

Energy and Sustainability Statement

Folkestone Waterfront, Plots F,G & H

Revision P06, March 2024



Document information

Report title: Energy and Sustainability Statement
Project name: Folkestone Waterfront, Plots F,G & H
Project number: 5708
Digital file name: 2023.11.26 ESS Report
Digital file location: K:\10\5700 - 5799\5708 - Folkstone Plots F,G,H\12. A10 Reports\Stage 2 Concept Design\2023.11.26 ESS ReportConcept Design\2023.12.22 ESS Report

Prepared

Prepared by: Jeovana Naidoo, Gunveer Singh, Joseph Roberts, Agathe Chevee
Signed: JN, GS, JR, AC
Date: 22/ 03/ 2024

Checked

Checked by: Samuel Miselbach
Signed: SM
Date: 22 / 03/ 2024

Approved

Approved by: Gustavo Brunelli
Signed: GB
Date: 22 / 03/ 2024

Revisions

No	Date	Approved
P01	26/ 11 / 2023	GB
P02	22/12/2023	GB
P03	31/01/2024	GB
P04	02/02/2024	GB
P05	08/02/2024	GB
P06	22/03/2024	GB

Atelier Ten
19 Perseverance Works
38 Kingsland Road
London E2 8DD
T +44 (0) 20 7749 5950
W atelierten.com

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Executive summary

This Energy and Sustainability Statement has been prepared to support the Reserved Matters Application for the development of Folkstone Harbour Plots F,G and H, Folkstone (‘the Site’), pursuant to the outline planning application document for the overarching masterplan design of Folkestone Harbour and Seafront. This is a standalone document prepared by Atelier Ten, outlining the environmental, sustainability and energy strategies for the proposed Site.

Plots F,G and H, hereafter referred to as the ‘Proposed Development’, consists of 405 new residential units with a mix of 1-4 bedroom apartments and town houses, as well as 48 commercial units of mixed uses, adjacent to the seafront and harbour in Folkestone. In addition, the development has basement-level car and bicycle parking for both the residential and commercial uses as well extensive landscaping across the plot.

The Applicant has informed the design team that high sustainability standards are to be adopted from the outset. Therefore, as the Proposed Development is submitted under the Reserved Matters Application, it will seek to follow, implement and where feasible exceed sustainability objectives and strategies proposed as part of the original outline planning application.

The Proposed Development adopts the following sustainability objectives:

Energy and whole life carbon

- The development adopts an energy hierarchy of lean, clean green to reduce operational energy and carbon emissions.
- The development has been designed to meet and where feasible surpass carbon targets set by Building Regulations Part L 2021
- In line with the outline planning application the development aligns with the Code For Sustainable Homes targets of reducing on-site carbon emissions by **58%** over a notional building as per Part L1A of the Building regulations 2010
- Reduce carbon emissions by **atleast 10%** via renewable technologies; these include:
 - Highly-efficient air source heat pumps for heating and cooling and mechanical ventilation with heat recovery.
 - Photovoltaic panels across rooftops
- Align the Proposed Development to industry-leading benchmarks for operational and embodied carbon.

Water reduction

- The Proposed Development will achieve a water consumption of **105 litres/person/day** through low flow and water-efficient fixtures and
- Incorporate grey water recycling to reduce the development’s water demand.

Health and well-being

- Site masterplan massing has been informed by computational analysis to maximise pedestrian comfort.
- Optimised façade design to provide good access to daylight and appropriate thermal comfort levels.
- Active transport is promoted through the incorporation cycle storage spaces and potential for a cycle hub.
- Promote the use of electrical vehicles by providing EV charging points.

Pollution

- An ‘All Electric’ servicing strategy allows the Proposed Development to accomplish an air quality ‘neutral’ Site.
- Vehicular strategy to minimise air pollution associated with vehicular traffic within the development.

Waste

- Incorporate circular economy principles into the proposed design, where feasible.
- Meet the following construction resource efficiency and diversion from landfill figures:
 - Construction waste: 13.9 m³ per 100 m²
 - Diversion from landfill by volume: Demolition: 80% Non-demolition: 95%
- The Proposed Development will incorporate a waste management strategy combined with suitable site waste storage areas.

Land use and ecology

- The Proposed Development will seek to minimise the impact on any existing biodiversity and target a significant biodiversity net gain by providing multiple terraces and extensive landscaping across the masterplan site.

Community

- The Proposed Development will provide a number of community enhancements, including the Goodsyard, landscaped spaces, the outdoor amphitheatre and a range of leisure, retail and dining offerings.

ASPIRATIONAL TARGETS

Embodied Carbon
500 kgCO₂/m²

Operational Energy
60 kWh/m²

WATER

- Low flow fixtures with leak detection
- 1** Rainwater harvesting
- Water metering
- Greywater harvesting

POLLUTION

- 1** Net positive air quality
- No negative noise impact
- Minimise light pollution
- Stormwater attenuation

WASTE

- Investigate circular economy
- Consolidated waste stores to reduce trips to the site
- Segregated waste streams to maximise recycling
- Achieve diversion of waste from landfill :
 - Demolition 70%
 - Non-Demolition 95%

COMMUNITY

- Communal gardens
- 1** Community space enhancement
- Promote local art on site
- 2** Landscape design refers to distinct character areas

HEALTH AND WELLBEING

- Healthy building materials
- 1** Exposed thermal mass
- 2** Private and communal amenity space
- 3** Façade optimised for daylight and energy
- 4** Views out
- Electrical car charging
- 5** Maximise bicycle storage provision and encourage active transport
- Development impact on external thermal comfort investigated and mitigated

BIODIVERSITY

- Enhance local ecology
- 1** Biodiversity gain
- Protecting ecological features

ROAD TO NET ZERO

- Responsibly sourced materials
- Single layer of basement helps reduce embodied carbon
- Explore design for reuse and recovery
- Low embodied carbon materials
- Structural grid optimisation
- Net zero carbon offsets
- 1** Solar shading
- Comfort cooling
- 2** Highly efficient HVAC
- 3** Maximise photovoltaic installation
- 4** Operable windows for natural ventilation
- Energy efficient lighting
- Feasibility for waste water heat recovery
- All electric buildings
- Battery storage
- Energy efficient lifts
- Smart metering
- Centralised energy network being investigated
- HVAC systems designed for future climate resilience



1 Introduction

The Proposed Development of Folkestone Plots F,G and H strives to combine ambitious sustainability goals with the highest level of spatial quality. Accordingly, Atelier Ten has prepared this document on behalf of Folkestone Harbour (GP) Limited (hereafter referred to as 'the Applicant') in support of the Reserved Matters Application for the Proposed Development.

