

Energy Statement

The Havelock Farm project involves refurbishing the existing Farm buildings located on Kew's Havelock Site. The project involves extensive upgrades and replacements to the fabric, structure and services. This work is essential to convert the buildings into commercial office spaces for on-site personnel.

The refurbishment will see the internal layouts being remodeled and the service infrastructure will be renewed to facilitate this change.

Using an IES modelling package, an overheating analysis has been developed using a dynamic thermal model to evaluate potential overheating conditions in the building after implementing the proposed fabric upgrades, as directed by the architect. This assessment utilised the future weather file DSY1 to ensure that our calculations accounted for future climate resilience. The results confirmed the cooling load assessments, informing the sizing of emitters in individual rooms, as well as the overall size of the mechanical plant. Additionally, the analysis revealed that relying solely on passive cooling in high-occupancy rooms can lead to overheating conditions, thereby necessitating the implementation of an active cooling solution.

In the early stages of mechanical design, various heating and cooling systems were considered. This resulted in a Variable Refrigerant Volume (VRV) system being considered as the best option, as it effectively addresses both heating and cooling needs without requiring separate systems. This system uses a refrigeration process to cool and heat air, allowing heated air from one area to cool another and vice versa.

Unlike traditional fossil fuel boilers, the VRV system does not produce on-site pollution, making it environmentally friendly. Additionally, it can take advantage of green energy tariffs, enhancing its sustainability. With two external heat pumps, the VRV system offers heating and cooling efficiencies that are approximately three times greater than standard direct electric heating systems.

The system is typically used for instant heating and cooling for office spaces and is preferred in newer constructions. Given the extensive upgrades to the construction materials and Kew's goal to become climate positive by 2030, this net-zero carbon approach is the preferred solution.

The mechanical services design also incorporates flow restrictors for tap outlets to minimise water usage. In areas with high hot water usage, water storage heaters are installed. These heaters are considered advantageous in spaces with high occupancy or multiple outlets, as they afford stored hot water compared to direct heating methods. However, direct heating methods are used in areas with limited space and outlets considered as being infrequent use.

With respect to ventilation, designs are compliant with Building Regulation's Part F (volume 2), which stipulates 10 L/s of air per person. This measure is essential for ensuring occupant comfort. With respect to mechanical ventilation, Mechanical Heat Recovery Ventilation (MHVR) systems are used to provide adequate air supply while recovering some of the spent heat, further reducing energy consumption. The systems also include monitoring and control of CO₂, which can provide optimal conditions for a healthy working environment and boost productivity. This solution was also favoured over a passive ventilation

system as it maintains temperature control, preventing an uncontrolled influx of ambient air into the space and meeting TM59 overheating assessment parameters.

The electrical design incorporates LED low-energy fixtures instead of traditional incandescent or halogen bulbs. This change offers approximately 90% higher energy efficiency and extends the lifespan of the lights by 5 to 50 times.

Additionally, renewable, sustainable energy sources such as solar photovoltaic panels have been proposed to replace existing panels that are no longer functional and to provide a local means of energy generation in alignment with Kew's net-zero goal.

Service Statement

A new heating and cooling solution utilising a suitably sized VRV (Variable Refrigerant Volume) system will be implemented for the building. In addition, the use of renewable technologies is still being explored to enhance the current proposals.

Hot water storage is provided by multiple-point-of-use water heaters, with direct instantaneous water heaters used where outlets are considered to be infrequent use.

To accommodate the proposed new systems, a suitably sized electrical supply will be brought into the plantroom. The plantroom shall also house a static inverter for the PV system. In addition to the electrical supply, a new water supply shall be provided. The water supply shall be complete with a stopcock, DCV, Water meter & PRV upon entry to the kitchenette & WC area on the ground floor.

The incoming water, as per the South East Water Grovelands water supply zone, is a slightly hard water area, and treatment to the mains would not be required as it falls below the 200 mg/L threshold, where treatment is advisable. Water monitoring and saving measures have been considered to optimise system water usage.

The proposal for the heating and cooling system is a VRV system in the main office & transitional spaces, and direct electric radiators for heating in the WC areas where space is limited, and comfort conditions are less crucial.

The distribution of Mechanical and Electrical services will primarily be routed at a high level within suitable containment systems, taking advantage of the exposed ceiling to maintain a symmetrical appearance of service runs. This design will help avoid unsightly service runs and fits the specified industrial aesthetical look that is being considered. The proposal is to have the main service runs originate from the plant room at a high level dropping down to supply individual emitters and ancillary equipment as needed.

Maintenance access will be considered for all services to ensure systems are accessible and fully maintainable.

The below-ground drainage design is provided by the structural engineer, coordinated with the mechanical design to account for soil stack locations and condensate waste removal.

The new electrical supply shall be a 3-phase, 100A supply to feed the Havelock Farm Office buildings

It is proposed that a new 100A TP&N supply is fed from the new UKPN transformer that is to be installed as part of the LCRN project, which shall run in tandem with the Havelock Farm project. This supply shall feed a new Eaton TPN MCB distribution board (DB1) located within the new Plant Room.

The existing single-phase supply located within the Bothy will be disconnected and removed as part of strip out works.

Ventilation will be provided to comply with Part F and Part L of the Building Regulations. It is proposed that ventilation will be provided by a combination of mechanical and passive solutions. Passive solutions are being provided when purge ventilation is necessitated.

Low-energy LED lighting is proposed throughout. Lighting will incorporate automatic occupancy sensors and time control programming, where appropriate, all linked to a lighting control system or BMS.

External lighting will be controlled via a time clock provided with a manual override switch.

The buildings will incorporate fire alarm and intruder alarm systems. The design and provision of these systems will be carried out by the client's incumbent security and fire specialists.

The buildings will be afforded connectivity to Havelock's site-wide internal network and Broadband facilities through a wholesale Wi-Fi installation, together with the provision of dedicated hard-wired data outlets where required

The building services installation will be provided fully in accordance with the Building Regulations, all relevant British Standards and CIBSE guidelines.