Proposed Care Home Development

Haverhill Care Home, Suffolk, Coupals Rd, Haverhill, CB97UW

MEP Design Intent

Version	Date	Note
V1	24/03/2023	First Issue

Contents

1 Introduction

1.1 This document is issued to provide an overview of the proposed mechanical, electrical and plumbing (MEP) building services.

1.2 At this point of the project, the proposed MEP strategy for the building has been considered based on various desktop studies and the proposed architectural general arrangements.

1.3 The MEP intent document is intended to provide an overview of the concept and requirements associated with providing MEP services to the proposed development.

1.4 The MEP intent document is a working document, initially it is intended to propose the overall MEP strategy and will evolve into a full specification to be issued along with the tender design.

1.5 The proposed development is a care home at land off Haverhill Care Home, Suffolk, Coupals Rd, Haverhill, CB97UW.

2 Incoming Services

2.1 New incoming utility services will be required for the new development. This is proposed to be gas, water, electricity and digital services.

Gas

2.2 The proposed incoming gas supply is to be located in an external glass reinforced plastic (GRP) enclosure adjacent to the road entrance. This is proposed to supply the Laundry and Kitchen equipment.

Water

2.3 The proposed incoming water supply and meter is to be located at the boundary utilising an inground meter.

Electricity

2.4 The proposed incoming electrical supply is to be located in an external glass reinforced plastic (GRP) enclosure adjacent to the road entrance.

Digital Services

2.5 The proposed incoming service is fibre to the premises, we are however waiting on information from Openreach to ascertain is this is available in the area.

Drainage

2.6 A number of new below ground drainage connections will be required to serve the building. These will be coordinated with the structural engineer responsible for below ground drainage.

3 Heating

3.1 It is proposed to heat the development utilising high efficiency air to water Air Source Heat Pumps (ASHP's).

3.2 It is proposed to locate the various ASHP's behind an acoustic enclosure on the roof.

3.3 It is proposed to utilise low temperature hot water (LTHW) underfloor heating throughout. This will require multiple underfloor heating manifold locations.

3.4 Control of the heating is proposed to be zonal with a room wall mounted controller provided for each room's heating zone.

4 Ventilation

4.1 It is proposed to provide Mechanical Ventilation with Heat Recovery (MVHR) to all bedrooms. This shall extract stale air from the bathrooms and deliver outside air into the bedroom space. These units shall be sized in line Part F of The Building Regulations and in compliance with the Dynamic Thermal Simulation overheating analysis to ensure compliance with TM52.

4.2 It is proposed to provide Mechanical Ventilation with Heat Recovery (MVHR) to each of the communal living spaces. These units shall be sized in line Part F of The Building Regulations and in compliance with the Dynamic Thermal Simulation overheating analysis to ensure compliance with TM52. Please note that the Dynamic Thermal Simulation overheating analysis has highlighted that several of the communal living areas will also require Comfort Cooling in order to limit overheating.

4.3 Please note that sufficient ceiling void space will be required to allow for the MVHR solution. Ceiling mounted MVHR units and associated ductwork will typically require 350mm of ceiling void for installation, along with a minimum of 600x600 access panels located under the units.

5 Comfort Cooling

5.1 A Dynamic Thermal Simulation overheating analysis has been undertaken to demonstrate that the building design and services strategy can deliver thermal comfort levels in accordance with CIBSE TM52. This simulation has highlighted that comfort cooling will be required in the following areas:

- General Offices
- Meeting Rooms
- Nurse's Offices
- Reception
- Staff Rooms
- Lounge/ Dining areas
- Café
- Day Areas

5.2 It is proposed to provide comfort cooling utilising a mixture of cassette and wall mounted style indoor units, using high efficiency low global warming potential refrigerant as the heat transfer medium cooling the room air. The refrigerant is then passed back to the outdoor unit and the heat energy is rejected.

5.3 It is proposed to locate the outdoor unit behind with an acoustic enclosure on the roof.

5.4 To install the cassette units, we will require a minimum of 350mm of ceiling void.

6 Domestic Water Services

6.1 A booster pump set will be required to meet the water demand of the building. The plant room is on the ground floor of the building and not an ideal location for this to be located. The tank will need to be sectional to be able to be routed to the room as there is no external access.

