



PJR

**BUILDING SERVICES
DESIGN ENGINEERS**

ENERGY STATEMENT

FOR

BLOCK 5, FULBECK AVENUE, WORTHING, WEST SUSSEX

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Ref: A30/01/ENS Ver 01

6 The Offices
10 Fleet Street
Brighton
BN1 4ZE
Tel: 01273 626247
Email: mail@PJRServices.co.uk

1.0 Introduction

PJR have been instructed to undertake an energy and sustainability strategy for the proposed residential development at Block 5, Fulbeck Avenue, Worthing, West Sussex.

This report has been prepared in support of the Section 96a application being submitted in relation to application number AWDM/1671/22.

The scheme involves the construction of Block 5, which will comprise of 23 number one-bedroom apartments and 9 number two-bedroom apartments.

Under Worthing Borough Council's emerging Local Plan 2020-2036, Policy DM16 -Sustainable Design, stipulates a requirement for applications to be supported by a Sustainability Statement. The purpose of the Sustainability Statement is to address specific policy requirements in relation to 0 carbon development and preventing overheating. Furthermore, Policy DM17-Energy sets out a requirement for new developments to follow the principles of the energy hierarchy/cooling hierarchy and to meet 10% of new build regulated energy use through renewable and/or low carbon technologies.

2.0 Planning Policy

The site falls within the authority of Worthing Borough Council (WBC) and is subject to the borough's Planning Policy. WBC has in place a core strategy dated April 2011, however this is in the process of being replaced by the emerging Local Plan 2020-2036.

Within the draft Local Plan, Policy DM16 sets out the key sustainable design principles that should be followed within applications for a major development.

Under this policy, all new build housing should achieve a 20% reduction in CO₂ against Part L 2013 standards through energy efficiency measures and a 31% reduction overall, as well as a minimum EPC rating of "C" for new residential developments. This should be demonstrated through the application of the energy hierarchy:

Be lean - Use less energy

Be clean - Supply energy efficiently

Be green - Use renewable energy.

Furthermore, all new developments are expected to minimise solar gain through design and maximise opportunities for passive cooling through natural ventilation and other passive means.

DM16 – Sustainable Design

- a) All development (excluding householder applications) will be required to achieve the relevant minimum standard/below unless superseded by national planning policy, Building Regulations or it can be demonstrated that it is not practicable, feasible or viable (in which case the minimum standard should be met as far as is possible). Applications for major development must be supported by a Sustainability Statement demonstrating that the minimum standards are met and where possible exceeded. All development is encouraged to exceed these minimum standards where possible.

Towards Zero Carbon Development

- b) All new build housing will achieve a minimum 20% CO₂ reduction compared to the Building Regulations Part L 2013 standard through energy efficiency measures, unless superseded by national policy or Building Regulations. Developers will be expected to provide evidence of the level of carbon reduction achieved in the dwellings through submission of SAP calculation reports at the design and built stages.
- c) New non-domestic buildings will achieve a 27% reduction in CO₂ on average per building compared to the Building Regulations Part L 2013 standard unless superseded by national policy or Building Regulations. Applications for major development should demonstrate how the design and layout of the development has sought to maximise reductions in carbon emissions in line with the energy hierarchy.
- d) All new build housing should seek to achieve an A rating (with a minimum expectation of B rating) Energy Performance Certificate. New housing should achieve a minimum of a 'C' rating Energy Performance Certificate.
- e) All non-domestic properties (including those created through conversions) should achieve a 'B' rating Energy Performance Certificate.

- f) Non-residential development of at least 1,000 sqm floorspace should achieve BREEAM New Construction 'Very Good' as a minimum rating based on the latest BREEAM scheme.

Preventing Overheating

- g) All new development should incorporate design measures where appropriate to minimise excessive solar gain and maximise opportunities for passive cooling through natural ventilation and other passive means to avoid contributing to the urban heat island effect and reduce vulnerability to overheating. Multifunctional green infrastructure should be integrated into public spaces, to provide urban cooling and access to shady outdoor space.
- h) Major development proposals should reduce potential overheating and reliance on energy intensive air conditioning systems and demonstrate this in accordance with the cooling hierarchy.

This report therefore provides a summary of the energy and sustainability assessment undertaken and the proposed strategy in accordance with the requirements of draft local plan policies DM16 and DM17.

