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VILLAGES

Kingscote Place

241300-CPW-XX-XX-RP-N-320002

Energy & Sustainability Statement

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1.0 Executive Summary

This Energy & Sustainability Statement has been prepared by CPW on behalf of Rangeford Village's ("the Applicant") in support of a Reserved Matters Planning Application ("RMA") for the redevelopment of land off Imberhorne Lane and adjacent to Bluebell Close, referred to as Kingscote Place ("the Site").

In December 2025, the Mid Sussex District Council, in its capacity as the local planning authority ("LPA") granted outline planning permission (ref: DM/23/2699) ("the OPP") for the redevelopment of the site, further details are provided in section 3.2.

This report highlights the methodology to demonstrate compliance with Part L 2021 of the Building Regulations, SAP10.2 carbon emission factors are to be utilised for all energy calculations when undertaken.

Energy modelling will be developed once detailed layouts are available, modelling will demonstrate compliance with Building Regulations, demonstrating compliance at the various design stages.

Several renewable technologies have been appraised in terms of their technical and physical feasibility, as potential renewable systems for use on this scheme. The energy strategy selected for Kingscote Place is a decentralised system utilising Exhaust Air Heat Pumps (EAHP) providing heating, cooling, ventilation and domestic hot water. Supplementary heating via electric panel/plinth heaters will also be provided to the Kitchen-Living-Dining areas.

The CFB shall be serviced as a standalone building, heating and cooling shall generally be provided via a VRF system generating simultaneous heating and cooling. Ventilation shall be generated locally via AHU's and MVHR units. Hot water shall be generated locally using electric point of use heaters.

Apartments – SAP Calculations

20 sample dwellings across the scheme have been modelled to enable the energy strategy to be assessed and confirmed.

The results are shown in the below table:

Block	%DER<TER	%DPER<TPER	%DFEE<TFEE	EER
Bungalow A	58.94	21.28	2.03	79C
Bungalow B	55.47	15.14	0.05	79C
Bungalow C	63.35	27.65	1.19	82B
CFB	67.69	34.17	5.09	86B-88B
Block A	68.10	35.03	4.35	85B-88B

Rangeford Villages require a minimum EPC rating of B for each dwelling, in order to achieve this requirement PV panels are required on bungalow types A & B. For the purposes of planning 4No PV panels have been allowed for each dwelling.

Central Facility Building – SBEM Calculation

The CFB has been modelled to enable the energy strategy to be assessed and confirmed.

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.46
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	14.66
Target primary energy rate (TPER), kWh _{pe} /m ² annum	178.9
Building primary energy rate (BPER), kWh _{pe} /m ² annum	155.77
Do the building's emission and primary energy rates exceed the targets?	BER =< TER BPER =< TPER

The CFB has a high hot water demand due to the application of the building, as such a large PV array is required to achieve compliance with Building Regulations. To achieve compliance an array of 330m² is required, for the purposes of planning the maximum PV possible on the CFB for south facing pitched roofs has been allowed. By default, the CFB achieves an EPC rating A.

2.0 Introduction

Couch Perry Wilkes (CPW) have produced an Energy Statement for the proposed Kingscote Place development. This is to demonstrate how the scheme will incorporate energy efficiency measures, decentralised energy sources and integrate Low and Zero Carbon (LZC) technology solutions, to reduce CO₂ emissions of the development. This Energy & Sustainability Statement has been prepared by CPW on behalf of Rangeford Village's ("the Applicant") in support of a Reserved Matters Planning Application ("RMA") for the redevelopment of land off Imberhorne Lane and adjacent to Bluebell Close, referred to as Kingscote Place ("the Site").

In December 2025, the Mid Sussex District Council, in its capacity as the local planning authority ("LPA") granted outline planning permission (ref: DM/23/2699) ("the OPP") for the redevelopment of the site, further details are provided in section 3.2.

This statement sets out energy and carbon reduction targets at National and Regional level along with the options being considered for achieving compliance and satisfy the RMA application.

To ensure responsible development, an Energy Hierarchy has been adopted for reducing CO₂ emissions, in line with best practice, as follows:

- Be Lean: Use less energy and manage demand during operation.
- Be Clean: Exploit local energy resources and supply energy efficiently and cleanly.
- Be Green: Maximise opportunities for renewable energy by producing, storing, and using renewable energy on-site.
- Be Seen: Monitor, verify and report on energy performance.

The design of the proposed development is underpinned by the desire to deliver a wide range of positive responses to climate change, the ambitions of Mid Sussex District Council's planning policies and the UK wide target of zero carbon

3.0 Development Overview

3.1 Site Location

The site is located in East Grinstead within the Mid Sussex District Council, situated close to Bluebell Railway line and nearby Kingscote Estate.

The site is bounded to the east off Imberhorne Lane and Bluebell Close consisting of existing residential properties, west private land and existing residential property and Worth Way Linear Country Park along the southern boundary.

Figure 1 presents the site, including apartment blocks and the CFB being delivered as part of the development.



Figure 1 -Kingscote Place Site Plan

3.2 Outline Planning Permission

In December 2025, the Mid Sussex District Council, in its capacity as the local planning authority ("LPA") granted outline planning permission (ref: DM/23/2699) ("the OPP") for the redevelopment of the Site.

Vistry's pending reserved matters application (ref: DM/26/0131) captures 550 dwellings, public open space and allotments, and not the remainder of the elements secured by the outline permission, which will come forward through separate reserved matters applications.

This statement sets out energy and carbon reduction targets at National and Regional level along with the options being considered for achieving compliance and satisfy planning including:

- Reduce energy demands and minimise carbon dioxide (CO₂) emissions as required by the LPA and Building Regulations.
- Provision of high-quality low energy buildings adapted for climate change and minimising the effects on local air quality.

The RMA specific to Kingscote Place consisting of 133 apartment over various apartment block and a central facility building has been discharged through this report as detailed below:

- Full detailed energy modelling demonstrating compliance the LPA and Building Regulations.
- Energy-efficiency measures and fabric-first specification, demonstrating improvements beyond and compliance with Building Regulations Part L.
- An overview of the proposed building services systems and associated efficiencies.
- Proposals for maximising on-site solar PV generation, demonstrating optimised roof space utilisation.

The development shall thereafter be carried out in accordance with the approved updated energy and overheating strategy, energy, sustainability and carbon-reduction measures shall be installed, retained and maintained for the lifetime of the development.

Energy modelling has been completed for SAP 10.2 to demonstrate compliance with Building Regulations, demonstrating compliance at the various design stages.

Please note, we have not carried out any additional energy modelling for SAP 10.3 which is a requirement of the recently introduced Future Homes Standard and the development will start on-site prior to March 2027.

4.0 Building Regulations & Planning Policy Requirements

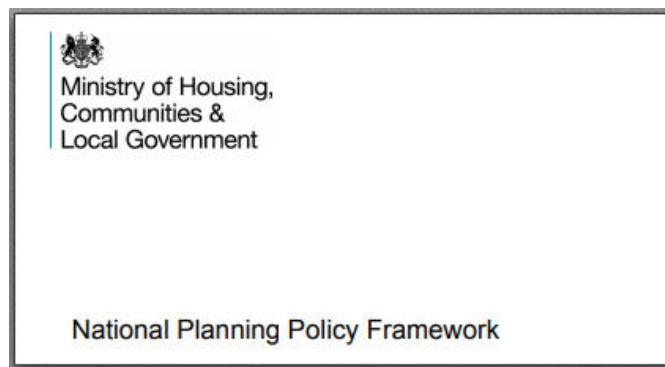
The Government's target is to achieve net zero by 2050, this target was changed in 2019 compared to the previous target of an 80% reduction in carbon emissions by 2050, against a 1990 baseline.

Energy efficiency and sustainability is key to meeting National, Regional and Local Policy and is achieved by best practice in design, construction and operation.

This section highlights the Building Regulation and Planning Policy requirements for the Kingscote Place development.

4.1 National Policies & Guidance

National Planning Policy Framework (NPPF) (August 2026)



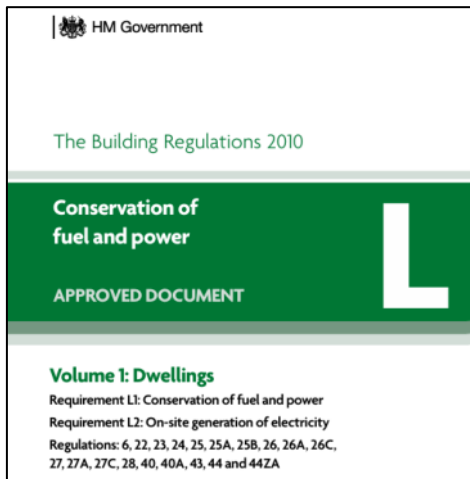
The National Planning Policy Framework (NPPF) serves as a key guide for planning in England, helping local authorities and developers make informed decisions about shaping the built and natural environment. The 2024 update emphasises sustainable development, community involvement, and resilience to climate change.

The NPPF provides clear policies and principles aimed at guiding sustainable development while ensuring local needs and environmental considerations are effectively addressed, the key objectives are highlighted below:

1. **Sustainable Development:** The NPPF stresses the importance of a balanced approach that considers economic, social, and environmental factors, encouraging developments that meet today's needs without compromising the future.
2. **Housing Delivery:** It promotes the creation of enough housing to satisfy local and national demands, including affordable options, while fostering diverse communities.
3. **Economic Growth:** The framework supports economic development by facilitating investments in infrastructure, businesses, and local services to stimulate growth.
4. **Environmental Protection:** There is a strong focus on safeguarding the natural environment, including protecting biodiversity, green spaces, and managing natural resources wisely.
5. **Climate Resilience:** The NPPF highlights the need for planning that adapts to and mitigates climate change, emphasising sustainable transport, energy efficiency, and effective flood risk management.
6. **Community Engagement:** It encourages meaningful public participation in the planning process, ensuring developments reflect the needs and wishes of local residents.
7. **Design Quality:** The NPPF advocates for high-quality design in new projects, ensuring they enhance the character of their surroundings and contribute positively to public spaces.
8. **Infrastructure Development:** It emphasises the importance of coordinated planning for infrastructure to support growth, including transportation, utilities, and community facilities.

Building Regulations Approved Documents

Part L Conservation of Fuel and Power deals with energy efficiency requirements in the Building Regulations. New buildings shall be assessed under Approved Document Part L1A (Domestic) and Part L2A (Non-Domestic) of the Building Regulations.



Part L1A 2021 of Building Regulations

Part L1A of the Building Regulations sets the energy efficiency requirements in new domestic buildings, this will apply to all apartments.

Under Building Regulations Approved Document Part L1A, compliance is achieved by demonstrating that the Dwelling Emission Rate (DER) does not exceed the Target Emission Rate (TER) and that the Dwelling Fabric Efficiency (DFEE) does not exceed the Target Fabric Efficiency (TFEE).