6.2 The development is in a hard water area. We would suggest installing a water filter and scale remover – this does not use salts/crystals to soften the water. As a result, there is less maintenance required and all water is drinkable.

6.3 The filtered boosted water supply will then feed all outlets within the property, including the hot water cylinders.

6.4 It is proposed to provide a connection for an irrigation tank top up system before the booster set and filtration.

6.5 Two hot water cylinders within the plant room on the ground floor will provide domestic hot water heated indirectly by ASHP's.

6.6 Control the hot water cylinder shall utilise the same control system as the heating.

6.7 It is proposed to provide a pumped hot water return system.

6.8 Water Efficiency shall be generally in accordance with building regulation's Part G regulation 36 requirement for 110 litres per person per day. General water efficiency control measures to be taken shall include water leakage monitoring, selecting energy efficient equipment and managing flow rates to water outlets by careful product selection and where necessary use of flow restrictors.

7 Above Ground Drainage

7.1 Proposed gravity foul drainage system to suit the building layout. It is proposed that this will utilise uPVC pipework.

8 Electrical Distribution

8.1 A main panel board will be provided in the central ground floor electrical cupboard, this board will distribute sub-main power cables to individual distribution boards on all levels in locations as detailed on the drawings.

9 Power

9.1 General power will be provided throughout the facility to satisfy requirements.

10 Lighting

10.1 Lighting will be low energy LED luminaires throughout. Traditional switching will be provided to bedrooms with presence activated lighting to corridors and common amenity areas.

11 Fire Alarm

11.1 A fully addressable fire alarm will be provided to the facility. A hybrid fire alarm is proposed with fire detection to throughout the building to BS5839 L1 standard. The evacuation procedure requires further development, which will involve the location of visual alarm devices (VADs) and sounders, or possibly speakers.

11.2 The fire alarm system will shut down other services as follows:

11.2.1 Ventilation systems (off)

11.2.2 Gas service (off)

11.2.3 Music systems (off)

11.2.4 Lift (travel to ground and doors open)

11.3 The system will be connected to an alarm receiving centre (ARC) to notify emergency services in the event of a fire alarm. A delay on notification may be provided (subject to a fire risk assessment) to allow on site staff to verify the fire detection is not an unwanted alarm.

12 Digital Communications

12.1 A fibre optic cable will terminate in a communication cabinet, where services will be distributed as follows:

12.1.1 Administrative positions - Cabled outlets.

12.1.2 Common spaces and resident bedrooms – WiFi via wireless access points (cabled).

12.1.3 Electrical and mechanical services - cabled outlets.

12.2 Active equipment such as switches and routers are assumed to be provided by others.

13 Lightning Protection

13.1 The building will be provided with a lightning protection consisting of a roof termination network connecting to a steel structure to act as down conductors to earth rod pits around the perimeter of the building.

13.2 Surge protection devices will be installed on electrical distribution systems.

14 Roof Services

14.1 We are proposing to install the kitchen extract fan and make up air fans on the roof.

14.2 Access to the roof will be required for maintenance access to mechanical plant and cleaning roof lights.

14.3 A roof man safe system will be required for the plant area.

14.4 Safe and adequate access to the roof will be required.

15 Sustainability

15.1 The project intends to incorporate multiple renewable low carbon energy sources, the first are air source heat pumps (ASHP's). The ASHP's will harvest, upgrade and move heat from one location to another. Using technology similar to that which is found in a common domestic fridge, heat pumps use the vapour compression cycle to generate heat. When used in reverse, this cycle provides the ability to take low temperature renewable heat from the environment and raise it to usable temperatures capable of handling the space heating and hot water loads required in this building.

15.2 The ASHP's proposed to be utilised for heating will use R407C refrigerant, this is a blend of non-ozone depleting HFC refrigerants (R32, R125 and R134a). Seasonal efficiency is a way of measuring the true energy efficiency of heating technology, over an entire year. This measure gives a more realistic indication of the energy efficiency and environmental impact of a system. The Seasonal Coefficient of Performance (SCOP) of this system is 3.54 meaning for every 1 unit of electricity utilised it produces 3.54 units of heat energy, an efficiency of 354%.