As the proposed development only comprises of residential dwellings the criteria relevant to non-domestic development is not applicable.

This report has been prepared in support of the Section 96a application being submitted in relation to application number AWDM/1671/22.

The energy strategy has been prepared following the energy hierarchy:

Be lean - Use less energy

Be clean - Supply energy efficiently

Be green - Use renewable energy.

The other draft Local Plan Policy that is relevant to the energy and sustainability strategy is Policy DM17-Energy. Under this policy all new housing and non-residential developments should incorporate low and zero carbon (LZC) technologies to meet at least 10% of predicted total energy requirements. Furthermore, heating and cooling systems should be selected in accordance with the heating/cooling hierarchy and the lowest carbon solution that is feasible should be used. Consideration should also be given to the connection to district heating networks where they exist, or possible connections to networks in the future.

DM17-Energy

- a) All new housing and major non-residential development should incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements (after CO2 reductions from energy efficiency measures).
- b) All proposals for major development must demonstrate that the heating and cooling systems have been selected in accordance with the heating and cooling hierarchy and that the lowest carbon solution that is feasible is used.

Applicants will be required to submit a feasibility assessment to provide a rationale for the chosen heating/cooling system.

- c) Applicants for major development within areas identified as heat network opportunity clusters should demonstrate how they have considered connecting to district heating networks where:
 - i) they exist at the time of permission being granted;
 - ii) the heat network route lies adjacent to the site; and
 - iii) otherwise it is feasible and viable to do so. Alternatively, where a heat network route is planned but has not been delivered, sites adjacent to the planned heat network routes should consider being heat network ready to enable a future connection.
- d) The development of renewable, low carbon, or decentralised energy schemes will be supported and community initiatives encouraged where proposals:
 - i) are located appropriately and do not cause an unacceptable impact on surrounding uses or the local environment, landscape character or visual appearance of the area (including the South Downs National Park), taking into account the cumulative impact of energy generation schemes; and
 - ii) mitigate any potential noise, odour, traffic or other impacts of the development so as not to cause an unacceptable impact on the environment or local amenity.

As the development does not meet the definition of “major development” for residential units, and no commercial spaces are being provided as part of the proposal, a BREEAM assessment is not required. However, the new build residential dwellings should achieve a 20% reduction in carbon below the Part L 2013 baseline through energy efficiency, a 31% reduction overall and a minimum EPC rating of “C”.

Furthermore, the site must consider the potential connection to any local heat networks and should follow the principles of the energy, heating and cooling hierarchies when developing the energy strategy.

3.0 Energy Strategy

During the detailed design development of the scheme an energy assessment will be undertaken for the new build residential accommodation using Building Regulations Approved Document Part L1A 2021 Compliant Standard Assessment Procedure (SAP) software which is approved for use by the Department for Communities and Local Government. Approved Document L1A relates to energy efficiency in new dwellings and seeks to ensure all new residential construction meets a minimum benchmark for regulated energy use.

The SAP calculations will be completed to determine the Approved Document L1A baseline, known as the target emission rate (TER). This is the benchmark emission rate as calculated by the software that each dwelling must meet or exceed to comply with Building Regulations.

Whilst WPC's policy discusses reductions against a Part L 2013 baseline, the development will be constructed to the new Part L 2021 standard that came into effect in June 2022. The Part L 2021 target baseline has been reduced from Part L 2013 standards by 31%, meaning that compliance with this new standard by any margin would demonstrate the overall carbon reduction requirements of Policy DM16 are being achieved. This approach is deemed to be more appropriate than using Part L 2013 software, since the building will not be constructed to this standard and the new regulations utilise up-to-date emission factors for each fuel type.

3.1 “Be Lean” Assessment

The first step of the energy hierarchy is to improve the development's energy demand through the specification of thermally efficient building fabric and services.

As previously mentioned, the new residential dwellings will be constructed to the new Part L 2021 standard and so the building fabric will be designed to meet this. Therefore, as this is the minimum standard to which the development must comply the Part L 2021 target emission rate (TER) baseline will be used to demonstrate the performance of the development at the “Be lean” stage of the energy assessment.

The “Be lean” fabric thermal performance as indicated in the table below will be used upon the figures used within Part L 2021 with the notional building to establish the TER baseline.