Part L1A also requires that the fabric elements and the fixed building services all meet minimum energy efficiency standards (Criterion 2), and reasonable provision for limiting solar gain through the building fabric (Criterion 3).

Part L2A 2021 of Building Regulations

Part L2A of the Building Regulations sets the energy efficiency requirements in new non-domestic buildings, this will apply to the CFB.

Under Building Regulations Approved Document Part L2A: Conservation of Fuel and Power, compliance is achieved by demonstrating that the Building CO₂ Emission Rate (BER) does not exceed the Target CO₂ Emission Rate (TER).

Part L2A also requires that the fabric elements and the fixed building services all meet minimum energy efficiency standards (Criterion 2), and reasonable provision for limiting solar gain through the building fabric (Criterion 3).

Future Homes Standard

The Future Homes Standard (FHS) is set to be implemented this year (2026) further reducing carbon emissions from new homes compared to current standards, setting standards for low-carbon heating systems and highly energy efficient building fabric specifications. The aim is to make all new homes "zero-carbon ready", moving away from fossil fuels and minimising carbon emissions from heating and hot water generation and be ready to transition to renewable energy sources as the electricity grid decarbonises further. The Future Homes Standard (FHS) enforces compliance with Building Regulations Approved Document Part L 2026 as well as SAP10.3 & HEM energy modelling.

As the RMA planning application is being submitted in August, within the stipulated time frame for FHS implementation, FHS doesn't apply to Kingscote Place and the scheme will comply with Building Regulation Part L 2021.

4.2 Local Policies & Guidance

Mid Sussex District Plan 2014-2031 (Adopted March 2018)

The Mid Sussex District Plan sets out the Council's spatial vision, key objectives and overall principles for development in the district. It forms the main basis for assessment in planning terms and this Statement has therefore been designed to address its requirements.

Protecting and enhancing the environment' is a priority theme within the Strategic Objectives for the District Plan, including resource efficiency, climate adaptation, protecting green infrastructure and promoting sustainable transport networks.



The Mid Sussex District Council District Plan aligns with the National Planning Policy Framework (NPPF) by supporting city-wide and national goals. It reflects the NPPF's focus on transit-oriented development and sustainable neighborhoods, while also adhering to the principles of housing delivery, climate change mitigation, and environmental protection, ensuring that Mid Sussex planned development's meet broader regional and national objectives.

DP39: Sustainable Design and Construction

DP39: Sustainable Design and Construction

Strategic Objectives: 1) To promote development that makes the best use of resources and increases the sustainability of communities within Mid Sussex, and its ability to adapt to climate change.

Evidence Base: Gatwick Sub Region Water Cycle Study; West Sussex Sustainable Energy Study, Mid Sussex Sustainable Energy Study.

All development proposals must seek to improve the sustainability of development and should where appropriate and feasible according to the type and size of development and location, incorporate the following measures:

- Minimise energy use through the design and layout of the scheme including through the use of natural lighting and ventilation;
- Explore opportunities for efficient energy supply through the use of communal heating networks where viable and feasible;
- Use renewable sources of energy;
- Maximise efficient use of resources, including minimising waste and maximising recycling/re-use of materials through both construction and occupation;
- Limit water use to 110 litres/person/day in accordance with Policy DP42: Water Infrastructure and the Water Environment;
- Demonstrate how the risks associated with future climate change have been planned for as part of the layout of the scheme and design of its buildings to ensure its longer term resilience

DP40: Renewable Energy Schemes

DP40: Renewable Energy Schemes

Strategic Objectives: 1) To promote development that makes the best use of resources and increases the sustainability of communities within Mid Sussex, and its ability to adapt to climate change.
Evidence Base: Gatwick Sub Region Water Cycle Study; Capacity of Mid Sussex District to Accommodate Development Study; Mid Sussex Landscape Capacity Study; Mid Sussex Sustainable Energy Study; West Sussex Sustainable Energy Study.

Proposals for new renewable and low carbon energy projects (other than wind energy development – see below), including community-led schemes, will be permitted provided that any adverse local impacts can be made acceptable, with particular regard to:

- Landscape and visual impacts, including cumulative impacts, such as on the setting of the South Downs National Park and High Weald Area of Outstanding Natural Beauty, and the appearance of existing buildings;
- Ecology and biodiversity, including protected species, and designated and non-designated wildlife sites;
- Residential amenity including visual intrusion, air, dust, noise, odour, traffic generation, recreation and access.

Assessment of impacts will need to be based on the best available evidence, including landscape capacity studies.

Proposals for wind energy development involving one or more wind turbines will only be granted if:

- the development site is in an area identified as suitable for wind energy development in a Neighbourhood Plan; and

DP42: Water Infrastructure and the Water Environment

DP42: Water Infrastructure and the Water Environment

Strategic Objectives: 1) To promote development that makes the best use of resources and increases the sustainability of communities within Mid Sussex, and its ability to adapt to climate change; 6) To ensure that development is accompanied by the necessary infrastructure in the right place at the right time that supports development and sustainable communities. This includes the provision of efficient and sustainable transport networks.

Evidence Base: Building Regulations (Approved Document G); Gatwick Sub Region Water Cycle Study; DCLG Housing Standards Review: Technical Consultation, September 2014; South East Water - Water Resources Management Plan 2014, Strategic Flood Risk Assessment.

New development proposals must be in accordance with the objectives of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study with respect to water quality, water supply and wastewater treatment and consequently the optional requirement

under Building Regulations – Part G applies to all new residential development in the district. Development must meet the following water consumption standards:

- Residential units should meet a water consumption standard of 110 litres per person per day (including external water use);
- Non-residential buildings should meet the equivalent of a 'Good' standard, as a minimum, with regard to the BREEAM water consumption targets for the development type.

Development proposals which increase the demand for off-site service infrastructure will be permitted where the applicant can demonstrate;

- that sufficient capacity already exists off-site for foul and surface water provision. Where capacity off-site is not available, plans must set out how appropriate infrastructure improvements approved by the statutory undertaker will be completed ahead of the development's occupation; and
- that there is adequate water supply to serve the development.

Planning conditions will be used to secure necessary infrastructure provision.

Development should connect to a public sewage treatment works. If this is not feasible, proposals should be supported by sufficient information to understand the potential implications for the water environment.

The development or expansion of water supply or sewerage/sewage treatment facilities will normally be permitted, either where needed to serve existing or proposed new development, or in the interests of long term water supply and waste water management, provided that the need for such facilities outweighs any adverse land use or environmental impacts and that any such adverse impact is minimised.

Mid Sussex District Site Allocations Development Plan Document (June 2022)



The Mid Sussex District Council Site Allocations Development Plan Document allocates development sites to meet the residual necessary to achieve the agreed housing requirement for the plan period as reflected in the District Plan 2014-2031. The allocations are in accordance with the Spatial Strategy and Strategic Policies set out in the District Plan. The document includes general principles which apply to all of the site allocations, alongside site-specific requirements.

Utilities

Liaise with water, gas and electricity providers to ensure that appropriate works are carried out if needed. • Demonstrate that there is adequate water supply capacity and/or waste water capacity both on and off the site to serve the development and that it would not lead to problems for existing or new users in accordance with District Plan policy DP42: Water Infrastructure and the Water Environment.

Sustainability

Design development to be resilient to climate change, minimise energy and water consumption and mitigate against flood risk in line with DP39: Sustainable Design and Construction, DP41: Flood Risk and Drainage and DP42: Water Infrastructure and the Water Environment. • Address sustainability at the conception stage of development proposals to exploit the benefits of passive design and orientation, fabric performance, energy efficiency measures and low carbon solutions; and wherever possible include on-site low or zero carbon technologies in accordance with District Plan policies DP39: Sustainable Design and Construction and DP40: Renewable Energy Schemes.

5.0 Proposed Building Services Systems

5.1 Apartments

5.1.1 System Overview

EAHP's feature high efficiency of heat recovery and provide ventilation, heating/cooling and domestic hot water through a single unit, an image of Nilan's Compact P EAHP is shown in the below figure.



Figure 2 - Nilan Compact P (EAHP)

EAHP's consists of a plate heat exchanger, a domestic hot water cylinder a reversible heat pump. The system operates to maximise efficiency and ensure as much energy as possible is taken from the air.

The unit increases air flow when necessary to provide tempered air or to recharge the domestic hot water cylinder. The domestic hot water cylinder has a capacity of 180 litres and a typical recharge time of 6 hours, allowing for a recharge between a typical shower either at morning or night. Additional electric heating coils can be added to the unit should a shorter recharge time be required.

Alternative manufacturers to Nilan are available such as NIBE, Joule, Quantum and Pichler. All units operate using the same process however each may have their own fan pressures, heating and cooling outputs and refrigerants. Systems using a lower GWP refrigerant will have benefits when looking at the embodied carbon of the system.

5.1.2 Heating & Cooling

The primary method of heating will be via the air, recovery heat via the heat exchanger or via the integral heat pump which can move heat between air streams. The Nilan Compact P may require additional electric panel/plinth heaters, generally within the Kitchen-Living-Dining areas, as a 'top-up' during extremely cold weather after a significant domestic hot water usage. The supplementary heaters will also allow for higher tempered air to be extracted through the unit to aid the heating of domestic hot water. All controls and operation of this plinth/panel heater will be via the EAHP unit, not the tenant, to provide heating when the EAHP is prioritising domestic hot water production.

There is a model variation that features the ability to connect to a wet heating system such as underfloor heating. This is not advised as supplementary heating; due to lower temperatures the underfloor heating will not achieve the expected temperature associated with underfloor heating and perceived performance will not be achieved.

This has been discussed with Rangeford Villages, given the apartments will be occupied by elderly people. Electric panel heaters will be provided within each habitable room i.e. bedrooms.

Cooling is provided via the air using an integral heat pump which extracts the heat from the incoming air. In cooling mode, the unit has a summer bypass ensuring unwanted heat is not transferred into the apartments.

If required, larger cooling capacity will be available through the use of multiple ducts to spaces, as the capacity is a component of the flow which is also dictated by pressure.

Cooling is available to the space when there is a heat sink to transfer the absorbed energy to. This means that should the domestic cylinder be fully charged to the predetermined set point, up to 80°C, then the cooling to the air would shut off.

5.1.3 Ventilation

EAHP'S feature four ducts, intake, exhaust (to atmosphere), supply and return (to rooms). Fresh intake air will be introduced into the apartment in order to comply with Building Regulations Part F. Intake air will pick up heat via the heat exchanger and be introduced into the room. Air will be removed from the apartment via the return ductwork, pass through the heat exchanger and be deposited to external via the exhaust ductwork.

5.1.4 Domestic Hot Water

The domestic hot water produced by this unit is stored in a tank for use by the occupant. There is an option to include for an electric immersion heater within the tank that will increase the domestic hot water recovery time and also to allow for the water to be stored at a higher temperature.

It is important the process of the unit under each of the operations is fully understood including air flow rates and domestic hot water recovery times, and requirement for an electric immersion.

There is also the option to store hot water within the cylinder at 80°C rather than 60°C, which would effectively increase the potential capacity of the tank.