Plots F,G and H, hereafter referred to as the 'Proposed Development', consists of 405 new residential units with a mix of 1-4 bedroom apartments and town houses, as well as 48 commercial units of mixed uses, arranged as independent blocks on the harbour in Folkestone. In addition, the development has basement and podium car and bicycle parking areas for residents and commercial units.

This document sets out the environmental and sustainability strategies incorporated into the Proposed Development in response to the previously submitted Outline Planning Application (OPA) and related conditions. This document acts as a standalone document, and any non-sustainability related information can be found within supporting documents submitted as part of the Reserved Matters Application.

Sustainability lies at the core of the Proposed Development as a whole. The Proposed Development aims to follow the strategies and targets set in the Outline Planning Consent - Ref Y17/1099/SH - by adopting a sustainable approach to design, construction, and operation. Relevant requirements of the OPA have been set out in Section 2, Outline Planning.

Section 3, Environmental Design and Sustainability, illustrates the Proposed Development's sustainable design and construction proposals.

Section 4, Masterplan Approach outlines how the massing has been considered on a larger scale, including the buildings impact on the external comfort of users of the spaces.

Finally, Section 5, Energy Strategy, outlines the design proposals to reduce energy and carbon impacts in line with the targets stated within the OPA.



Figure 1.1 Folkestone Plots FGH Design Proposal

1.1 The Folkestone Harbour and Seafront masterplan

The development of Folkestone Harbour and Seafront represents an opportunity to create a new waterfront environment of the highest spatial quality that provides the potential for people to live and work in a unique seaside location yet within an attractive town.

The approved masterplan allows for the construction of up to 1000 new residences and 10,000 square meters of commercial development accompanied by enhancements to public spaces and landscaping. The site is easily accessible from various points, ensuring residents can reach it on foot or via transportation, with designated parking areas for each plot.

To ensure the vision of the Folkestone Seafront is achieved, the following key aims were established:

- Establishing a network of distinctive public spaces suitable for commercial activities, such as leisure facilities and dining venues, while preserving and celebrating the site's historical structures.
- To create commercial outlets that will be appropriate and useful for residents.
- To enhance connectivity through new pedestrian walkways and improve car circulation.
- To use key buildings and new public squares through the site as "attractors" that will help encourage people to visit and generate year-round footfall.
- To offer a diverse range of residential options, including apartments, town houses, and beach houses, all featuring exceptional sea views to attract a wide range of buyers.
- To restore and provide public access to the railway viaduct, former railway station and Harbour Arm.

Ultimately, the plans aim to harmonise with existing Victorian and Edwardian architecture while establishing a lively and enticing neighbourhood. This community is envisioned to become a lasting home for a new generation, with buildings designed to withstand the test of time.

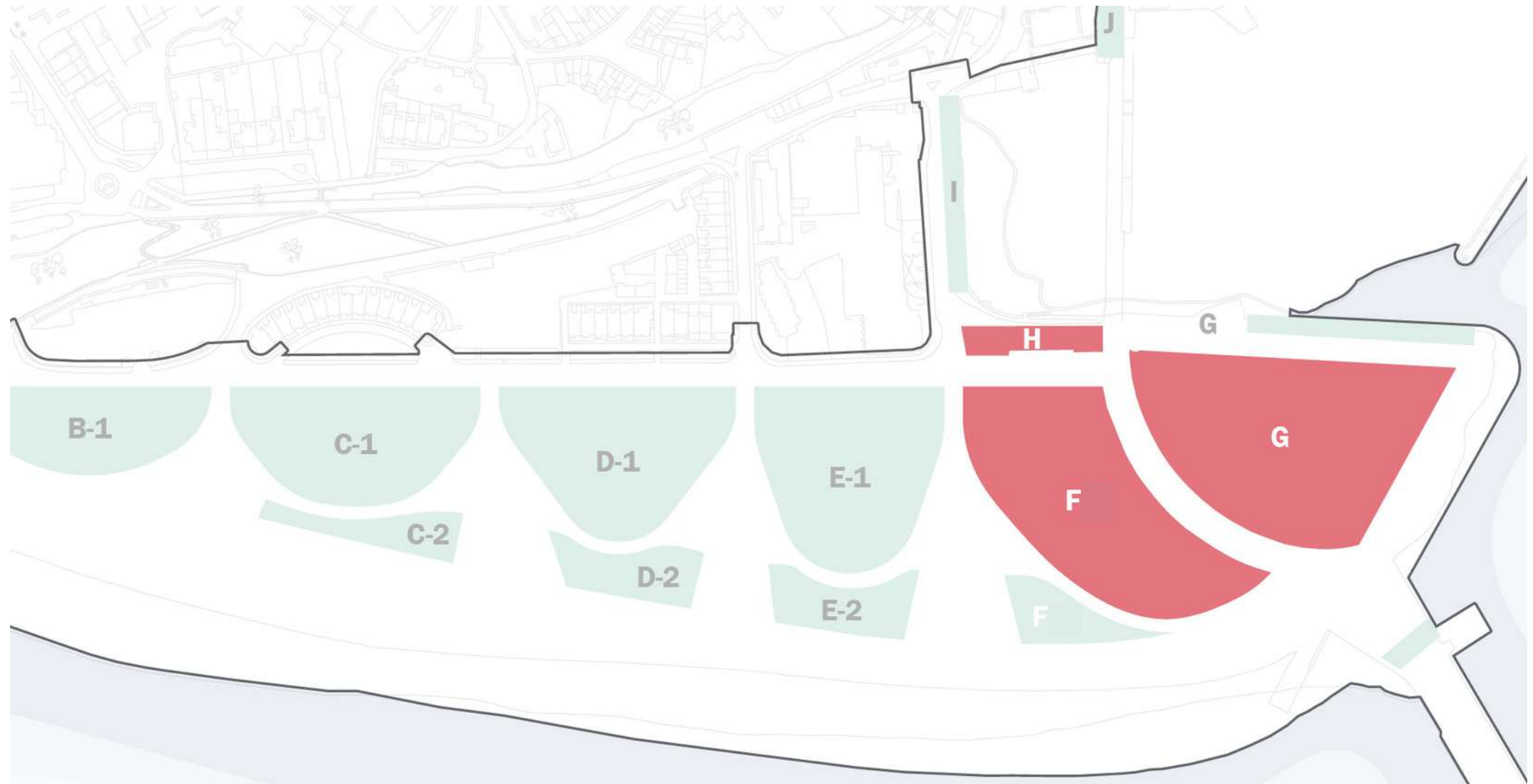


Figure 1.2 Plot F, G&H highlighted within Folkestone Harbour and Seafront existing masterplan

2 Outline planning

2.1 Planning context

Plots F,G & H are subject to the reserved matters concerning the outline planning consent granted to the overall Folkestone Harbour and Seafront masterplan.