Building Element	U-value w/m ² K
External Wall	0.18
Roof	0.11
Ground / Exposed Floor	0.13
Glazing (g=0.3)	1.20
Doors	1.20
Air permeability (m ³ /hr.m ²)	3.00

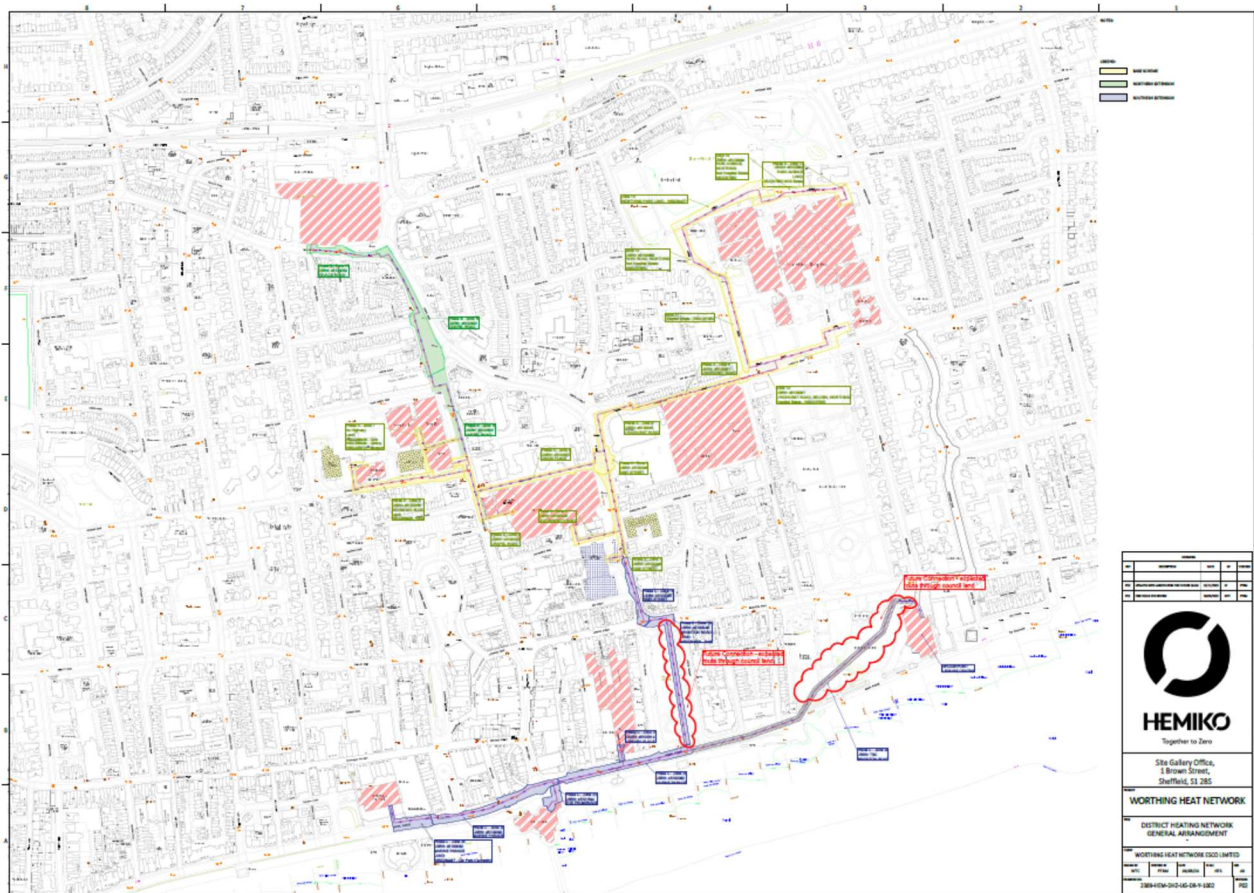
Building Fabric Constructions

3.2 “Be Clean” Assessment

District Heat Networks

Within WBC’s emerging Local Plan Policy DM17 it is confirmed that new developments should consider the viability of connection to heat networks.

The Worthing Heat Network is currently under construction by HEMIKO, however it appears that currently there is no intention for the heat network to be extended to the vicinity of Fulbeck Avenue as reflected by the HEMIKO drawing no. 2389-HEM-DHZ-UG-DR-Y-1002-P02 as below, and as such it is not considered that this would be a viable option for the project.