The below table assumes a 180-litre tank that is full of all water within the cylinder at the temperatures shown.

Domestic Hot Water Storage Temperature	Domestic Cold Water Temperature	Percentage Mix @ 43°C		Tapped Water Volume @ 43°C
		Hot	Cold	
60°C	10°C	67	33	269 Litres
80°C		47	53	383 Litres

Domestic hot water storage temperature is adjustable at the point of installation and commissioning provided the relevant valves are installed. This temperature is not an end user variable and will be locked after installation.

In order to implement the 80°C domestic hot water storage temperature an additional anti-scald valve should be fitted at the cylinder before the water is distributed around the apartment. This anti-scald valve will have an additional cost associated. Increasing the domestic hot water storage temperature also increases the cooling capacity of the air by increasing the size of the heat sink and potentially extending the cooling operation time.

5.2 Central Facility Building

The CFB is a standalone building which has apartments located above. The energy use shall be independent to the residential aspects of the scheme and shall be assessed under its own BRUKL as its classed as a commercial building. The CFB shall be fully fitted out. The following sub sections highlight the proposed systems.

5.2.1 Heating & Cooling

Heating and cooling shall be provided by high efficiency VRF systems powered from direct electricity.

There will be a dedicated external plant area externally at ground floor to house air source heat pumps.

This low carbon technology utilises electricity to generate low grade heat energy. For every 1 kW of electrical energy used 3 kW of heat energy is produced with a significant reduction in the carbon emissions of the building. This plant can work in tandem with on-site electricity generation and green tariffs where all the electricity consumed could be generated from renewable sources. The UK Government is looking at phasing out fossil fuels in line with the UK pledge for 2050. Therefore, by utilising air source heat pumps the building will be in line with tackling the Climate issue the World faces.

Simultaneous heating and cooling will be generated from the ASHP's, refrigerant pipework will be distributed at high level and within ceiling voids to serve cassettes within each occupied space which end users will have control over.

Electric panel heaters shall provide heating to unoccupied areas such as WC's and corridors.



4-Way Heating and Cooling Cassette



Electrical Panel Heater

The CFB features a swimming pool, the swimming pool will have a standalone pool treatment system which will heat the water within the pool, it is envisaged that solar thermal collectors will integrate into the specialist systems to reduce the energy consumption associated with the pool hot water requirement.

5.2.2 Ventilation

The proposed ventilation strategy is critical to the environmental success of the project and will need to provide satisfactory fresh air flow rates to occupants, maintain good indoor air quality, dilute pollutants, and provide a comfortable environment throughout the year.

Ventilation rates shall comply with the Approved Document F and the guidance provided in CIBSE for the building application. Fresh air ventilation is provided to meet several needs:

- Provide sufficient fresh air for occupants.
- To maintain acceptable air quality.
- Control internal heat gains during occupied periods.
- Provide makeup air to balance extract systems in toilets, offices, workshops/stores etc.
- Legal and statutory requirement.

The strategy is to provide a mixed mode solution, utilising both openable windows for crossflow ventilation supplemented by mechanical ventilation during peak winter and summer conditions.

Individual mechanical ventilation heat recovery units (MVHRs) to be installed within each main space with intake and exhaust ductwork.

Ground floor ductwork shall be concealed within the ceiling void with air distributed via 4-way grilles and diffusers or air valves.



Ceiling Mounted Mechanical Ventilation Heat Recovery Unit

The CFB features a swimming pool, the swimming pool will have a standalone AHU which will provide heating, cooling and ventilation to the swimming pool.

5.2.3 Domestic Hot & Cold Water

It is currently proposed to deliver potable mains cold water to the CFB directly from the mains water service.

The CFB shall be provided with a single meter. The water meter will be located within the plantroom, incorporating the main stopcock, pressure reducing valve, non-return valve and pressure gauge.

Hot water shall be provided to outlets by means of electric local point of use water heaters and showers.



Electric Showers



Electric Instantaneous Water Heater

6.0 Carbon Emission Factors & Establishing CO₂ Emissions

To benchmark the proposed new development, estimated energy demands, and CO₂ emissions data require calculating and will demonstrate the percentage of the building's total energy consumption and CO₂ emissions in accordance with Building Regulations and local planning policy.

As the RMA planning application is being submitted in August, within the stipulated time frame for FHS implementation, FHS doesn't apply to Kingscote Place and the scheme will comply with Building Regulation Part L 2021.

6.1 CO₂ Emissions – Baseline Case

Carbon emissions for the Baseline Building have been derived using current Building Regulations compliance modelling recommended carbon emissions factors.

To benchmark the proposed new development, estimated notional energy demands and resulting CO₂ emissions data, Target Emissions Rate (TER) need to be calculated. The TER is used as the benchmark to assess the percentage of the building's total regulated CO₂ emissions that could be reduced or offset in accordance with the Energy Hierarchy.

Standard Assessment Procedure (SAP) (Residential) and Simplified Building Energy Modelling (SBEM) (CFB) has been used to produce an energy model representing the Carbon Dioxide Emissions after each stage of the Energy Hierarchy in order to see the savings procured from changes to the fabric and MEP strategies.

Results of this energy modelling are presented later within this report.

6.2 Electricity & Gas Carbon Factors

The Carbon Factors of the Building Regulations Approved Documents Part L 2021 and 2026 are shown below.

Building Regulations Approved Document Part L Carbon Factors	
Fuel	Part L 2021
Mains Electricity	0.136
Mains Gas	0.210
* - Reflects the continued grid decarbonisation	

6.3 Predicted Regulated vs Notional CO₂ Emissions

The predicted notional regulated CO₂ emissions utilising Part L 2021 emission factors and analysis methodology for the development are as follows.

Apartments – SAP Calculations

20 sample dwellings have been modelled to enable the energy strategy to be confirmed, the following dwellings have been modelled:

- All apartments at first floor of the CFB
- All apartments within apartment block type A
- Bungalow A
- Bungalow B
- Bungalow C

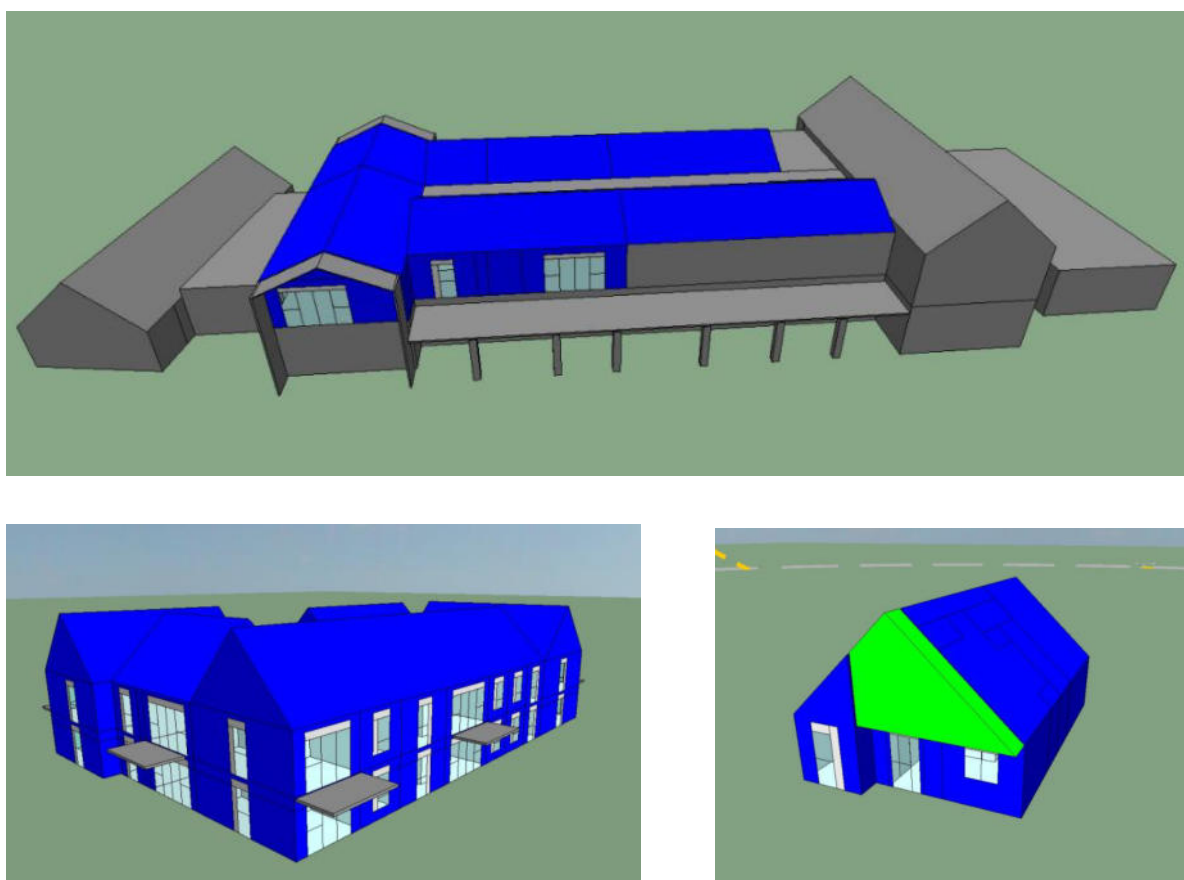


Figure 3 – Various Plots Modelling Images

The results are shown in the below table:

Block	%DER<TER	%DPER<TPER	%DFEE<TFEE	EER
Bungalow A	58.94	21.28	2.03	79C
Bungalow B	55.47	15.14	0.05	79C
Bungalow C	63.35	27.65	1.19	82B
CFB	67.69	34.17	5.09	86B-88B
Block A	68.10	35.03	4.35	85B-88B

Rangeford Villages require a minimum EPC rating of B for each dwelling, in order to achieve this requirement photovoltaic panels are required on bungalow types A & B.

For the purposes of planning 4No PV panels have been allowed for each dwelling.

Central Facility Building – SBEM Calculation

The CFB has been modelled to enable the energy strategy to be confirmed.