Outline Planning Consent was granted in 2015 (ref. Y12/0897/SH), with amendment approved in 2018 (ref. Y17/1099/SH) for the development of Folkestone Seafront. Consent was granted for residential development of up to 1000 dwellings and 10,000m² of commercial space, will all matters reserved (Access, Appearance, Scale, Layout, and Landscaping). The Outline Planning Application (OPA) sets out formal ‘specifications’, ‘parameters’ and ‘guidelines’ for the layout, scale and appearance of future development plots, for the site’s landscaping and access arrangements.

The OPA included a Sustainability Statement that sets out the sustainability strategy for the masterplan, including Plots F,G and H. At OPA, the Site looked to bring together sound sustainable design principles in the natural coastal environment. To ensure this was achieved, five strategic aims were established and are outlined below:

1. Re-establish Folkestone’s relationship with the seafront
2. Celebrate the rich and varied natural and historical assets of Folkestone
3. Improve the quality of life and sense of place for residents and visitors
4. Provide an adaptable development which can respond to changing environmental and market conditions
5. Adopt a best practice holistic approach to sustainable development

Twelve sustainability themes, based on ‘Code for Sustainable Homes,’ as seen in Table 2.1, were established to fulfil the strategic aims of the site. At the time of the OPA, ‘Code for Sustainable Homes’ was deemed a viable option for certification for residential developments. However, this certification scheme is no longer available. Therefore, each of the twelve sustainability themes are addressed in the Reserved Matters Application with specific targets and aspirations following the goals and spirit of CSH, in line with the OPA strategies.

Table 2.1 Folkestone Seafront masterplan sustainability themes

Outline Planning Theme	Description	Reserved Matters Application
Energy and carbon	Addresses energy and carbon emitted from the Proposed Development.	Addressed within Section 3.1 and Section 5
Water	Addresses strategies to reduce water use.	Addressed within Section 3.2
Materials	Reduce the impact of materials, including responsible sourcing.	Addressed within Section 3.3
Surface water run-off	Flood risk assessments and management of surface water run-off rates	Addressed within Section 3.6
Waste	Addresses storage and collection of recyclable/non-recyclable waste, construction waste and management	Addressed within Section 3.5
Pollution	Reviews items such as NO _x emissions and GWP of insulates	Addressed within Section 3.6
Health and well-being	Addresses items including daylighting leisure and sports facilities	Addressed within Section 3.4
Management	Reviews items including home user guides, considerate construction practices and construction site impacts	The requirements associated with CSH management credits have been incorporated across different sustainability strategies from energy to waste in this RMA.
Ecology	Incorporates ecological value and biodiversity enhancement	Addressed within Section 3.7
Transport	Deals with items including connectivity, parking and traffic impact	Addressed within Section 3.4
Heritage and culture	This theme deals with the strategy taken to deal with the unique heritage of the site	Addressed within Section 3.8
Social inclusion	This item addresses social inclusion and interaction of people	Addressed within Section 3.8

3 Environmental design and sustainability

The Proposed Development aims to achieve high standards of sustainability. The strategies devised focus on achieving true sustainability by following a holistic approach in design, construction and operation. The Proposed Development follows industry benchmarks and tackles key sustainability issues including; energy and carbon reduction, water reduction, materials, health and well-being, waste reduction, pollution, land use and ecology, and community. Atelier Ten has identified strategies related to each issue which are reference within the following sections of this report.

3.1 Energy and carbon reduction

A full description of the energy strategy and calculation is outlined in more detail in Section 5, Energy Strategy.

The proposed design and operational philosophy prioritise the reduction of in-use energy consumption and associated carbon emissions. It adopts numerous passive, active and renewable measures to achieve this goal.

Passive design measures have been systematically integrated into the design process as set out below:

- Highly insulated building fabric to minimise heat loss during cold seasons with building fabric targets drawing from PassivHaus parameters.
- Low air permeability to reduce leakage through the façade
- Façade optimisation studies have been carried out to understand optimal window-to-wall ratios to reduce solar gain without compromising daylight penetration.
- Balcony and terrace placement to create external shading to limit summertime solar heat gain.
- Exposed thermal mass to regulate internal temperature fluctuations.
- Solar control glazing is specified on all façades.
- Operable windows to allow for natural ventilation to be utilised, and the majority of dwellings are dual aspect to enhance natural ventilation effectiveness.
- Large enclosed spaces such as the Goods Yard are fully naturally ventilated and passively heated/cooled.

In terms of active design measures, the Proposed Development has been designed to be 'All Electric'; this reduces the reliance on fossil fuels, including natural gas and utilises the benefits of the de-carbonising electrical grid. Highly efficient equipment will be incorporated into the design to help reduce the energy demand for heating, cooling, ventilation, and lighting.

The Proposed Development will incorporate energy efficient HVAC systems through mechanical ventilation with heat recovery (MVHR) units in each dwelling. These units provide fresh air to the space when natural ventilation is not viable, have low specific fan power (SFP) ratings to help reduce energy demand and high heat recovery efficiency to recover heat from the extract air, resulting in lower energy for ventilation and heating.

High efficiency air-source heat pumps (ASHPs) will provide low temperature hot water to the heat interface unit (HIU) and chilled water to the cooling interface unit (CIU) within each apartment. In addition, energy efficient lighting has been specified throughout the development. The ASHPs are often shared across multiple buildings within the plot to improve plant space efficiency, improve heat recovery and a potential reduction in embodied carbon.

The Proposed Development incorporates renewable energy in the form of solar photovoltaic (PVs) panels and ASHPs. The development aims to maximise the area of solar PV. In addition to on the building roof spaces, PV panels on terraces and elsewhere across the development will be investigated to maximise on-site generation. This, combined with the ASHPs will achieve significant carbon reductions for the Proposed Development.

Further to the above, the following low and zero carbon technologies will also be investigated for inclusion in the Proposed Development. These items will be researched further in later design stages to determine their feasibility:

- Ground source heat pumps
- Wastewater heat recovery units
- Battery storage to be used during times of high electric demand on the grid.

As further detailed in Section 5, the Proposed Development achieves a reduction of 58% of regulated carbon emissions calculated following Part L 2021 methodology, in alignment with the OPA.

3.2 Water reduction

The Proposed Development will minimise the consumption of potable water. As stated within the conditions relating to the OPA, a water demand of no more than 105 l/person/day is required. Water-efficient fixtures and fittings are proposed, including dual-flush toilets and low flow rate wash hand basin taps, shower-heads, and kitchen taps. The following flow rates are presented at this stage:

- Toilets 0.1 l/s
- Wash and basin: 0.15 l/s
- Showers: 0.25 l/s
- Bath: 0.43 l/s

Further to the above, greywater recycling has been proposed for the development to help meet the water consumption targets. The inclusion of water recycling allows the use of high water flow fitting to suit the required target high-end market of the development without increasing potable water demand.