Combined Heat and Power

Combined heat and power (CHP) also known as cogeneration, is the simultaneous generation of thermal and electrical energy from a single stream of fuel. A CHP engine burns fuel to run a turbine, which in turn generates electricity. The “waste” heat from the combustion process is then used to provide heating and hot water within a building. In this way electricity from conventional power stations is displaced and the substantial conversion, transmission and distribution losses are avoided. The resulting efficiency gives typical small scale CHP installations a simple payback period of between 3 and 5 years, beyond which the units continue to save energy right up until the end of the plant economic life.

Systems must be “heat lead” for high efficiency, which best suits applications in situations where there is a significant demand for heat for long periods of time, such as hospitals, hotels and leisure centres. As the development is solely residential in nature it will have a high hot water demand, although this will likely only be at peak times such as in the mornings and evenings. This usage profile is not well suited to CHP, as the engines require a continuous load to ensure they operate at all time, and realise the potential carbon savings.

Furthermore, CHP does not perform particularly well against the new Part L 2021 standard, as the gas used to generate the electricity within the unit actually has higher CO₂ emissions per kWh than grid supplied electricity. A CHP engine would therefore put the dwellings at a disadvantage in terms of Building Regulations and planning policy compliance.

For the reasons stated above no further reduction in emissions could be achieved from the “Be clean” stage of the analysis.

3.3 Be Green Assessment

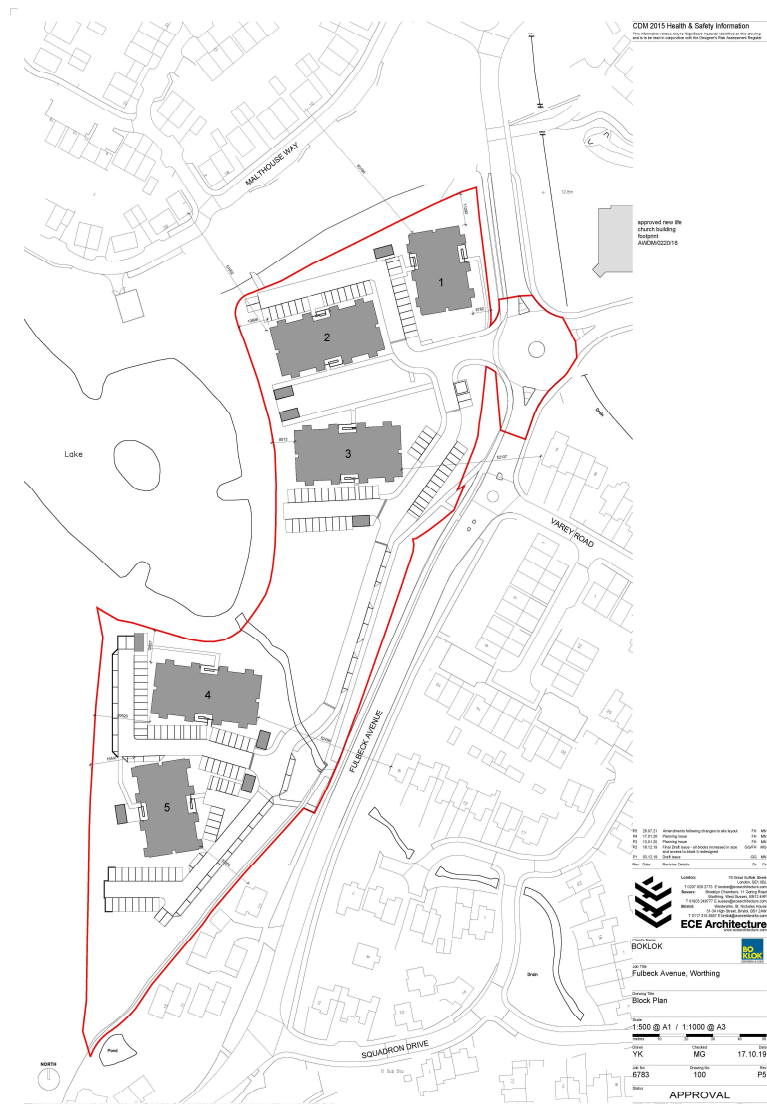
The commentary below provides an overview of the potential LZC technologies available for specification within the development and presents the associated opportunities and constraints.