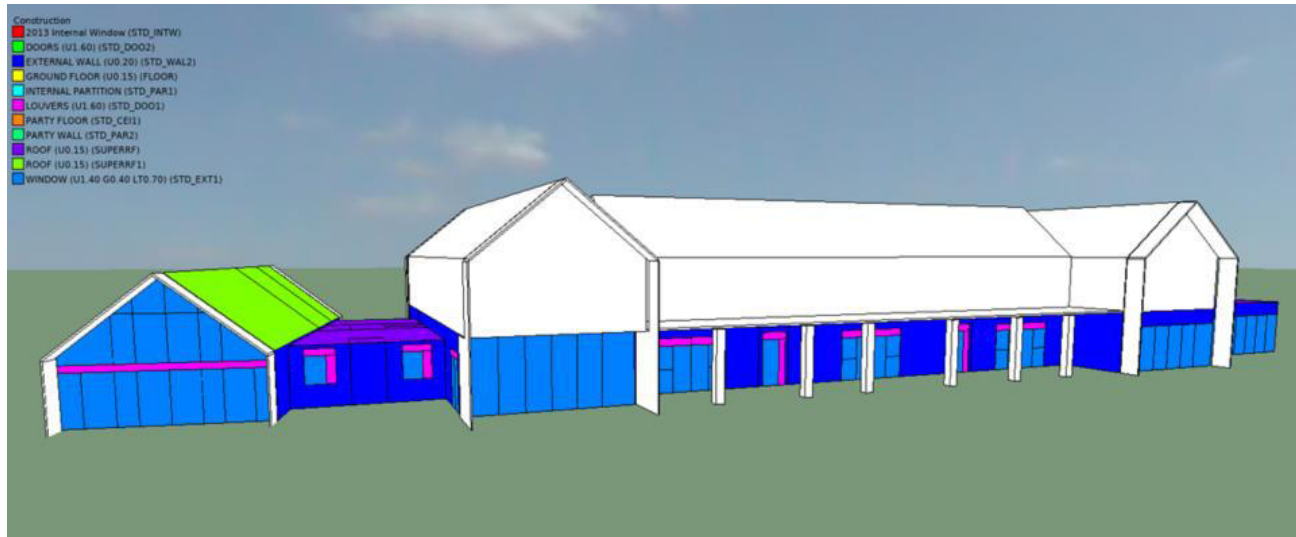


Figure 4 – CFB Modelling Images

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.46
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	14.66
Target primary energy rate (TPER), kWh _e /m ² annum	178.9
Building primary energy rate (BPER), kWh _e /m ² annum	155.77
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	17.37	6.03
Cooling	7.01	1.42
Auxiliary	13.64	12.3
Lighting	12.75	14.26
Hot water	96.47	87.06
Equipment*	43.52	43.52
TOTAL**	147.25	121.07

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	45.81	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	45.81	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	183.37	83.97
Primary energy [kWh _e /m ²]	155.77	178.9
Total emissions [kg/m ²]	14.66	16.46

Energy Performance Certificate Non-Domestic Building



CFB Commercial plus 62096 kWh energy production via PVs
CFB Commercial plus 62096 kWh energy production via PVs
CFB Commercial plus 62096 kWh energy production via PVs
Certificate Reference Number: 1713-0732-0982-7545-5436

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document Energy Performance Certificates for the construction, sale and let of non-dwellings available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient



A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

Less energy efficient

Net zero CO₂ emissions

15

This is how energy efficient the building is.

Technical Information

Main heating fuel: Grid Supplied Electricity
Building environment: Air Conditioning
Total useful floor area (m²): 1355.487
Building complexity: Level 5
Building emission rate (kgCO₂/m²per year): 14.66
Primary energy use (kWh_e/m²per year): 155.77

Benchmarks

Buildings similar to this one could have ratings as follows:
17 If newly built
69 If typical of the existing stock

Figure 5 – CFB BRUKL & EPC Results

The CFB has a high hot water demand due to the application of the building, as such a large PV array is required to achieve compliance with Building Regulations. To achieve compliance an array of 330m² is required, for the purposes of planning the maximum PV possible on the CFB for south facing pitched roofs has been allowed.

7.0 Demand Reduction – Be Lean

In order to deliver an environmentally responsible building, an exemplar approach is being proposed based on low energy design principles. This approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of building services; such that the building itself is being used as the primary environmental modifier.

Long term energy benefits are best realised by reducing the inherent energy demand of the development in the first instance before introducing Low and Zero Carbon (LZC) technology solutions to decarbonise the energy supply – firstly, to meet Building Regulations and to migrate towards a 'Zero Carbon' design standard.

7.1 Passive Design

The general construction design standards to be adopted must exceed the requirements of the current Part L Building Regulations and should aim to achieve 10% betterment on these for-domestic buildings and 15% for non-domestic elements. Domestic and non-domestic parameters may change as the detailed modelling develops.

Building Orientation, layout, and form

Building layout, orientation and form can influence many key features of the development. The design should provide for an effective use of space and appealing layout, with opportunities to benefit from natural daylight balanced with achieving solar gain without overheating. In general, a higher thermal performance can be achieved by limiting the surface area to volume ratio as this minimises heat loss through the wall area.

By orientating a building so that the long sides of the building face north and south, glare arising from the low early morning and evening sun is mitigated. It should be noted that where the building footprint is extremely tight, for example in a city centre location, then the building form and orientation may have to be dictated by the available space and not by implementation of best practice measures. Invariably, planning constraints and/or the functional relationships of specific areas will result in some measure of deep planning, thus reducing the opportunity for natural ventilation.

Solar heating or solar gain is often welcome in winter months, helping to heat up the building. However, careful design and attention to building orientation is essential to avoid summertime overheating. Planning the internal layout of buildings and rooms to maximise the benefits of solar gain and minimise the disadvantages is essential. Spaces where overheating would be critical can be placed on the north side of the building or overhangs used to protect from excessive solar gain.

High Performing Envelope

The building envelope will be designed to ensure that the fabric and form of the development encompasses low energy sustainability principles. The use of a high performing facade, with mineral wool insulation, provides thermal mass retaining heat in the winter and reduce summertime overheating.

The following table details the proposed targeted building envelope thermal performance criteria for the residential elements:

Dwellings

Element	Part L U-value/specification	Proposed U-value/specification
External walls	0.26 W/m ² K	0.2 W/m²K
Walls to corridor	n/a	Fully filled and sealed - 0.00 W/m²K
Party walls	n/a	Fully filled and sealed - 0.00 W/m²K
Ground floor	0.18 W/m ² K	0.13 W/m²K
Roofs	0.16 W/m ² K	0.16 W/m²K
External Door	1.6 W/m ² K	1.2 W/m²K
Window performance Frame factor - 0.70 frame G-value - 0.5	U-value - 1.6 W/m ² K	U-value - 1.3 W/m²K
Air permeability	8.0 m ³ .h ⁻¹ .m ⁻² @50Pa	3.0 m³.h⁻¹.m⁻²@50Pa

Central Facility Building

Element	Part L U-value/specification	Proposed U-value/specification
External walls	0.26 W/m ² K	0.2 W/m²K
Ground floor	0.18 W/m ² K	0.15 W/m²K
Roofs	0.16 W/m ² K	0.15 W/m²K
External Door	1.6 W/m ² K	1.6 W/m²K
Window performance Frame factor - 0.70 frame G-value - 0.5	U-value - 1.6 W/m ² K	U-value - 1.4 W/m²K
Air permeability	8.0 m ³ .h ⁻¹ .m ⁻² @50Pa	4.0 m³.h⁻¹.m⁻²@50Pa

Thermal Bridging

In well insulated buildings, a large portion of heat loss can occur through thermal bridges and should be designed to minimise heat loss.

Dwellings

Wall/floor/roof/ thermal bridge reference	Element	U-value/specification
E2	Lintel	0.069 W/mK (Thermally broken lintel or independent lintel)
E3	Sill	0.025 W/mK (Recognised detail MPF-125-E3-01)
E4	Jamb	0.020 W/mK (Recognised detail MPF-125-E4-01)
E5	Ground floor	0.056 W/mK (Recognised detail MPF-125-E5-10)
E6	Intermediate floor within a dwelling	0.003 W/mK (Recognised detail MPF-125-E6-01)
E7	Party floor between dwellings	0.045 W/mK (Recognised detail MPF-125-E7-01)
E10	Eaves (insulation at ceiling level)	0.065 W/mK (independently assessed)
E11	Eaves (insulation at rafter level)	0.020 W/mK (independently assessed)
E12	Gable (insulation at ceiling level)	0.044 W/mK (Recognised detail MPF-125-E12-01)
E13	Gable (insulation at rafter level)	0.040 W/mK (independently assessed)
E13	Gable (insulation at rafter level) - wall to roof void	0.040 W/mK (independently assessed)
E14	Flat roof	0.160 W/mK (default)
E16	Corner (normal)	0.043 W/mK (Recognised detail MPF-125-E16-01)
E17	Corner (inverted)	minus 0.085 W/mK (Recognised detail MPF-125-E17-01)
E18	Party wall between dwellings	0.038 W/mK (Recognised detail MPF-125-E18-01)
E23	Balcony between dwellings	0.150 W/mK per dwelling (independently assessed)
E24	Eaves (insulation at ceiling level - inverted)	0.075 W/mK per dwelling (default). 0.150 W/mK if not shared between dwellings
E25	Staggered party wall between dwellings	0.036 W/mK (Recognised detail MPF-125-E25-01)
P1	Party wall - ground floor	0.044 W/mK (Recognised detail MPW-P1-10)
P2	Party wall - Intermediate floor within a dwelling	0.000 W/mK (default)
P3	Party wall - Intermediate floor between dwellings	0.000 W/mK (default)
P4	Party wall - roof (insulation at ceiling level)	0.040 W/mK (Recognised detail MPW-P4-01)

Wall/floor/roof/ thermal bridge reference	Element	U-value/specification
P5	Party wall - roof (insulation at rafter level)	0.040 W/mK (independently assessed)
R1	Head of roof window	0.120 W/mK (independently assessed)
R2	Sill of roof window	0.120 W/mK (independently assessed)
R3	Jamb of roof window	0.050 W/mK (independently assessed)
R5	Ridge (inverted)	0.050 W/mK (independently assessed)
R6	Flat ceiling	0.020 W/mK (independently assessed)
R7	Flat ceiling (inverted) - Dormer	0.030 W/mK (independently assessed)
R9	Roof to wall (flat ceiling) - Dormer	0.060 W/mK (independently assessed)

Central Facility Building

Thermal bridging for non-domestic buildings is assigned as a percentage of the u-value associated with the specific construction element.

External Shading

External shading is provided by roof overhangs, careful placement of balconies and depth of window reveal.

Daylight/Glazing Ratio

The glazing specification for the new development will be optimised to ensure that the glazed elements provide excellent thermal performance combined with optimum solar reflectance to minimise summer solar heat gains along with high daylight transmittance factors to maximise daylight factors. Encouraging the correct quality and quantity of daylight to penetrate the building is key to reducing the amount of light required from artificial sources and hence energy requirements.

Glazing ratios will be carefully developed within the wider consultant team to achieve the optimum balance of good daylight levels, winter solar gain, minimising summer solar gain and active cooling.

The proposed buildings are highly insulated, reducing heating requirements in winter months and reducing solar gain in summer.

7.2 Active Building Design – Energy Efficient Services

Energy Efficient Lighting

It is imperative that the lighting design philosophy provides the correct quality of lighting with minimum energy input whilst limiting internal heat gains. The latest low energy lighting technology will be employed throughout. External lighting will be designed with consideration to security requirements and minimising nuisance glare and light pollution to the surrounding area.

Efficient HVAC Systems

Reducing demand to a minimum after applying the foregoing passive measures means that the duty and energy consumption of the heating, cooling, hot water and ventilation systems will be also minimised. All elements will be highly efficient, exceeding the notional target for each system.

