MAX FORDHAM

1 Ene 04 Low carbon design

Updates to the Passive and LZCT reports considering the revised Energy Strategy for the CSC and Site Accommodation.

Passive Design Analysis Report

- Given the lightweight modular structural design proposed for the Site Accommodation, thermal mass is no longer being pursued as a method of reducing peak temperatures.
- The Energy Strategy for the CSC and Site Accommodation considers updated fabric performance parameters, shown in Table 1 below. The updated figures reflect the change to a modular building strategy for most of the building.

Table 1: Thermal performance of the building fabric proposed for the Site Accommodation

	MINIMUM STANDARD	ORIGINALLY PROPOSED	UPDATED FIGURE
ROOF	0.25 W/m²K	0.18 W/m²K	0.19 W/m²K
WALL	0.35 W/m²K	0.15 W/m²K	0.19 W/m²K
FLOOR	0.25 W/m²K	0.15 W/m²K	0.19 W/m²K
WINDOW	2.2 W/m²K	1.5 W/m²K	1.4 W/m²K
AIR PERMEABILITY	10 m³/m²h	3 m³/m²h	5 m³/m²h

Low and Zero Carbon Technology Report

- PVs are no longer proposed for on-site electricity generation. The financial and embodied carbon cost of installing PVs on the remaining roof area outweighs the benefit of such a system, since the available area would not provide a meaningful contribution to the building's total energy demand.
- The hot water demand for the Site Accommodation is to be provided by a dedicated air source heat pump (ASHP) system rather than instantaneous electric heaters. The inclusion of large shower blocks and a commercial kitchen has significantly increased the hot water demand in the building, and consequently hot water storage is needed. Considering requirements set out in the latest version of the London plan which state electrically driven heating plant should be preferred to gas boilers, the strategy now is for electrically driven ASHPs to heat the large volumes of hot water required for the kitchen and shower blocks.

2 Wst 05 Adaptation to climate change (Fabric and structure)

An update on progress regarding the resilience of the building structure and fabric

- Thermal mass is unlikely to be used, given the modular design of the building. As such it is no longer being pursued as a method of reducing peak temperatures.
- The intentionally short lifetime (10-15 years) and single-use purpose of the building mean that the requirement for future-proofing layouts i.e. for reduced occupancy densities is not relevant or beneficial.
- Current elevations show low glazing ratios of window to wall area, particularly since the central module of the southern block is to have no windows, in line with energy targets.
- Current elevations show that most windows avoid using low-level glazing in line with energy targets.

3 Wst 05 Adaptation to climate change (MEP)

Please see Table 2 below for an update on the feasibility of free cooling strategies.

Table 2: Feasibility of free cooling strategies for the CSC and Site Accommodation

Free Cooling Mechanism	Initial Feasibility	Technically Feasible and to be Investigated?
Night-Time Cooling	Night-time cooling – introducing external air when ambient temperatures are lower – is a useful method to "pre-cool" spaces, allowing peak internal temperatures to be reduced by 1 to 2°C during occupied hours. It is reliant on exposed thermal mass and the provision of secure openings. Since the building does not utilise natural ventilation or thermal mass, night-time cooling could be provided by running the mechanical ventilation system at night when the building is unoccupied. A cost-benefit analysis would have to be performed to ascertain whether the free cooling benefit outweighs the additional energy consumption.	Y
Natural Ventilation	The entirety of the building is to be mechanically ventilated, given the significant noise and air pollution caused by the adjacent construction works. By design, the lifespan of the building will coincide with the construction works and as such natural ventilation is not a feasible option.	N
Displacement Ventilation	Displacement ventilation introduces air at low level (normally floor level) and allows a temperature differential to be created between inlet and room exhaust (normally at high level) to provide space cooling without the need for low air temperatures (ordinarily required for traditional overhead "mixing" systems). This method allows outside air to be introduced when external ambient temperatures are typically below 17°C, significantly decreasing the amount of time where mechanical cooling is required. Given the mechanical ventilation strategy and lack of façade openings, displacement ventilation is not possible.	N
Ground Coupled Air Cooling	Ground coupled air cooling relies on laying a buried labyrinth of ground ducts (normally concrete) between an air intake position and room outlet. The ground provides a thermal buffer and thermal mass, cooling outside air as it passes through the labyrinth. A labyrinth is typically provided to maximise contact time with the ground. It is not considered suitable for this site due to a lack of available ground area to run buried ducts.	N
Surface Water Cooling	Surface water cooling systems utilize lakes, rivers, oceans, and other surface water bodies to provide heat sinks for heat pumps. These systems provide energy-efficient heating and cooling to buildings. Surface water cooling is not considered feasible for this project since there are no large surface water bodies nearby.	N
Ground Water Cooling	Groundwater in aquifers is typically at a temperature of around 8-12°C, which can be used to provide cooling by passing it over a heat exchanger. High efficiencies can be achieved due to the constant, low, water temperature and the minimal amount of energy required to obtain the cooling (pumping and circulation). The barrier to these systems is often the high capital cost associated with the drilling of the borehole. Since there is no available aquifer on site to be used for ground water cooling this mechanism is unfeasible.	N
Evaporative Cooling	Evaporative cooling relies on rejecting heat to the atmosphere by spraying cool water onto a heat exchanger. These evaporative coolers (sometimes referred to as "wet cooling towers") are extremely effective but require a high level of water treatment and maintenance to avoid the proliferation of Legionnaire's Disease. Given the available plant space at roof level, this mechanism is feasible and will be investigated further at the next stage.	Y
Desiccant Dehumidification	Desiccant dehumidifiers rely on a salt-based material to absorb moisture from the air. The desiccant is then dried by applying heat to regenerate the surfaces. This type of system uses a similar amount of energy as a refrigerant based means of dehumidification but provides a far greater level of room stability with respect to Relative Humidity. Since humidity control is not required in this building, this mechanism will not be investigated further.	N
Absorption Cooling	Absorption cooling in this context uses waste and refrigerant to reject heat from a building. It works best when a low-cost heat supply is available, such as surplus heat from industrial processes, district heating or solar thermal energy. Any solar PV arrays for the project are to be used to for electricity generation, and aside from this there are no other convenient 'waste heat' sources which can be utilised in this way. As such, absorption cooling is unfeasible.	N