Water meters, with pulse or other open protocol communication output to enable connection to an appropriate utility monitoring and management system e.g. building management system (BMS), are proposed for the mains water supply to the buildings. Additional submeters of the same type are fitted on the supply to individual water consuming plant or building areas. This metering strategy ensures that water consumption can be monitored and managed encouraging reductions. This system will also be used as a leak detection system.

3.3 Materials

The Proposed Development seeks to align itself to industry best practices for embodied carbon. This is an area that significantly evolved from the original requirements set within the Code for Sustainable Homes. The growing focus on embodied carbon and the circular economy has sparked renewed initiatives to minimise the environmental impact of building materials. A significant importance has been given to attain a notable level of material sustainability. This endeavour has been guided by the adoption of a specific embodied carbon hierarchy, whenever possible:

- Use Less
- Reuse and recycle
- Specify low carbon
- Offset

The procurement of sustainable materials is a necessity to lower life cycle carbon emissions and improve sustainability. Emphasis will be put on designers and contractors to source materials locally and specify and procure materials with valid Environmental Product Declarations (EPDs). This will be secured by selecting materials with high sustainability standards such as sustainably sourced wood, recycled steel and low carbon concrete.

The design team has investigated embodied carbon hotspots of the Proposed Development and developed various strategies and construction techniques to reduce embodied carbon. These primarily relate to the structural and façade systems.

Additionally, material strategies consider vulnerable parts of the Proposed Development and address them accordingly. Areas exposed to high pedestrian traffic and vehicular and trolley movements have been considered for such treatment, and exposed parts of the building have been protected from material degradation through intense rainfall, high temperatures, and the aggressive saline environment. This process will minimise the frequency of material replacement and improve whole life performance.

The project intends to select suppliers who can provide an environmental management system (EMS) certificate (e.g. EMAS/ ISO 14001/ BES6001 certificate). In addition, the principal contractor will also be expected to operate under an accredited EMS, which will demonstrate environmental accountability for their practice.

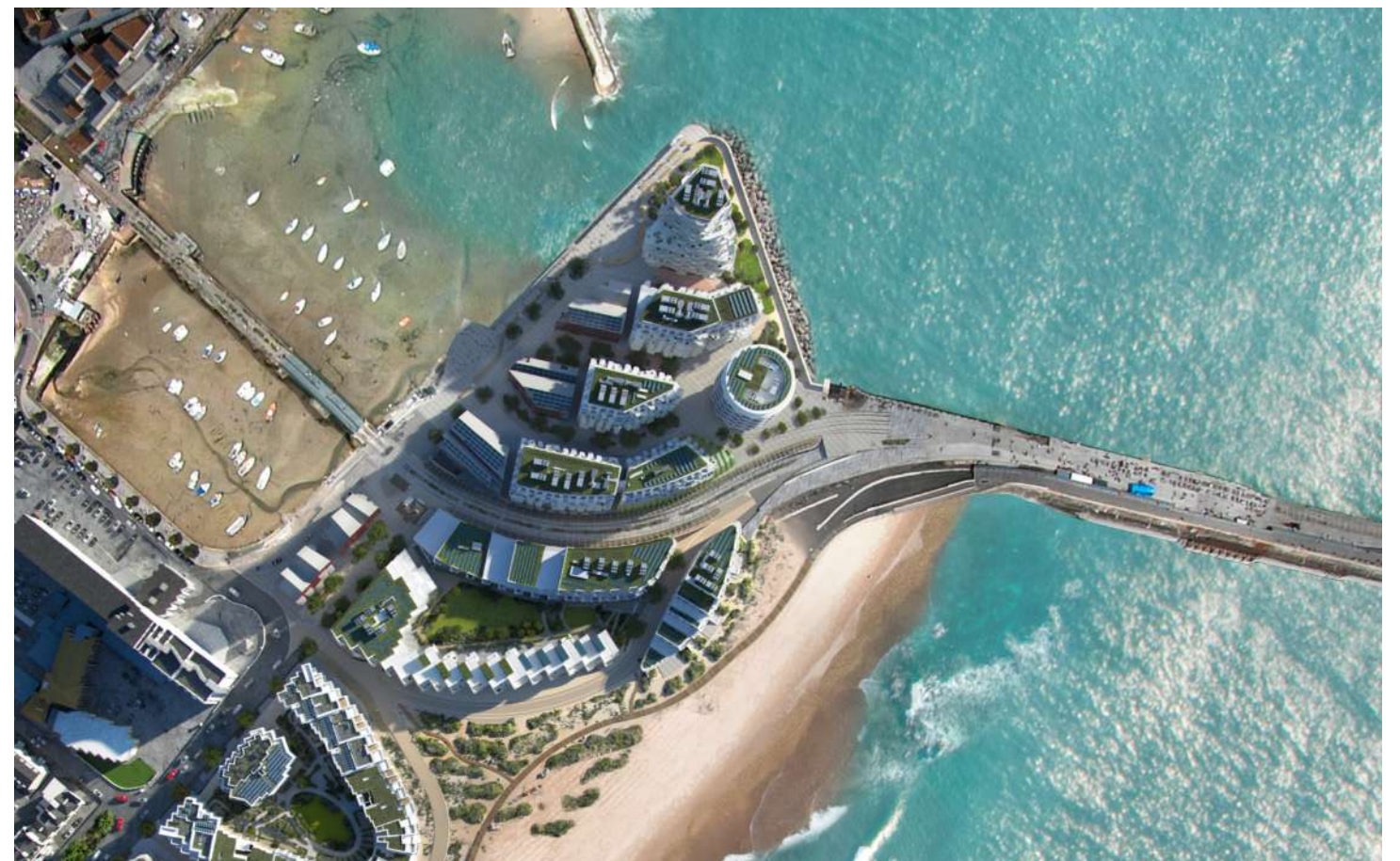


Figure 3.1 Proposed PV roof arrangement

3.4 Health and well-being

The Proposed Development prioritises the integral link between the built environment and occupant well-being. This section underscores the development’s commitment to a holistic living experience. Through providing daylighting, minimising overheating, healthy modes of transport and ensuring air quality, the development will strive to create a community that minimises its environmental impact while actively promoting the physical, mental, and social well-being of its inhabitants.