Renewable Energy

The Part L 2021 notional specification includes an allocation for photovoltaic panels, the energy generation shall be calculated in line with SAP 10.2.

8.0 Be Clean – CHP and Communal Heating Systems

CPW has established that there is currently no existing district heating network within the surrounding area which the site could benefit from. Therefore, building services design does not include for a centralised LTHW heating system, that is viable to connect into an existing district heating network.

9.0 Renewable Energy

These measures serve to reduce the overall emissions of the development through the inclusion of renewable technologies. Several renewable technologies have been appraised in terms of technical and physical feasibility as potential renewable systems for use on the development.

9.1 LZC Technology Review

The technical feasibility and economic viability of installing each LZC technology at the development were assessed in order to discount any unsuitable options at an early stage. A summary of the feasibility process is tabulated below, and an overview of each viable technology is given subsequently.

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
Solar Photovoltaic	Solar photovoltaic panels convert solar radiation into electrical energy through semiconductor cells. They are not to be confused with solar panels which use the sun's energy to heat water (or air) for water and space heating.	Low maintenance/no moving parts Easily integrated into building design No ongoing costs	Any overshadowing reduces panel performance Panels ideally inclined at 30° to the horizontal facing a southerly direction	YES CFB & Dwellings
Solar Thermal	Solar thermal energy can be used to contribute towards space heating and hot water requirements. The two commonest forms of collector are panel and evacuated tube.	Low maintenance Little/no ongoing costs	Must be sized for the building hot water requirements Panels ideally inclined at 30° to the horizontal facing a southerly direction Doesn't suit occupancy profile of a student accommodation development as likely to be unoccupied over summer months	YES CFB
Ground Source Heat Pump (GSHP)	GSHP systems tap into the earth's considerable energy store to provide both heating and cooling to buildings. A number of installation methods are possible including horizontal trench, vertical boreholes, piled foundations (energy piles) or plates/pipe work submerged in a large body of water. The design, installation and operation of GSHPs is well established.	Minimal maintenance Unobtrusive technology Flexible installation options to meet available site footprint Balanced with Heating Decarbonisation of the grid promoting electrically driven heat pumps.	Large area required for horizontal pipes Full ground survey required to determine geology More beneficial to the development if cooling is balanced Integration with piled foundations must be done at an early stage High Capital Cost	NO

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
Air Source Heat Pump (ASHP)	Electric ASHP's extract thermal energy from the surrounding air and transfer it to the working fluid (air or water).	Efficient use of fuel Relatively low capital costs Limited plant space requirements Highly efficient when supporting both heating and cooling Decarbonisation of the grid promoting electrically driven heat pumps.	Specialist maintenance Requires defrost cycle in extreme conditions External / open plant space required Potential acoustic treatment required	YES CFB
Exhaust Air Heat Pump (EAHP)	Electric ASHP's extract thermal energy from air extracted from apartments and transfer it to the working fluid (air or water).	Efficient use of fuel Low Capital costs Can fit within an apartment utility cupboard No defrost cycle required All services provided from a single unit	Maintenance is often only available from the manufacturer Hot water has a long recovery time Operational limitations that require careful consideration	YES 1No / Dwelling
Wind Turbine (Stand-alone column mounted)	Wind generation equipment operates on the basis of wind turning a propeller, which is used to drive an alternator to generate electricity. Small scale (1kW – 15kW) wind turbines can be pole or roof mounted.	Low maintenance/ongoing costs Minimum wind speed available (www.bwea.com) Excess electricity can be exported to the grid	Planning issues Aesthetic impact and background noise Space limitations on site Wind survey to be undertaken to verify 'local' viability	NO

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
Wind Turbine (Roof Mounted)	As above	Low maintenance/ongoing costs Minimum wind speed available (www.bwea.com) Excess electricity can be exported to the grid	Planning issues Aesthetic impact and background noise Structural/vibration impact on building to be assessed Proximity of other buildings raises issues with downstream turbulence Wind survey to be undertaken to verify 'local' viability	NO
Gas Fired Combined Heat and Power	A Combined Heat and Power (CHP) installation is effectively a mini on-site power plant providing both electrical power and useful heat. CHP is strictly an energy efficiency measure rather than a renewable energy technology.	Potential high CO₂ saving available Efficient use of fuel Excess electricity can be exported to the grid Benefits from being part of an energy centre/district heating scheme	Maintenance intensive Sufficient base thermal and electrical demand required Some additional plant space required Uses fossil fuel	NO
Bio-fuel Fired Combined Heat and Power	As above.	Potential high CO₂ saving available Efficient use of fuel Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme	Maintenance intensive Sufficient base thermal and electrical demand required Significant plant space required Biomass fueled systems are at early stages of commercialization	NO

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
			Large area needed for fuel delivery and storage Reliable biomass fuel supply chain required	
Fuel Cells	Fuel cells convert chemical energy directly into electricity by combining hydrogen and oxygen in a controlled reaction	Virtually no pollution High electrical efficiency	High capital costs Early stages of commercialisation High technology risk	No

The current and forecasted decarbonisation of the national electricity grid means that electrically driven energy generation, in lieu of gas-fired solutions, provides a low carbon heat source and greater carbon savings can be obtained.

It is therefore proposed that the development utilises Air Source Heat Pumps (CFB) & Exhaust Air Heat Pumps (Apartments) to support the delivery of the heating, cooling and domestic hot water demand as a renewable / low carbon heat source.

In addition, roof mounted solar photovoltaic (PV) panels will be provided for renewable electrical energy generation and Part L compliance.

10.0 Water Efficiency Measures

The Kingscote Place development is targeting reducing water usage by ensuring the design of the domestic water services installations and selection of associated sanitaryware will be undertaken with the primary aim of reducing the water consumption via the following strategies:

- Wash Hand Basin outlets to be fitted with flow restrictors to limit the peak flow rate to 6 litres / minute
- Sink outlets to be fitted with flow restrictors to limit the peak flow rate to 7 litres / minute
- Showers to be fitted with flow restrictors to limit the peak flow rate to 8 litres / minute
- WC cisterns to be specified as 5 / 3 litre dual flush type
- Where white goods are specified – washing machines and dishwashers – water efficient appliances will be considered
- Metering of the incoming and outgoing water mains within each apartment block will enable major leak detection of the buried water services
- Sanitary supply shut off devices will be included on the water connections to common area WCs within the CFB

The above measures will help support the development's good practise approach of limiting the maximum water demand target to 110 litres / person / day and compliance with Building Regulations Approved Document Part G.

11.0 Cooling & Overheating

It is important to identify potential overheating risk in residential accommodation early in the design process and then incorporate suitable passive measures within the building envelope and services design to mitigate overheating and reduce cooling demand. The following measures should be followed in order to reduce the demand for cooling across the development. These have been included for within the development as follows:

Please note: acoustics and daylighting need to be carefully considered during the overheating and energy modelling. Initial overheating modelling has been assessed in line with the energy strategy set out within this reports and CIBSE TM59 Compliance is achieved.

1. Reducing Solar Gains – reduced g-values depending on the orientation have been targeted in order to minimise solar gains.
2. Minimising Internal Heat Gains – heating and hot water pipe work will be designed and insulated to minimise heat loss into the building.
3. Thermal Mass – Thermal mass is being incorporated through the floor slabs and roof, which will comprise concrete planks. Suspended ceilings are likely to be required for acoustic reasons, however further investigation will be undertaken as to the design of these and the floor finishes to try to utilise and expose the thermal mass of the concrete floors wherever possible, so as to help regulate the internal temperature.
4. Passive Ventilation – All dwellings on the development will make use of restricted openable windows, purge ventilation (fully openable windows with restrictors removed) may be required to mitigate overheating during the hottest periods of the year. The ventilation strategy shall also comply with the Acoustics Stage 2 report.
5. Mechanical Ventilation – Supply and extract systems will be specified with heat recovery and summer bypass. This enables the opportunity for the dwellings to benefit from ‘free cooling’ in summer where the outside air temperature is below that of the occupied spaces.
6. Active cooling – as required if the above passive solutions do not satisfy overheating mitigation to comply with Approved Document O using the CIBSE TM59 calculations methodology.



12.0 Appendices



Appendix A - SAP Results

Results - Option 1 - CFB

DER<TER										
Sample dwelling number	Dwelling reference	Number of units	Total floor area	DER	TER					BLOCK %DER<TER
1	CFB - 2 BED APT - 98	1	97.94	2.77	8.37		98	271	820	
2	CFB - 1 BED APT - 70	1	70.01	3.09	9.08		70	216	636	
3	CFB - 2 BED APT - 98	2	97.94	3.03	9.67		196	594	1894	
4	CFB - 2 BED APT - 98	2	97.94	3.22	9.94		196	631	1947	
5	CFB - 1 BED APT - 70.4	2	70.34	3.42	10.60		141	481	1491	
		8					700	2193	6788	
								3.13	9.69	67.69

DPER<TPER										
Sample dwelling number	Dwelling reference	Number of units	Total floor area	DPER	TPER					BLOCK %DPER<TPER
1	CFB - 2 BED APT - 98	1	97.94	29.43	43.45		98	2882	4255	
2	CFB - 1 BED APT - 70	1	70.01	32.96	47.17		70	2308	3302	
3	CFB - 2 BED APT - 98	2	97.94	32.05	50.30		196	6278	9853	
4	CFB - 2 BED APT - 98	2	97.94	34.04	51.69		196	6668	10125	
5	CFB - 1 BED APT - 70.4	2	70.34	36.34	55.28		141	5112	7777	
		8					700	23248	35312	
								33.19	50.42	34.17

DFEE<TFEE										
Sample dwelling number	Dwelling reference	Number of units	Total floor area	DFEE	TFEE					BLOCK %DFEE<TFEE
1	CFB - 2 BED APT - 98	1	97.94	24.44	26.46		98	2394	2591	
2	CFB - 1 BED APT - 70	1	70.01	23.60	25.63		70	1652	1794	
3	CFB - 2 BED APT - 98	2	97.94	30.30	32.94		196	5935	6452	
4	CFB - 2 BED APT - 98	2	97.94	34.04	34.44		196	6668	6746	
5	CFB - 1 BED APT - 70.4	2	70.34	28.64	29.88		141	4029	4204	
		8					700	20678	21788	
								29.52	31.11	5.09

Energy Efficiency Rating		
Sample dwelling number	Dwelling reference	EER
1	CFB - 2 BED APT - 98	88B
2	CFB - 1 BED APT - 70	88B
3	CFB - 2 BED APT - 98	87B
4	CFB - 2 BED APT - 98	86B
5	CFB - 1 BED APT - 70.4	87B