15.3 The ASHP's proposed to be utilised for hot water production will use R744 refrigerant, this is CO2 utilised as a refrigerant, meaning it is a natural refrigerant. It is not only a non-ozone depleting refrigerant, but it also has one of the lowest global warming potentials of any refrigerant. The SCOP of this system is 3.65 meaning for every 1 unit of electricity utilised it produces 3.65 units of heat energy, an efficiency of 365%.

15.4 The project intends to utilise photo voltaic panels on various sections of the roof. This technology harvests solar energy converting it into electrical energy. It is expected that all of the energy harvested will be utilised on site. To ensure all of the harvested energy is utilised on site any surplus energy will diverted to the hot water system utilising an immersion heater solar power diverter. This ensures the harvested energy is put to the most efficient use.

15.5 An initial BRUKL Simple building energy model (SBEM) indicates the proposed developments the target CO2 emission rate is well over 19% below the notional emission rate of the 2013 regulations. Further detailed information is provided in the BRUKL Output document.

15.6 A further SBEM was carried out to ascertain the requirements to gain a 19% betterment on the current 2021 regulations. In order to achieve this approximately 350m^2 of photo voltaic panels would be required.

15.7 Weather compensation controls will be provided to allow the system to adapt to the external environment, increasing efficiency and reducing energy usage.

15.8 Mechanical ventilation with heat recovery is proposed. The heat recovery unit is over 95% efficient in recovering heat when required. The MVHR will have an ErP rating of A.

15.9 Mechanical ventilation will provide summer bypass to allow passive cooling when conditions permit the opportunity. This reduces the overheating risk and the size of the comfort cooling systems required.

15.10 Lighting will be high efficiency LED lighting with intelligent controls to common spaces.

15.11 Smart energy metering of services will be provided to allow review and management of services.

16 Overheating

16.1 A TM52 report which analyses the possibility of a building overheating in summer was completed to ascertain the different methods which could be implored to stop this from occurring.

16.2 The summarised design data for the TM52 is stated as below:

The building has been modelled predominately as Mechanically Ventilated with areas of Comfort Cooling to Communal areas, using the following construction data.

Construction U values

Ground Floor	0.18 W/m²K
External Wall	0.26 W/m²K
Roof	0.18 W/m²K
Windows	1.60 W/m²K
Personnel Doors	1.60 W/m²K

Glazing

Light Transmittance 70%

Solar Energy Transmittance (G Value) 40%

Occupancy Levels:

The occupancy time of the bedrooms is assumed as 24hrs a day.

The occupancy time of the other zones in the building is assumed as 7am-7pm.

The occupancy levels have been modelled as follows;

Zone Type	Occupancy (persons)
Bedrooms	1 persons
Meeting Room	4 persons
Lounge/Dining	25 persons
Nurse Office	2 persons
Offices	2 persons
Day Area	4m²/person
Reception	3 persons
Café	20 persons
Staff Room	10 persons

The ventilation rates to zones containing mechanical ventilation or mechanical extract are as follows;

Zone Type	Ventilation Levels
WCs/Ensuites/Sluice/Cleaners	6 ACH
Laundry	10 ACH
Bedrooms	1 ACH
Offices	10 l/s/p
Meeting Room	10 l/s/p
Reception	10 l/s/p
Café	10 l/s/p
Lounge/Dining	10 l/s/p
Staff Room	10 l/s/p
Nurse's Office	10 l/s/p

Comfort Cooling

Comfort cooling has been assumed in the following areas

- Offices
- Meeting Room
- Nurse's Office
- Reception
- Staff Room
- Lounge/Dining
- Café
- Day Areas

A cooling set point of 24°C has been assumed.

16.3 All rooms listed above under the 'Comfort Cooling' are proposed to be done with mechanical ventilation and comfort cooling.

16.4 The design was calculated with having natural ventilation within the bedrooms, but this did not meet the ventilation rates required.

16.5 The design was calculated with having mechanical ventilation in the bedrooms, the building passed at least 2 of the 3 criteria of TM52. Therefore, the building is compliant with using only mechanical ventilation.

16.6 The design was calculated with having a mixture of mechanical and natural ventilation for the bedrooms. This had a higher compliance than just having the mechanical ventilation alone, therefore this is the option that we would propose for the building.

16.7 Further information is available on the TM52 overheating report.