3.4.1 Transport

The Proposed Development aims to promote healthy and active transport methods by providing private cycle storage spaces for residents, easily accessible bicycle lanes, and publicly accessible and secure bicycle parking facilities. The development also proposes to include a ‘cycle hub’ within Plot H to incentivise this sustainable means of transportation. The scheme will provide a total of 1063 bicycle parking spaces:

- 733 residential cycle spaces
- 212 short-to-medium term commercial cycle spaces
- 118 medium-to-long term commercial cycle spaces

These requirements are as per the Kent Design Guide Parking Standards 2021. The proposal will also improve pedestrian infrastructure to and around the development and encourage physical activity through the use of footpaths. Vehicle management and interaction with pedestrians has been carefully considered through the design process to ensure the pedestrian comfort is maximised. There is also a proposal for a consolidated delivery hub to centralise deliveries and reduce the extent of on-site transport. EV charging will be available in the basement parking areas.

Refer to the Transport Strategy document by Pell Frischmann for further information.

3.4.2 Air quality

The development will promote high indoor air quality by providing large areas of openable windows and doors to encourage natural ventilation during times of favourable external conditions. Furthermore, the material specifications will explicitly avoid products containing Volatile Organic Compounds (VOCs) wherever possible to improve indoor air quality. Typical VOC sources to be avoided include certain paints, lacquers, some pressed timber products (including some hardboards, particle boards, hardwood plywood wall panelling), glues and adhesives, furniture made from pressed wood products and foamed insulation.

The Proposed Development aims to minimise and eliminate where possible the presence of indoor pollutants including particulate matter (PM), organic and inorganic gases following criteria stipulated in WELL Standard V2. To help achieve this, air filters will be present on the MVHR units selected for all residential dwellings. Ventilation rates will provide sufficient fresh air to remove pollutants. The vehicle management strategy will also reduce on-site transport, and hence air pollution.

3.4.3 Façade Optimisation and Daylighting

The Proposed Development will aim to optimise the façade design to balance the impact of excessive solar heat gains causing overheating, beneficial solar heat gains to reduce heating demand and the quality of daylight access to the dwelling units.

Figure 3.2 shows the early-stage solar insolation studies conducted on the development massing to identify solar heat gain hotspots - the dark orange and yellow areas indicate spaces receiving high levels of solar gain that may be susceptible to overheating.

These initial studies helped the design team to identify areas at risk of high/low solar insolation and inform the initial proposals for the façade design and glazing ratio.

As the massing and façade further developed, a second, more detailed iteration of this study was conducted using Atelier Ten’s bespoke parametric façade tool, as shown in Figure 3.3. This was focussed on optimising the façade parameters for a series of sample apartments, that could then be used to develop a guiding philosophy across the wider masterplan for similar units.

The parametric evaluations were carried out using a design iteration testing approach to assess different design parameters and their alignment with the design project’s designated targets for daylight, overheating, and heating demand as specified in Table 3.1.

Table 3.1 Parametric analysis assessment criteria

Assessment Criteria	Targets
Overheating	TM59 Criteria 1a (Living rooms) – number of hours which delta T is greater than 1K should not be more than 3% of the occupied hours TM59 Criteria 1b (Bedrooms) during 22:00-07:00 the number of hours in which the operative temperature exceeds 26 °C should not be more than 1% of the occupied hours.
Daylight	Spatial Daylight autonomy (sDA) target of 200 lx for 40% of the occupied hours for more than 30% floor area (sDA is expressed as a percentage and represents the portion of the annual occupied hours during which a specific point or area within the indoor space receives sufficient daylight levels without the need for artificial lighting. In other words, it measures the extent to which the space is adequately illuminated by natural light throughout the year.)
Heating	Achieve a heating demand between 15-25 kWh/m²/yr

By varying the space use type, window-to-wall ratio, shading depth and glazing U and g-values, this iterative and analytical approach allowed the team to optimise the shading design and glazing ratios to balance the key design drivers of overheating, energy demand and daylight levels, whilst considering other drivers such as view out and design aesthetic.

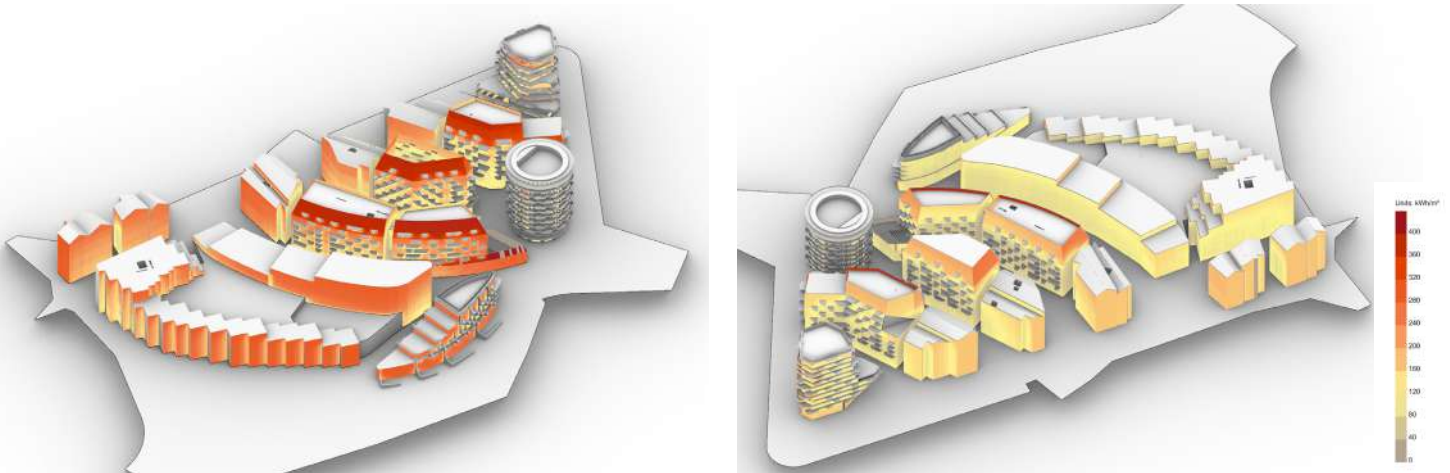


Figure 3.2 Solar insolation studies conducted on the massing during a typical summer period (21st June) in different orientation