Results - Option 1 - Block A

DER<TER										
Sample dwelling number	Dwelling reference	Number of units	Total floor area	DER	TER					BLOCK %DER<TER
1	A - TYPE 09	1	97.94	3.33	11.00		98	326	1077	
2	A - TYPE 01	1	70.01	3.17	9.28		70	222	650	
3	A - TYPE 10	1	97.94	2.86	8.84		98	280	866	
4	A - TYPE 12	1	113.02	2.46	7.45		113	278	842	
5	A - TYPE 13	1	115.35	2.82	9.38		115	325	1082	
6	A - TYPE 03	1	78.53	3.40	10.81		79	267	849	
7	A - TYPE 09	1	97.94	3.31	10.55		98	324	1033	
8	A - TYPE 01	1	70.01	3.15	9.29		70	221	650	
9	A - TYPE 10	1	97.94	2.84	8.66		98	278	848	
10	A - TYPE 12	1	113.02	2.46	7.45		113	278	842	
11	A - TYPE 13	1	115.35	2.79	8.95		115	322	1032	
12	A - TYPE 05	1	87.65	3.22	10.25		88	282	898	
		12					1155	3403	10670	
								2.95	9.24	68.10

DPER<TPER										
Sample dwelling number	Dwelling reference	Number of units	Total floor area	DPER	TPER					BLOCK %DPER<TPER
1	A - TYPE 09	1	97.94	35.13	57.46		98	3441	5628	
2	A - TYPE 01	1	70.01	33.71	48.20		70	2360	3374	
3	A - TYPE 10	1	97.94	30.34	45.83		98	2971	4489	
4	A - TYPE 12	1	113.02	26.22	38.57		113	2963	4359	
5	A - TYPE 13	1	115.35	29.77	48.88		115	3434	5638	
6	A - TYPE 03	1	78.53	35.97	56.38		79	2825	4428	
7	A - TYPE 09	1	97.94	34.89	55.07		98	3417	5394	
8	A - TYPE 01	1	70.01	33.47	48.26		70	2343	3379	
9	A - TYPE 10	1	97.94	30.15	44.89		98	2953	4397	
10	A - TYPE 12	1	113.02	26.19	38.55		113	2960	4357	
11	A - TYPE 13	1	115.35	29.45	46.56		115	3397	5371	
12	A - TYPE 05	1	87.65	34.10	53.41		88	2989	4681	
		12					1155	36053	55493	
								31.22	48.06	35.03

DFEE<TFEE										
Sample dwelling number	Dwelling reference	Number of units	Total floor area	DFEE	TFEE					BLOCK %DFEE<TFEE
1	A - TYPE 09	1	97.94	37.32	38.73		98	3655	3793	
2	A - TYPE 01	1	70.01	26.64	27.19		70	1865	1904	
3	A - TYPE 10	1	97.94	27.28	28.86		98	2672	2827	
4	A - TYPE 12	1	113.02	24.00	25.29		113	2712	2858	
5	A - TYPE 13	1	115.35	33.71	34.95		115	3888	4031	
6	A - TYPE 03	1	78.53	32.52	33.38		79	2554	2621	
7	A - TYPE 09	1	97.94	35.43	36.65		98	3470	3590	
8	A - TYPE 01	1	70.01	25.13	26.99		70	1759	1890	
9	A - TYPE 10	1	97.94	26.25	27.96		98	2571	2738	
10	A - TYPE 12	1	113.02	23.29	25.19		113	2632	2847	
11	A - TYPE 13	1	115.35	32.09	32.99		115	3702	3805	
12	A - TYPE 05	1	87.65	31.38	32.89		88	2750	2883	
		12					1155	34231	35787	
								29.65	30.99	4.35

Energy Efficiency Rating		
Sample dwelling number	Dwelling reference	EER
1	A - TYPE 09	85B
2	A - TYPE 01	88B
3	A - TYPE 10	87B
4	A - TYPE 12	88B
5	A - TYPE 13	87B
6	A - TYPE 03	86B
7	A - TYPE 09	86B
8	A - TYPE 01	88B
9	A - TYPE 10	87B
10	A - TYPE 12	88B
11	A - TYPE 13	87B

12	A - TYPE 05	86B
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Appendix B – CFB BRUKL Modelling Results

Project name

CFB Commercial plus 62096 kWh energy production via PVs

As designed

Date: Tue Jul 28 12:16:27 2026

Administrative information

Building Details

Address: CFB Commercial plus 62096 kWh energy production via PVs,

Certifier details

Name: CPW

Telephone number: 0121 709 6600

Address: INTERFACE 100 ARLESTON WAY SOLIHULL, BIRMINGHAM, B90 4LH

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.28

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.28

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 1024.48The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.46
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	14.66
Target primary energy rate (TPER), kWh _{PE} /m ² annum	178.9
Building primary energy rate (BPER), kWh _{PE} /m ² annum	155.77
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.2	0.2	L0000011:Surf[4]
Floors	0.18	0.15	0.15	L0000011:Surf[0]
Pitched roofs	0.16	0.15	0.15	L0000000:Surf[18]
Flat roofs	0.18	0.15	0.15	L0000002:Surf[1]
Windows** and roof windows	1.6	1.4	1.4	L0000011:Surf[3]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.6	1.6	L0000011:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	4

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- HEATING AND COOLING VIA VRF FED BY ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	2.5	0	1.6	-
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

2- HEATING ONLY VIA RADIATOR FED BY ASHP PLUS NATURAL VENTILATION

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	-	0.3	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- POU WATER HEATER PLUS NO STORAGE

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
L00 : ADMIN OFFICE	110	-	-
L00 : ART STUDIO / ACTIVITY SPACE	110	-	-
L00 : BAR	110	-	-
L00 : C OFFICE	110	-	-
L00 : CAFE / BAR / LOUNGE	110	-	-
L00 : CARE OFFICE	110	-	-
L00 : CIRCULATION	110	-	-
L00 : CIRCULATION	110	-	-
L00 : CIRCULATION	110	-	-
L00 : CIRCULATION	110	-	-
L00 : CIRCULATION	110	-	-
L00 : COMMS	110	-	-
L00 : ENTRANCE LOBBY	110	-	-
L00 : FEMALE CHANGE CIRCULATION	110	-	-
L00 : FEMALE WC	110	-	-
L00 : FEMALE WC	110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
L00 : GYM		110	-	-
L00 : HAIR STUDIO		110	-	-
L00 : KITCHEN		110	-	-
L00 : MALE CHANGE		110	-	-
L00 : MALE CHANGE		110	-	-
L00 : MALE CHANGE		110	-	-
L00 : MALE CHANGE		110	-	-
L00 : MALE CHANGE CIRCULATION		110	-	-
L00 : MALE WC		110	-	-
L00 : MALE WC		110	-	-
L00 : MEMBERS LOUNGE		110	-	-
L00 : NAIL STUDIO		110	-	-
L00 : POOL		110	-	-
L00 : POOL PLANT		110	-	-
L00 : POST		110	-	-
L00 : PRIVATE DINING		110	-	-
L00 : RECEPTION / FOYER		110	80	1.688
L00 : RESTAURANT		110	-	-
L00 : SAUNA		110	-	-
L00 : SHOWER		110	-	-
L00 : STAFF ROOM		110	-	-
L00 : STAIRS		110	-	-
L00 : STAIRS		110	-	-
L00 : STEAM		110	-	-
L00 : STORE		110	-	-
L00 : STORE		110	-	-
L00 : STORE		110	-	-
L00 : STORE		110	-	-
L00 : STORE		110	-	-
L00 : SWITCH ROOM		110	-	-
L00 : TREATMENT		110	-	-
L00 : TREATMENT		110	-	-
L00 : VM OFFICE		110	-	-
L00 : WATER TANK ROOM		110	-	-
L00 : WC		110	-	-
L00 : WC		110	-	-
L00 : WC		110	-	-
L00 : WC		110	-	-
L00 : WC F		110	-	-
L00 : WC M		110	-	-
L00 : YOGA		110	-	-
L00 : FEMALE CHANGE		110	-	-
L00 : FEMALE CHANGE		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L00 : FEMALE CHANGE		110	-	-
L00 : FEMALE CHANGE		110	-	-
L00 : LAUNDRY		110	-	-
L00 : LAUNDRY		110	-	-
L00 : LAUNDRY		110	-	-
L00 : CHANGE		110	-	-
L00 : CHANGE		110	-	-
L00 : ACC CHANGE		110	-	-
L00 : ACC CHANGE		110	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00 : ADMIN OFFICE	NO (-78%)	NO
L00 : ART STUDIO / ACTIVITY SPACE	NO (-72.6%)	NO
L00 : BAR	NO (-45.8%)	NO
L00 : C OFFICE	N/A	N/A
L00 : CAFE / BAR / LOUNGE	YES (+55.1%)	NO
L00 : CARE OFFICE	NO (-66.1%)	NO
L00 : COMMS	N/A	N/A
L00 : GYM	NO (-64.6%)	NO
L00 : HAIR STUDIO	NO (-87.6%)	NO
L00 : MEMBERS LOUNGE	NO (-65%)	NO
L00 : NAIL STUDIO	N/A	N/A
L00 : POOL	YES (+44.8%)	NO
L00 : POST	NO (-99.7%)	NO
L00 : PRIVATE DINING	N/A	N/A
L00 : RECEPTION / FOYER	YES (+89.7%)	NO
L00 : RESTAURANT	NO (-45.3%)	NO
L00 : STAFF ROOM	NO (-71.4%)	NO
L00 : SWITCH ROOM	N/A	N/A
L00 : TREATMENT	N/A	N/A
L00 : TREATMENT	NO (-79.8%)	NO
L00 : VM OFFICE	NO (-90.4%)	NO
L00 : YOGA	NO (-13.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	1355.5	1355.5
External area [m ²]	2746.3	2668.3
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	4	3
Average conductance [W/K]	784.13	786.44
Average U-value [W/m ² K]	0.29	0.29
Alpha value* [%]	25.08	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
100 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	17.37	6.03
Cooling	7.01	1.42
Auxiliary	13.64	12.3
Lighting	12.75	14.26
Hot water	96.47	87.06
Equipment*	43.52	43.52
TOTAL **	147.25	121.07

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	45.81	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>45.81</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	183.37	83.97
Primary energy [kWh _{PE} /m ²]	155.77	178.9
Total emissions [kg/m ²]	14.66	16.46

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	178.2	76.2	21.3	13.4	14.5	2.33	1.58	2.5	2.5
	Notional	50.4	45.1	5	2.7	15	2.78	4.63	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	215.8	0	26.9	0	3.5	2.23	0	2.5	0
	Notional	146.6	0	14.7	0	1.7	2.78	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Energy Performance Certificate

Non-Domestic Building



CFB Commercial plus 62096 kWh energy production via PVs
CFB Commercial plus 62096 kWh energy production via PVs
CFB Commercial plus 62096 kWh energy production via PVs

Certificate Reference Number:
1713-0732-0982-7545-5436

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

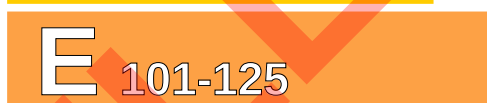
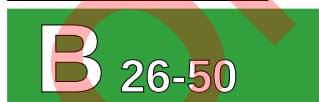
More energy efficient



Net zero CO₂ emissions



This is how energy efficient the building is.



Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Air Conditioning
Total useful floor area (m ²):	1355.487
Building complexity:	Level 5
Building emission rate (kgCO ₂ /m ² per year):	14.66
Primary energy use (kWh _{PE} /m ² per year):	155.77

Benchmarks

Buildings similar to this one could have ratings as follows:

17 If newly built

69 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software: Virtual Environment v7.0.28 using calculation engine ApacheSim v7.0.28

Property Reference: UPRN-000000000000

Assessor Name: CPW

Assessor Number: LCEA071368

Accreditation Scheme: CIBSE Certification Limited

Assessor Qualifications: NOS5

Employer/Trading Name: Trading Name

Employer/Trading Address: Trading Address

Issue Date: 31 Jul 2026

Valid Until: 30 Jul 2036 (unless superseded by a later certificate)

Related Party Disclosure: Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 5526-5081-1775-0057-5301

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by CIBSE Certification Limited. You can obtain contact details of the Accreditation Scheme at www.cibsecertification.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.ndepcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit www.ndepcregister.com. To opt out of having information about your building made publicly available, please visit www.ndepcregister.com/optout.

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

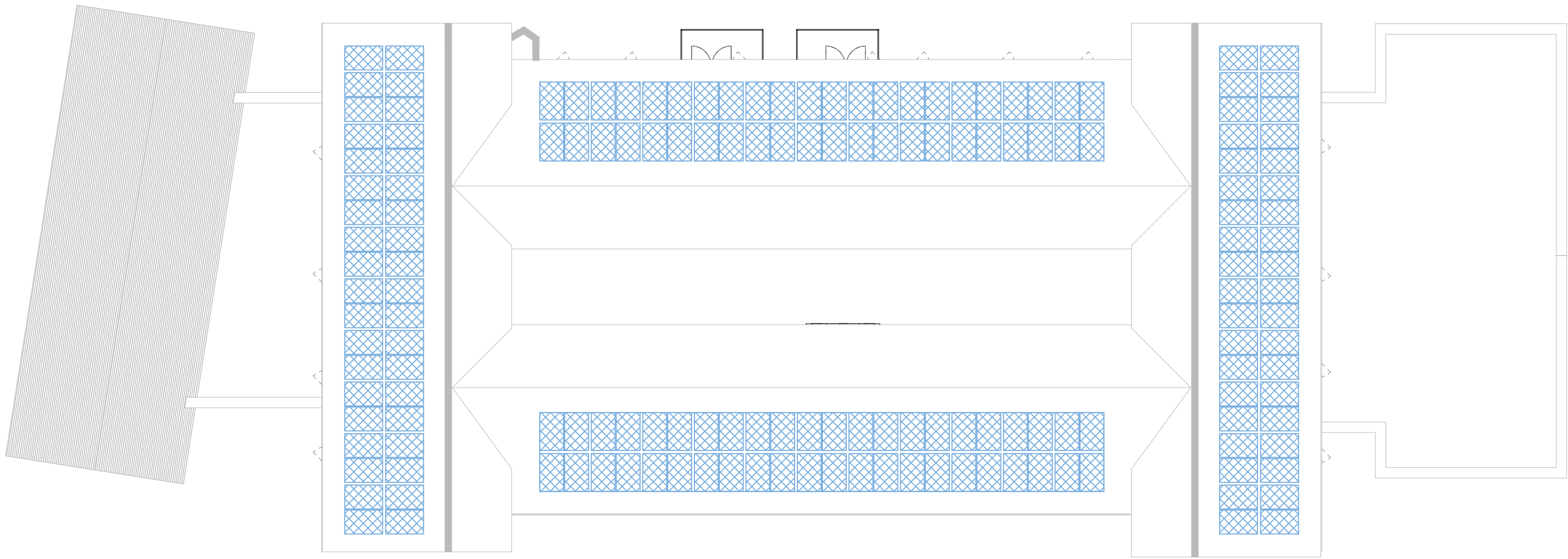
The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

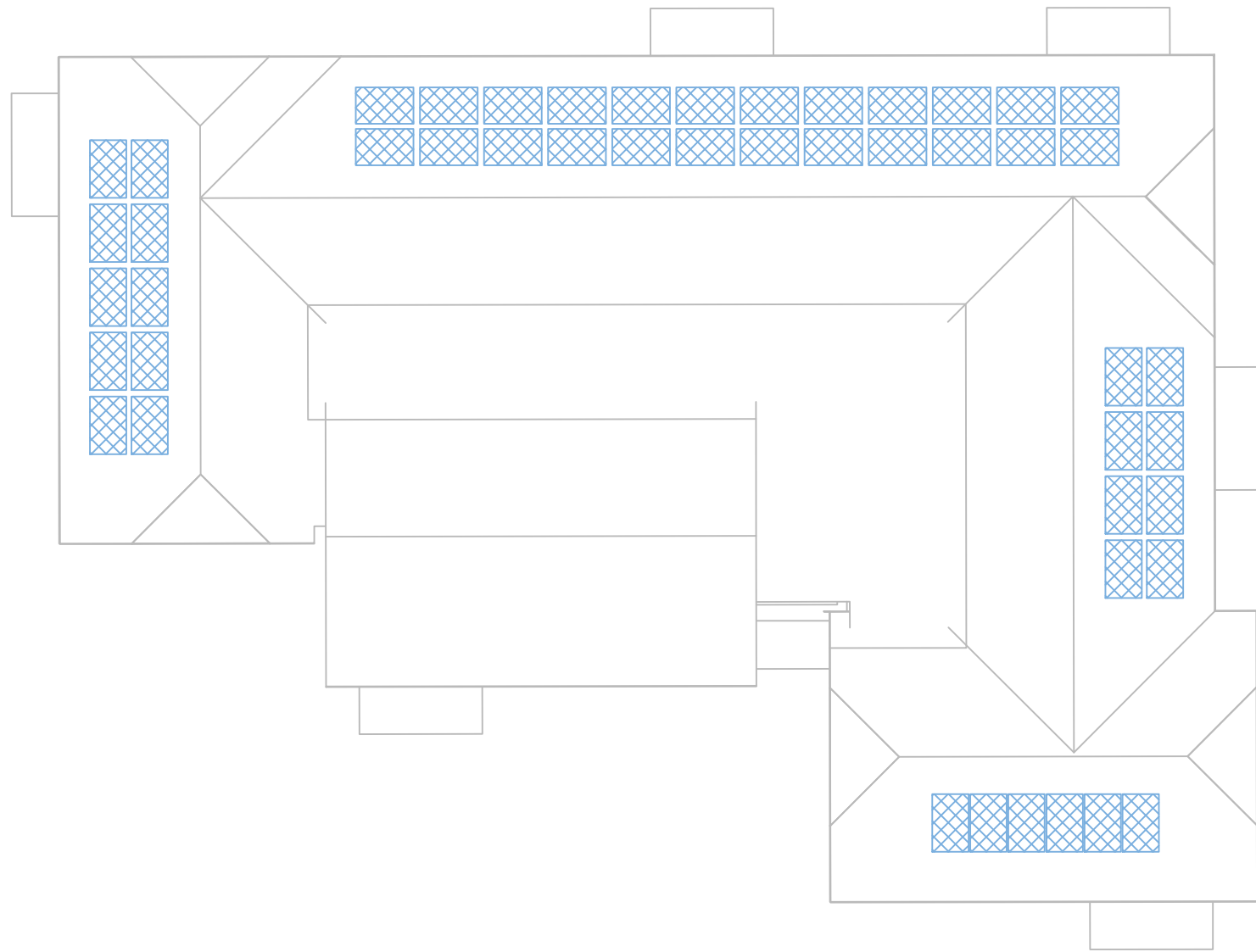
Appendix C – Initial Photovoltaic Layout

THIS DRAWING IS AN INDICATIVE LAYOUT ONLY, DEMONSTRATING THE CONCEPTUAL REQUIREMENTS. THE PURPOSE OF THIS DRAWING IS TO DEMONSTRATE DESIGN INTENT, FOR FURTHER DEVELOPMENT BY THE RELEVANT SERVICES DESIGNER ONLY.

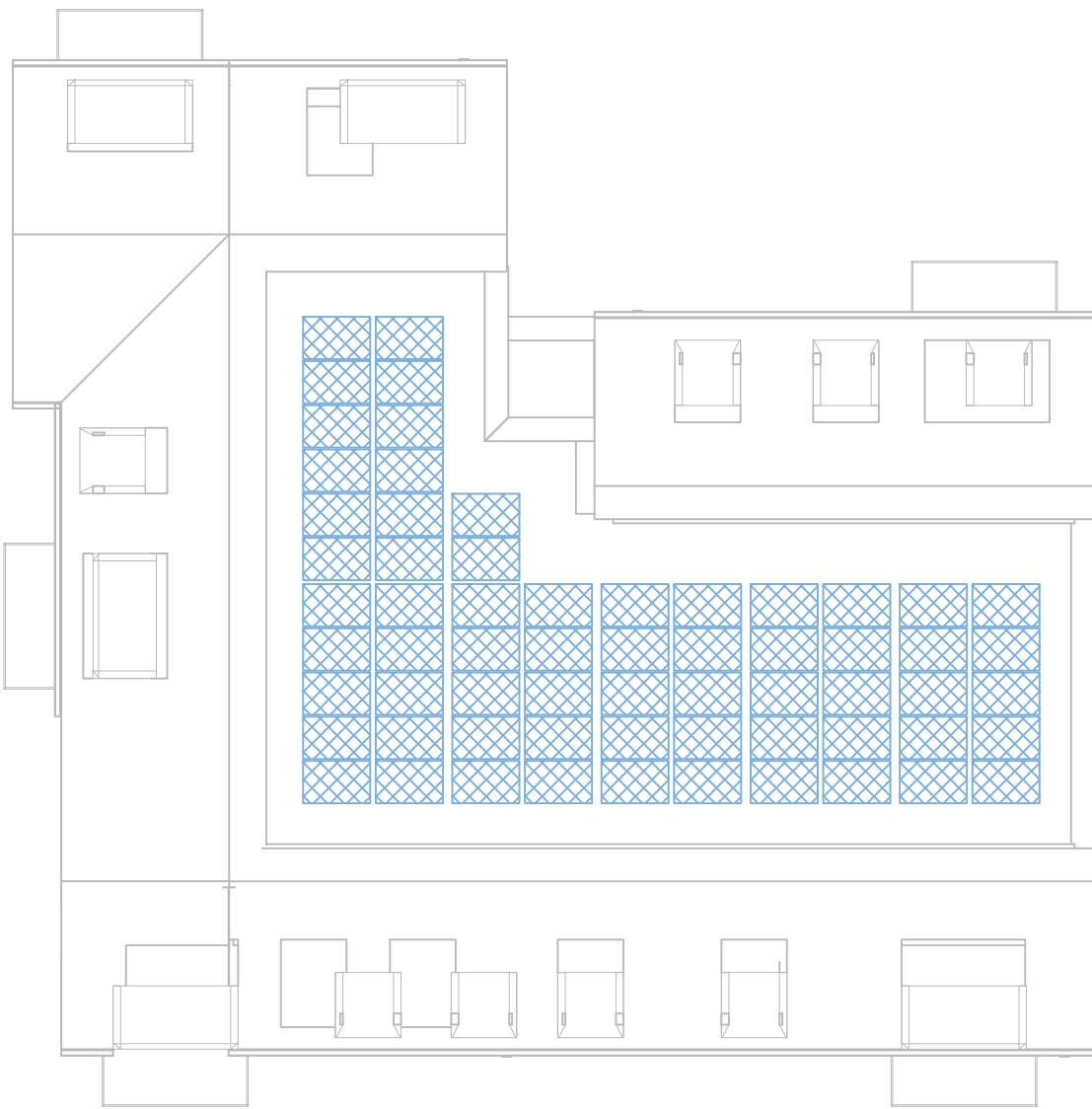
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE STAGE 2 M&E REPORT & ALL RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