Ground Source Heat Pumps

A ground source heat pump (GHSP) is a system used to extract heat from the ground to provide space heating and domestic hot water within buildings. At a depth of two metres below the surface the ground remains at a relatively constant temperature throughout the year (approximately 10 to 12°C in England) and so this can be used as a heat source. A heat transfer fluid is circulated through a closed loop buried in the ground and passes through a heat exchanger in the heat pump that extracts heat from the fluid through a vapour compression cycle, similar to a refrigerator in reverse.

Whilst both space heating and hot water could in theory be provided to the residential dwellings through the use of a ground source heat pump, in reality there is insufficient space available on site for either a horizontal “slinky” style system or vertical boreholes as reflected on the below block plan due to the overall length of horizontal collectors that would be required and spacing required between vertical boreholes.

A ground source heat pump system is therefore not considered to be viable for use within the development.



Air Source Heat Pumps

In a similar way to ground source heat pumps, air source heat pumps extract renewable heat from the outside air using an external condenser unit and vapour compression cycle. This is then transferred through refrigeration pipework to an indoor unit, which conveys that heat to the heat emitters and hot water cylinder. This system can provide 100% of heating and primary heating of domestic hot water within a dwelling when sized correctly.

As there are a total of 32 number proposed residential dwellings it would not be practical to specify a separate air source heat pump system for each dwelling based on a Monobloc external condenser due to spatial restrictions and aesthetics. However, a viable alternative to this would be an exhaust air heat pump (EAHP). This system utilises the extract air from the dwelling as a heat source for space heating and domestic hot water through a heat pump vapour compression loop and coils within the EAHP. With the lower emissions factor associated with grid supplied electricity in Part L 2021 and the high coefficient of performance (COP) of exhaust air heat pumps this strategy will offer a low carbon solution to heating and domestic hot water provision.

Due to the high COP associated with heat pumps and the low carbon emissions associated with electricity in Part L 2021 this is considered to be a viable low carbon heating and hot water strategy.

Biomass

Within a biomass system waste timber, in the form of wood chips or pellets, can be used as fuel in biomass to provide heating and hot water within buildings. Biomass generation is close to carbon neutral, meaning the CO₂ that is emitted by the combustion is comparable to the CO₂ that is removed from the atmosphere during the life of the tree. Wood chips and pellets present no risk if accidentally released into the environment and there are no harmful by-products. The flue gas is smoke free and the ash content of between 0.5% and 3% by volume (depending on material), is minimal.

Biomass heating systems are typically sized to meet the majority of the building heating load, with gas condenser boilers providing the additional input required at peak times to reduce the amount of on/off cycling of the biomass boilers. A biomass system would therefore need to be coupled with gas fired boilers to offer a Bivalent Heating Solution.

Storage of the biomass fuel would be required on site, size to accommodate at least one peak month of heating. On this site there is limited available area to locate the fuel storage and delivery of the fuel could pose an issue to local traffic in an urban context. Furthermore, the flue emissions from the boiler could affect local air quality and would likely not comply with local authority policy in this regard.

For these reasons, a biomass heating system is not considered to be viable for the development.

Solar Thermal

Solar thermal heating systems use the renewable energy from the sun to heat water, most commonly in the UK for hot water demands. The systems use a heat collector, generally mounted on the roof in which a fluid is heated by the sun. This fluid is passed through a heat exchanger and used to heat up water which is stored in either a separate hot water cylinder or a twin coil hot water cylinder within the dwelling. There are two types of collectors used for solar water heating applications with these being flat plate collectors and evacuated tube collectors. Evacuated tube collectors are generally more expensive due to a more complex manufacturing process to achieve the vacuum but offer a higher performance during winter months.

A solar thermal system would normally supply heat to a cylinder within a dwelling in conjunction with a typical gas fired system boiler arrangement. As it is not feasible to provide a separate system and hot water storage vessel within each dwelling any solar thermal system would need to feed into a central buffer vessel which would then be topped up by the primary heat generator which is not feasible in this situation.

A solar thermal system would be more preferable than photovoltaics for use with a system that is gas fired, since gas has a higher emissions factor for electricity in Part L 2021. However, as the proposed heating and hot water strategy is likely to be electrically powered this will not be a factor.

For these reasons, a solar thermal hot water system is not considered to be viable for the development.