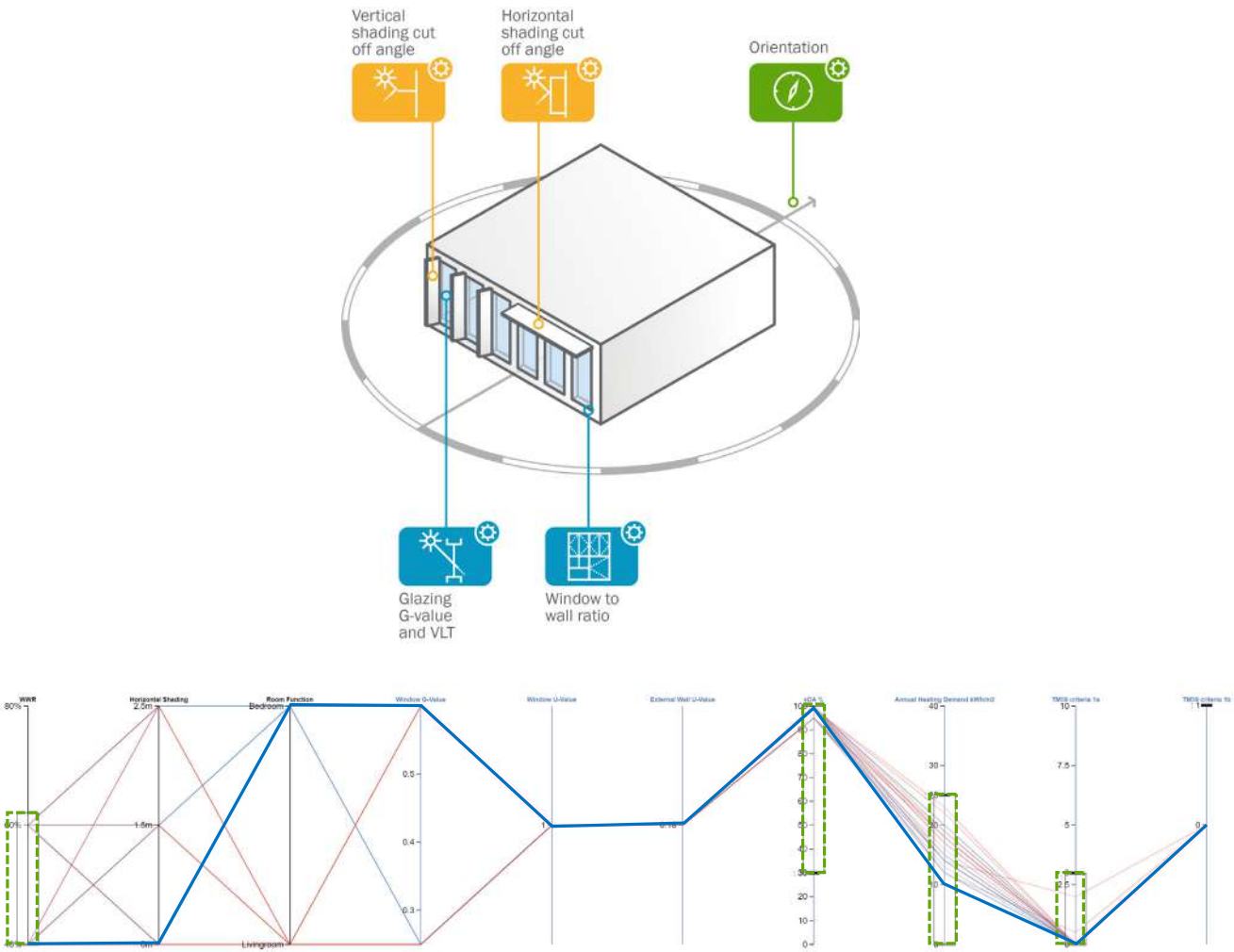


Figure 3.3 Parametric design approach for façade optimisation study

3.4.4 Overheating

Overheating is an issue that has moved to the forefront of designers' minds. The introduction of Part O emphasises the need to minimise overheating and reduce the reliance on mechanical cooling. The Proposed Development has introduced several passive measures to minimise overheating. These measures are summarised below:

- Exposed thermal mass to regulate the internal temperature
- Solar-controlled glazing with low g-values and external balconies and winter gardens to minimise the ingress of solar heat gain.
- Openable windows provided across all dwellings to maximise natural ventilation
- Maximising cross-ventilation through apartments by prioritising dual-aspect dwelling design

The optimisation of the façades reduces the overheating risk in the Proposed Development, however the dwellings will be provided with active cooling to meet market demand and mitigate any remaining overheating risk.

Atelier Ten have performed overheating risk assessments for a series of residential units across the proposed development. The purpose of the assessment is to establish whether internal conditions are likely to remain comfortable during the summer, for both current and predicted future climates without recourse to active cooling. A passing result demonstrates compliance with Building Regulations summarised in Approved Document Part O (ADO) is achieved.

Dynamic thermal modelling is used in the assessment, following the procedures set out in 'Overheating: Approved Document O' which is based on 'CIBSE TM59: 2017 Design methodology for the assessment of overheating risk in homes'.

The following section presents the methodology followed to assess the overheating risk of the representative sample apartments.

Methodology

CIBSE Technical Memorandum 59 on "Design methodology for the assessment of overheating risk in homes" (CIBSE TM59:2017) provides a methodology to predict overheating in residential buildings. The criteria for compliance differ for naturally ventilated buildings and mechanically ventilated buildings.

Whilst the flats will all be provided with cooling equipment, in order to ensure that these spaces have been optimised to avoid overheating in the first place they will be treated as naturally ventilated for the purpose of this exercise. Compliance has been assessed against TM59 criteria (a) and (b) described below.

For predominantly naturally ventilated homes, TM59 provides two criteria for assessing overheating risk. Compliance is based on passing both of the following criteria:

- (a) For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to 1 K during the period May to September inclusive shall not be more than 3% of occupied hours. (Note that ΔT is the temperature difference between the indoor operative temperature and the threshold comfort temperature, which is variable depending on weather).
- (b) For bedrooms only: to guarantee comfort during the sleeping hours, the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note that 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

Weather files

The overheating risks of the spaces were assessed for current and future climate scenarios. Following the methodology set out in CIBSE TM49, the following three years were selected to form the set of probabilistic design summer years for future weather scenarios:

- DSY1 for the 2020s, high emissions, 50th percentile scenario - a moderately warm summer
- DSY2 for the 2020s, high emissions, 50th percentile scenario - a longer, persistently warm summer
- DSY3 for the 2020s, high emissions, 50th percentile scenario - a short, highly intense summer

The analysis uses DSY weather files for Southampton as this was considered to be the most climatically similar of the approved CIBSE weather data files, The development must meet Part O requirements using the DSY1 (2020High50%) weather file however scenarios have been tested using DSY2 and DSY3 weather files too to inform design.

Modelling

Dynamic thermal modelling was performed using IES VE v2022.4.1.0, based on the most recent drawing set received.

A selection of 'at-risk' units shown in Table 3.2 were selected. These were considered potentially most at risk of overheating due to their orientation and proposed façade design.

The fabric properties align with those outlined within Section 5, Energy Strategy and will be discussed in greater detail in that chapter.

Results

The proposed design complies with Part O of the Building Regulations (and CIBSE TM59) by not exceeding the criteria (a) or (b) overheating thresholds for DSY1 weather file.

It is important to note that all dwellings across Plots F, G and H will be fitted with cooling equipment to ensure thermal comfort against future climate change.