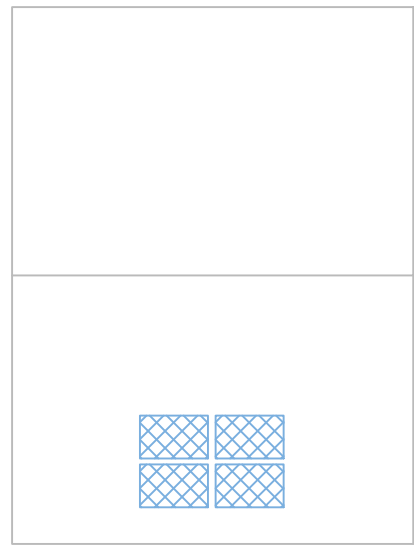
BUILDING CFB
CIRCA 370m² OF PV



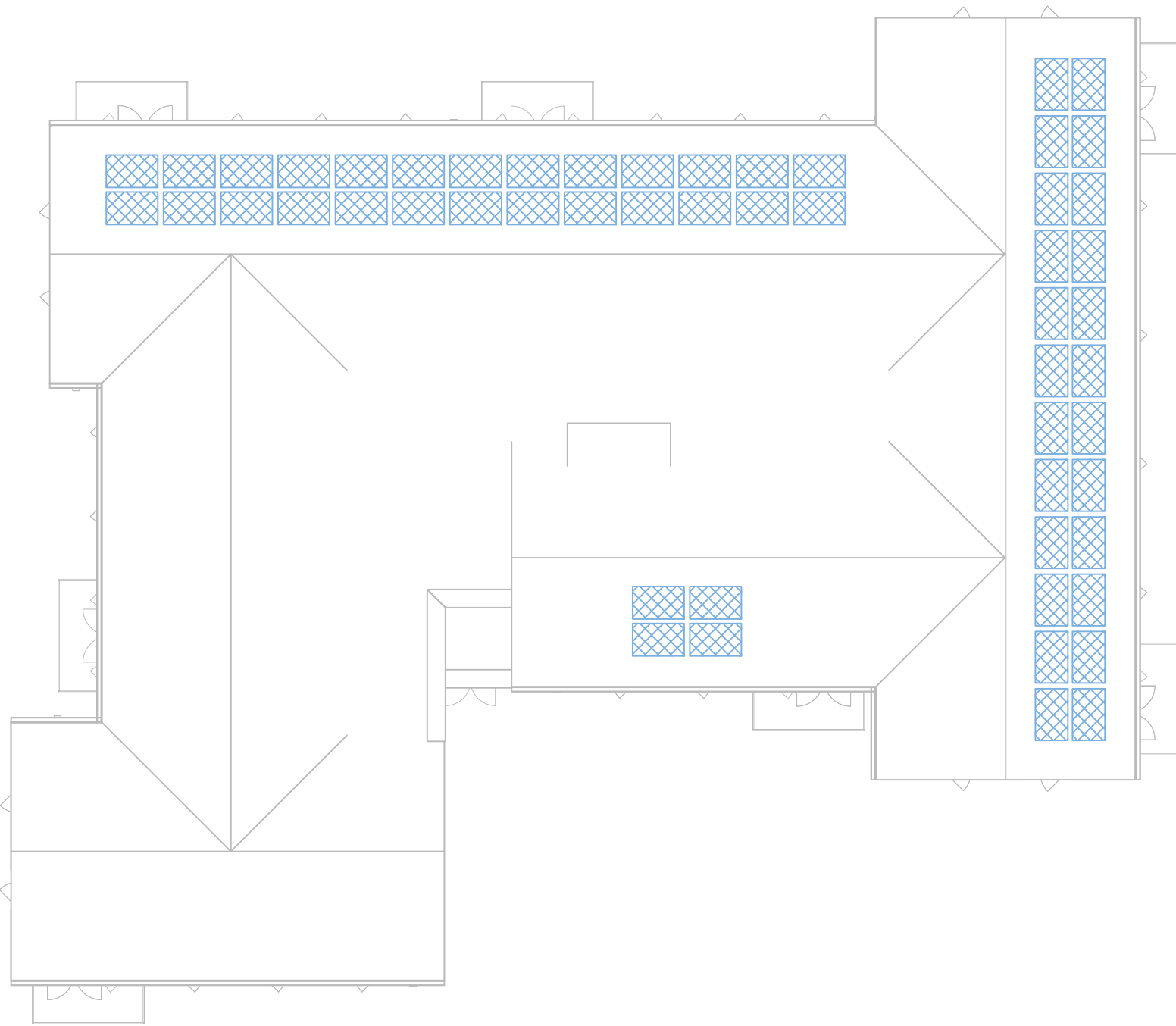
BUILDING A
4 PV PANELS PER APARTMENT



BUILDING B
4 PV PANELS PER APARTMENT



ALL BUNGALOWS
4 PV PANELS PER APARTMENT



BUILDING C
4 PV PANELS PER APARTMENT

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All scaled dimensions taken from this drawing are to be verified on site.

HEALTH AND SAFETY INFORMATION

Standard hazards and risks may not necessarily be identified on this drawing. The caution symbols that are identified, but not limited to, related to specific hazards and risks associated with this type of project.
Reference should be made to the DRA for further details.

DRA Ref No.	Description
	It is assumed that all works shall be undertaken by a competent contractor working, where appropriate, to an approved method statement.

LEGEND

 PV PANEL (1800mm X 1140mm)

CPW

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Victoria Street
Derby, DE1 1EQ

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derby@cpw.com

www.cpw.com

RIBA Stage

STAGE 2

Status
SUITABLE FOR INFORMATION

Client
RANGEFORD
VILLAGES

Project
KINGSCOTE PLACE

Drawing Title
PV REQUIREMENTS

Scale (A1)
1:200

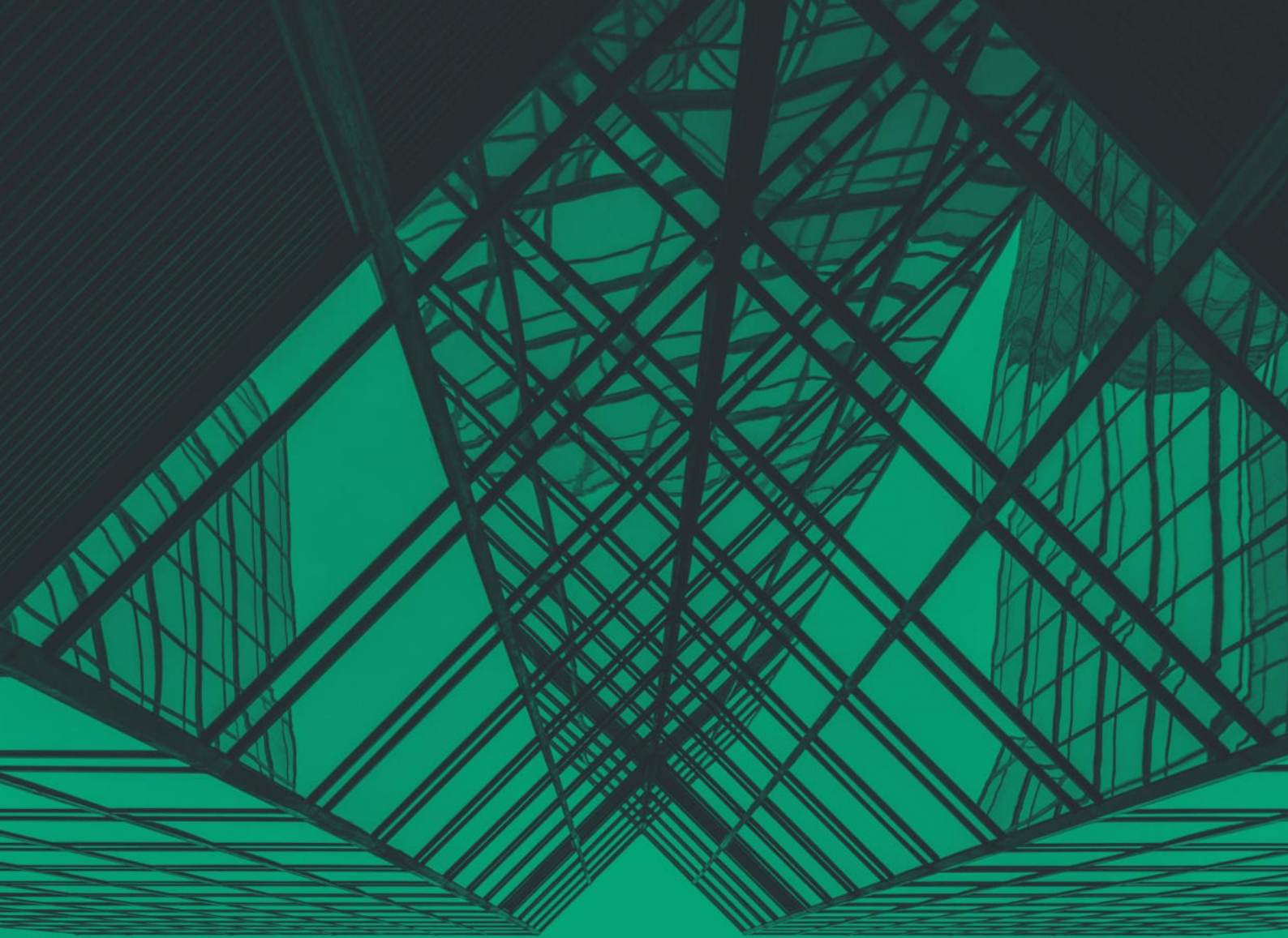
Date
AUG '26

By
DH

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SPT

ProjID	Originator	Functional	Spall	Form	Discipline	Number	Subsity	Reason
241300	CPW	ZZ	ZZ	DR	E	285001	S2	P01

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