Photovoltaics

Solar photovoltaic (PV) technology is a semi-conductor-based technology that converts the energy in sunlight into electricity. The term describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun. When sunlight strikes the surface of a PV cell, this electrical field provides momentum and direction to light stimulated electrons, resulting in a flow of direct current when the solar cell is connected to an electrical load. A PV system should be unshaded as shading, even over a small area of the panel can significantly reduce performance. Excess energy can be exported to the grid, with an export tariff paid.

The available roof area is unlikely to be sufficient for the required quantity of PV modules to satisfy the CO₂ and energy targets through Part L 2021 in itself.

During the detailed design stage of the project consideration will be given to incorporating photovoltaic arrays to supplement the anticipated electrically powered exhaust air source heat pump (EAHP) solution.

4.0 Energy Strategy Conclusion

An energy strategy for the proposed development at Block 5, Fulbeck Avenue, Worthing has been undertaken, including an assessment of the development in accordance with Worthing Borough Council's emerging Local Plan. This has been based upon the energy hierarchy of:

Be lean – Use less energy

Be clean - Supply energy efficiently

Be green - Use renewable energy.

This report has been prepared in support of the Section 96a application being submitted to the previous consented scheme.

Following this approach will result in an energy efficient scheme that has minimised CO2 emissions associated with the use of regulated energy through the high thermal performance of the building envelope and high energy efficiency building services strategy. These measures are expected to result in a reduction in annual CO2 emissions for the development below the established Part L 2013 baseline.

As the building will be constructed in accordance with Building Regulations Approved Document Part L1A 2021 the target baseline will be reduced from Part L 2013 standards by 31%, meaning the compliance with this new standard by any margin would demonstrate the overall carbon reduction requirements of policy DM16 being achieved.

The “Be lean” development will adopt a building fabric thermal performance to match the Part L 2021 notional building and will utilise mechanical extract ventilation and LED lighting. During the detailed design stage of the project consideration will be given to further enhancing the building fabric thermal performance over the minimum requirements of Part L 2021.

As the site is significantly remote from the Worthing heat network that is currently being constructed, with no apparent intention for this to extend the vicinity of the site it has been concluded that connection to a future heat network would not be technically viable.

Whilst technically feasible, on the site CHP is not a viable option given the reduced emission factors of the new SAP 10/Part L 2021 and the move away from gas fired strategies in favour of electrically driven solutions. Therefore, as neither a local heat network, or secondary heat source are viable no further savings can be realised at the “Be clean” stage of the hierarchy.

An LZC technology appraisal has been undertaken, which concludes that an exhaust air heat pump system would be the most suitable option for inclusion. Therefore, it is proposed that individual and local exhaust air heat pump systems are utilised to deliver heating and hot water to each residential dwelling.

As the proposed services strategy relies solely on electricity the percentage reduction in CO2 from the “Be lean” scenario will directly translate to the same reduction in regulated energy use. The proposed LZC strategy will therefore exceed the 10% energy reduction target from LZC technologies required under policy DM17. The overall strategy will significantly exceed the 31% reduction below the Part L 2013 baseline required under policy DM16 and the 20% required from energy efficiency measures.

ENERGY STATEMENT - Ver 01:

BLOCK 5, FULBECK AVENUE
Worthing, West Sussex



The previous application submitted under application number AWDM/1671/22 included an Energy and Sustainability Statement reference FUL-HYD-))-ZZ-RP-ME-0001 dated January 2020 prepared by Hydrock, which concluded the energy strategy would be based on air source heat pumps supplemented by gas fired boiler plant. The proposed energy strategy reflects the previous energy strategy to adopt heat pumps and enhances the energy credentials of the development from the previous strategy as this will now negate the requirement for the use of fossil fuels to serve gas fired boiler plant.

5.0 Sustainability Strategy

In addition to the energy strategy, a partial sustainability strategy has been developed to demonstrate the broad sustainability principles of the scheme. This strategy addresses additional requirements of WBC's emerging local plan policies DM16 and DM17.

Cooling Hierarchy

With overheating risk becoming an ever-increasing concern due to climate change, it is important to address this at an early design stage of any project. Residential developments registered with Building Control after 15th June 2021 are now subject to Approved Document Part O Overheating Mitigation. This document sets out assessment criteria to mitigate overheating risk, which are based upon CIBSE Technical Memorandum 59 Design Methodology for the assessment of overheating risk in homes. This standard using the adaptive thermal comfort method to assess the risk of overheating relevant to external conditions.