Table 3.2 Sample selection of residential units for analysis

Residential unit	Bedrooms	Main orientations
F Building1-411	3	W / S
F Building 3-501	2	SW
F Building 4-303	2	SE
G Building 2-504	2	SW
G Building 5-802/902 (maisonette)	1	SW
G Building 6-904	2	S
G Building 8-603	3	N / E / S
G Building 9-811	2	N / SW / SE

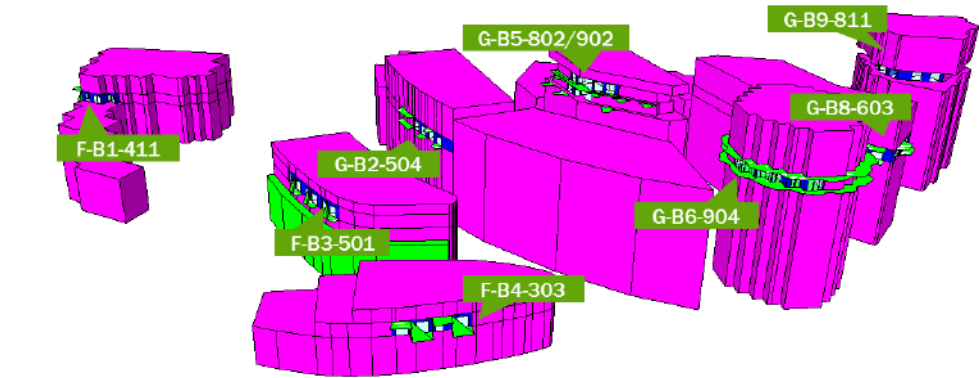


Figure 3.4 Folkstone plots F and G overheating assessment 3D model

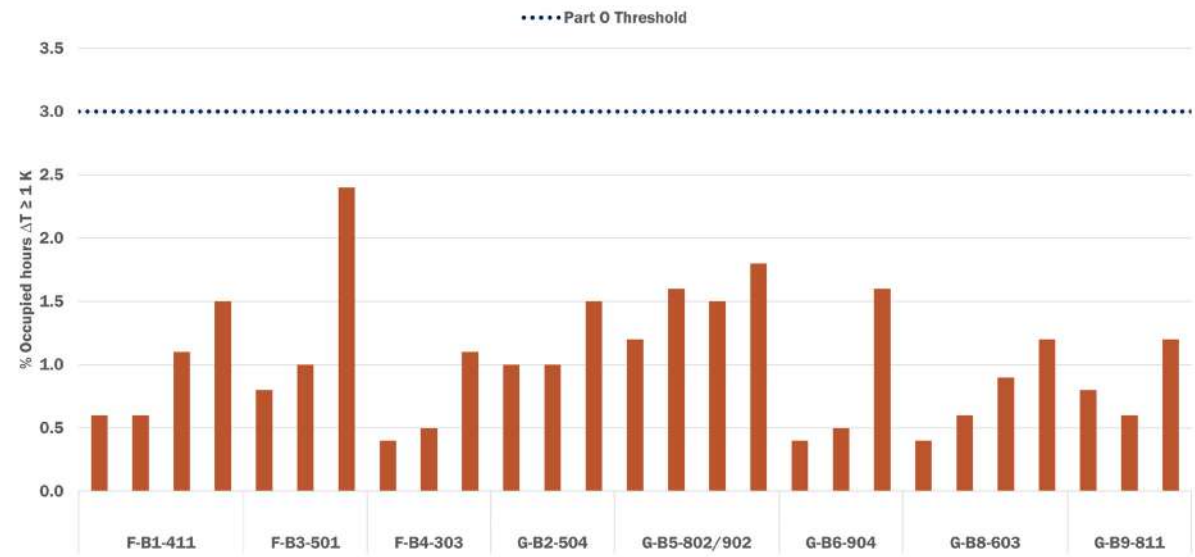


Figure 3.5 TM59:2017 overheating criterion (a): kitchens, living rooms and bedrooms

3.5 Waste Reduction

The Proposed Development aims to integrate the principles of the circular economy into the project's framework. Circular economy involves the idea of preserving materials in use at their optimal value for an extended duration, thereby reducing material wastage.

At its essence, three fundamental concepts are integral to this approach, and they are inherently connected to principles aimed at decreasing overall carbon emissions throughout the life cycle while also minimising material waste. These are:

- Conserve resources, increase efficiency and source sustainably as with most, by
 - Minimising the quantities of materials used
 - Specifying and sourcing materials and other resources responsibly and sustainably
- Design to eliminate waste (and for ease of maintenance by):
 - Designing for longevity, adaptability or flexibility and reusability or recoverability
 - Designing out construction, demolition, excavation, and municipal waste
- Manage waste sustainably and at the highest value by:
 - Managing demolition waste
 - Managing excavation waste
 - Managing construction waste
 - Managing municipal waste

As a principle the Proposed Development shall employ and implement a Site Waste Management Plan (SWMP). The plan would aim to identify the type of waste materials being removed from the site to promote resource efficiency via the effective management of construction waste. Construction waste materials will be sorted into separate key waste groups, either on-site or off-site and diverted from landfills. Wherever feasible, non-hazardous construction waste generated by the project will be reused, salvaged/ reclaimed, recycled, composted, recovered on or off-site and/or returned to the supplier.

At least 85% of construction waste (by volume) will be diverted from landfill with no more than 4.8m³ of construction waste per 100m² GIA. The targets will form part of the contractor documents to ensure they are achieved on-site.

As there are no existing buildings on the site, the primary feature is the car park area. Thus, methods to reuse the existing materials from the car park and other elements on the site in the new development scheme will be explored. A pre-demolition audit of the existing material on-site will be commissioned to identify opportunities for material reuse.

To reduce operational waste being sent to landfill (i.e. resident and commercial unit waste), an appropriate collection regime with separate recycling streams and adequate area shall be provided for the residents. Dedicated food waste and recycling storage facilities will be provided for all dwellings and for the commercial units. This may include under kitchen-counter space for separate bins and communal space for multiple bins for recycling and potentially composting as well as an information pack for residents. An on-site management strategy will be put in place to transfer bins to central collection points as required. More details in the waste strategy are included in the in the Design and Access Statement.

Furthermore, the design of the Proposed Development will consider end-of-life strategies and identify opportunities for easy adaptation, flexibility, and disassembly to minimise waste at the end of the building life.

3.6 Pollution

To reduce pollution arising from the operation of the Proposed Development, an 'all electric' HVAC system is proposed. This eliminates the need for combustion and allows the building to target net positive air quality.

The building services design aims to use refrigerants with low GWP (Global Warming Potential). Furthermore, ASHP shall be provided with leak detection system with automatic response mechanisms to minimise the environmental impact of refrigerants.

