWP refrigerant (approximately a third) than the Water loop VRF option as well as using lower quantities. As such, this results in the HVRF solution being the most appropriate in terms of whole life carbon.

### 2.2.5 Maintaining Architectural Integrity

As the development is on a grade II listed building, architectural integrity and sensitivity is key. As such, the MEP services have looked to reuse as much of the existing routing and plant locations as possible. Due to the move away from gas services and a change to ASHP's to provide an efficient form of electrical heating and cooling, there is an increase in roof plant requirements. These areas have been highlighted in the Extraction Statement in the next section of the report.

The architectural integrity has driven some of the services decisions such as the use of heat recovery central air handling units on the roof serving down dedicated risers to supply and extract air from the floor plates. The alternatives of passive ventilation via façade openings or the use of local ventilation units have been discounted due to the architectural impact of adding louvres or window openings in the listed façade. There would also be potential issues with regards to noise and pollution given the buildings City Centre location.

Plant has been carefully located to minimise visual impact, as set out in the Design and Access Statement.

### 3. EXTRACTION STATEMENT

The Pall Mall Court development will be provided with ventilation in accordance with Part F 2016 of the Building Regulations.

The preferred method of providing ventilation to this new development would be via mechanical ventilation with heat recovery wherever possible due to the limitations of using passive ventilation and the listed status of the façade.

#### 3.1 Mechanical Ventilation

Mechanical ventilation will be provided to each of the three main blocks (Marsden Street, King Street and Tower) using central air handling units located on the roof of the associated block (as indicated on the plan layout in Appendix A). Air inlets for air handling units will be located away from sources of pollution and each air handling unit will incorporate filtration ePM2.5  $\mu$  65% in accordance with ISO 16890, to maintain good quality of the supply air being provided. The use of thermal wheels shall be used for heat recovery for the following reasons:

- It's more compact nature given the limited roof space available
- Higher levels of heat recovery compared to plate heat exchangers

#### 3.2 Kitchen Ventilation

The main kitchen, located on the lower ground floor, does not provide full commercial catering and will be a preparation and light cooking kitchen in operation. This main kitchen will be provided with supply and extract ventilation via a dedicated air handling unit located on the roof.

This kitchen supply and extract air handling plant will be located on the Marsden Street roof area above the kitchen with the exhaust air discharged to atmosphere vertically at the Marsden roof level.

The air inlet for this air handling unit will be located away from sources of pollution and will incorporate filtration ePM2.5  $\mu$  65% in accordance with ISO 16890, to maintain the quality of the supply air being provided. It is not anticipated given the nature of cooking activities that odour control will be required, but this will be considered based on its proximity to adjacent buildings.

The kitchen canopy will incorporate baffle grease filtration.

#### 3.3 Future Kitchen Ventilation

There is also allowance for a future kitchen provision in the basement area on the King Street side of the building. This is speculative at this stage, and it is anticipated that any future kitchen provision will include the likes of an (electric) pizza oven or similar, but the final usage and design is to be established.

Any future kitchen supply and extract air handling plant will be located within the building floor plates with the intake and exhaust ducted via risers to the King Street roof area. At roof level, the intake air will be ducted to a louvre bank and the exhaust air will be discharged directly to atmosphere. Odour control will be considered for this future kitchen provision once more information is known and its proximity to adjacent buildings will be considered.

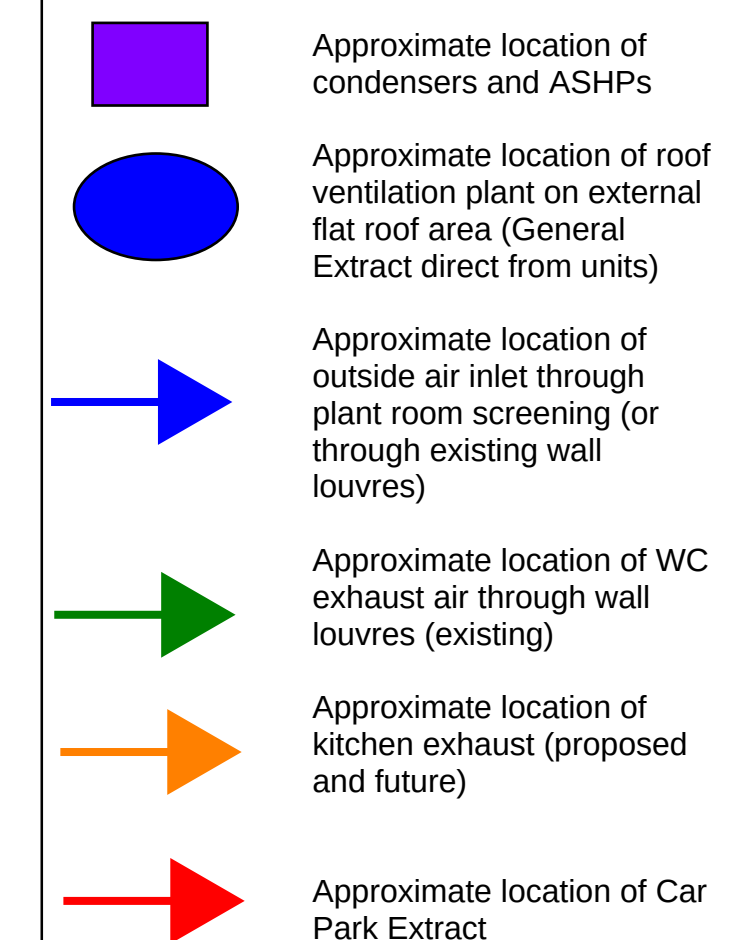
### **3.4 Smoke Ventilation**

For the covered carpark appropriate car park mechanical ventilation systems will be adopted and these will provide the required smoke management in the situation of fire, as called for in part B of the building regulations. Exhaust ventilation will be ducted to the service yard off Brown Steet at Ground Floor level, where existing louvres are located. This is seen as a beneficial location with minimal impact on the building appearance and being away from the public domain.

## **4. PLANT AREAS**

Plant spaces and unoccupied spaces will be provided with natural ventilation (using existing louver locations) via wall louvres or louvered door sections as appropriate.

## **APPENDIX A – EXTERNAL VENTILATION PLANT LOCATIONS**



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| PLANNING |
|----------|

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