As discussed previously, WBC's emerging local Plan Policy DM17 stipulates a requirement for new developments to follow the cooling hierarchy to minimise energy use. Consideration of the cooling hierarchy at each stage relevance the project is therefore given below:

Minimise Internal Heat Generation Through Energy Efficient Design

The three primary forms of internal heat within residential units will be occupants, lighting and equipment. Whilst little can be done to reduce occupancy gains, lighting gains will be kept to a minimum through the specification of low energy LED lighting throughout. LED lighting typically has an associated heat gain as low as 2W/sqm.

Heat gains from domestic "plug in" equipment cannot be controlled within the design. The Approved Document Part O standard makes some allowances for this, with specific heat gains defined for each room type. However, some other internal gains will be present due to heating pipework and hot water storage. To reduce the impact of this all pipework and hot water storage will be highly insulated throughout the dwellings.

Reduce The Amount of Heat Entering the Building in Summer

Due to the proposed location of the building and the residential accommodation being located over ground to third floors the proposed building will not benefit from shading by surrounding buildings.

To mitigate the solar gain risk as far as practical it is recommended that glazing with a solar transmittance "G" value of 0.3 should be considered. Light coloured blinds should be considered to be installed internally to reflect solar gains and avoid the infrared absorption associated with darker colours.

The building form will also assist in reducing solar gain entering the building. The dwellings will be constructed with balconies, and glazing will be set back from the edge of this. This will create a significant overhang which will shadow the glazing during warmer months when the sun is higher in the sky.

Passive Ventilation

The proposed ventilation strategy during the warmer months of the year will be predominantly natural through the use of openable windows. This strategy will likely be sufficient to maintain the required thermal comfort conditions during much of the year. However, due to the layout and form of the

building only single sided ventilation can be achieved within certain of the dwellings. Windows will also need to be restricted for safety reasons, and this will reduce the available “free area” for fresh air, which may present an issue during warmer months when external conditions are calmer.

Therefore, whilst a natural ventilation strategy will be adopted to address overheating in summer months, it is likely that this will need to be supported with mechanical ventilation.

Mechanical Ventilation

The proposed ventilation strategy to maintain air quality will be a centralised mechanical extract ventilation system centred on the exhaust air heat pump providing space heating and generation of domestic hot water. Centralised MEV has been selected as an appropriate strategy as this offers a continuous level of ventilation, extracting stale air from the dwellings when windows are closed by occupants, while simultaneously introducing fresh air through background ventilators. The proposed ventilation equipment will have low specific fan powers, and so will be a low energy installation. The system can be used effectively in summer months to support the natural ventilation through windows and background ventilators in removing heat gains. The ventilation system will have a boost mode to increase fan speed during periods of excessive high temperature.

Water Reduction Strategy

Water stress is becoming a greater problem in the UK, with increasing requirements for water neutrality from developments. To tackle this issue the proposed development will be designed to reduce regulated water use levels.

To protect water resources, water consumption within the residential dwellings will be reduced as far as practicable. This will be achieved using low and dual flush WC systems, restricted taps/ showers and low-capacity baths.

The performance of these sanitary components will meet the following as a minimum:

WC's - 6/3 litre dual flush

Basin taps - 6 litres per minute

Kitchen taps - 8 litres per minute

Showers - 8 litres per minute

Baths - 140 litre capacity to overflow.

With the above data entered into the Approved Document Part G water calculator a performance level of 109.3 litres per person per day would be achieved.

Pollution Prevention

Potential sources of pollution from the site or affecting the site could be varied. Measures will need to be considered by the project delivery team to avoid any significant impact of pollution. Carbon emissions are not considered as a pollutant, and these have been discussed within previous sections of this report.

As previously indicated within this report, the domestic heating and hot water strategy will involve the use of exhaust air heat pumps. The heat pumps are electrically driven and so the heating generation plant will have no local emissions and no impact upon local air quality.

ENERGY STATEMENT - Ver 01:

BLOCK 5, FULBECK AVENUE
Worthing, West Sussex



Light pollution from the site will be designed out through the effective use of external down lighting, and noise pollution will be avoided by adopting internally located exhaust air heat pumps rather than external Monobloc air source heat pumps.