The Proposed Development will minimise external light pollution. The external lighting on the buildings will be designed to avoid spill into neighbouring properties or skywards to avoid light pollution. The lighting to the public realm will also be sensitive to resident and commercial space users, as well as avoiding light pollution in the hours of darkness or in a way that may negatively impact the site biodiversity.

The Proposed Development will also minimise noise pollution and achieve no negative noise impact. All equipment will be suitably attenuated to minimise the impact of plant operation on the site and neighbouring properties.



Figure 3.7 Waste storage and collection strategy

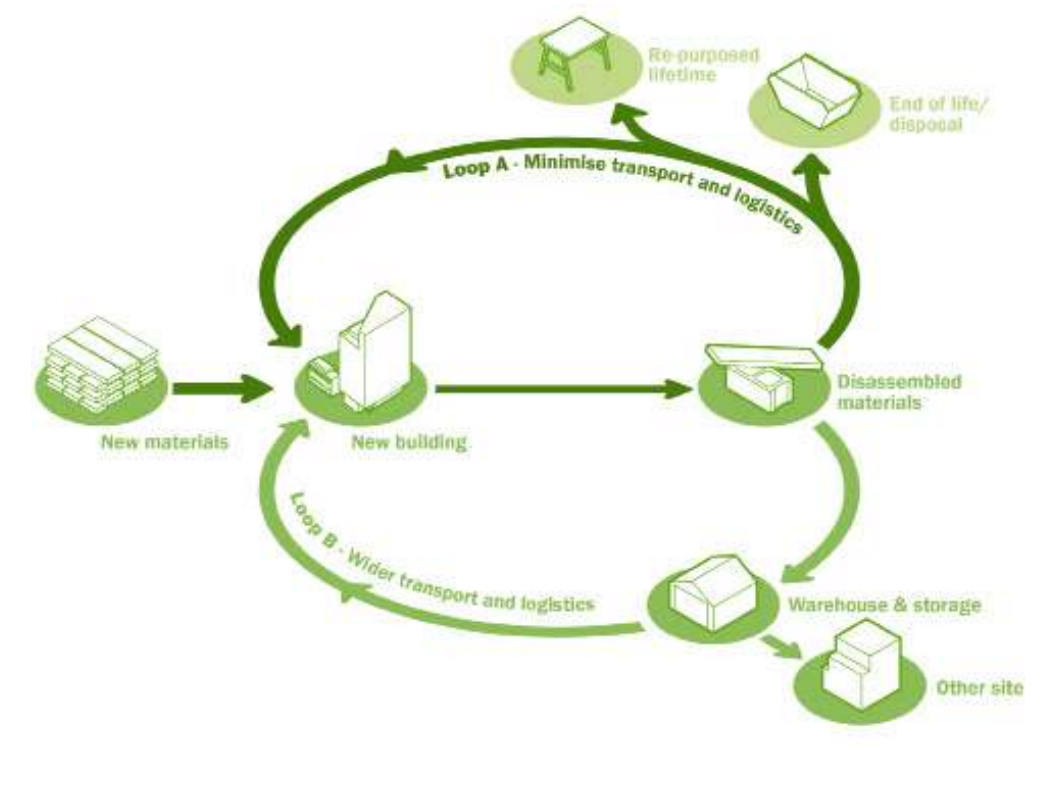


Figure 3.6 Circular economy loop

3.7 Land use and ecology

The Proposed Development seeks to minimise the impact of construction on the existing biodiversity. The landscape design is focused on biodiversity and the proposal aims to maximise green and amenity spaces, emphasising the selection of native plant, shrub and tree species. Refer to the landscape strategy document by Spacehub for further information.

More information on the ecological features of the site can be found in the Preliminary Ecological Appraisal undertaken for the site by Fellgrove. A Biodiversity Net Gain assessment will be provided as a separate report to this application.

3.8 Community

The Proposed Development follows the Folkestone Harbour and Seafront masterplan vision to provide regeneration to the existing community and extend the benefits of the masterplan beyond the immediate area.

It will create hundreds of new jobs, creating space for new chefs, front of house staff, maintenance engineers, gardeners, customer service staff and more. The harbour will also breathe new life into spaces for existing employees.

Existing community businesses on the seafront will have the opportunity to grow into brick-and-mortar stores encouraging real progress and inviting new businesses into the space. More appealing public spaces will allow businesses to thrive with access to developed amenities

To ensure the proposed design is sensitive to the existing architecture of the area, several studies were carried out by the architect; Aisfor. Information relating to the design of the Proposed Development can be found in the Design and Access Statement.

The Proposed Development provides significant areas for community use across the site, including:

- The Goodsynd
- An enhanced retail, restaurant and leisure offering.
- A large area of publicly accessible landscaped spaces
- External amphitheatre
- Harbour station
- Viewing platform
- Seafront park

The idea is to create a community for Plot F, G and H, as well as the wider seafront development, whilst also enhancing the existing fabric and character of the Folkestone harbour area.

The applicant has ongoing relationships with the artists through Creative Folkestone Foundation and the Folkestone Triennial and this collaboration will continue across Plots F, G and H, with artwork forming part of the placemaking of the development.



Figure 3.8 Site wide landscaping strategy



Figure 3.9 Landscape and community at Plots F, G and H, including the Goodsynd event space

4 Masterplan Approach

The Proposed Development aims to shape a sustainable living environment beyond the individual building boundaries. Central to this vision is a commitment to urban development strategies that prioritise solar access and outdoor comfort. Through thoughtful design and planning, the Proposed Development aims to ensure a sustainable and year-long usable environment for residents and the local community.

4.1 Urban development and site planning

During the design process, extensive research was undertaken to investigate the influence of solar access on human comfort in the planned open spaces and the impact the proposed massing had on it. The analysis involved examining the building's form and orientation during typical summer and winter solstices, as well as the spring equinox.

The studies helped inform the massing as it was being developed by the design team. Specific outdoor areas within the development were assessed, with an aim to determine the number of sun hours they receive throughout the day at different times of the year (refer to Figure 4.1). This information is crucial in evaluating the impact of solar access on the comfort experienced in these outdoor spaces.

To assess the comfort levels in the specified open public areas, the Universal Thermal Comfort Index (UTCI) was used as a matrix of measuring thermal stress. This comprehensive study considered different environmental scenarios to understand how the outdoor spaces would feel (UTCI interpretation) during the day under varying climatic conditions (see example in Figure 4.2).

By combining massing and orientation studies with UTCI analysis, valuable insights were gained to optimize the design and ensure comfortable outdoor experiences for the public.

For the majority of sun and wind conditions, the proposed massing results in a thermally comfortable outcome for pedestrians. Given the exposed nature of the site, and its proximity to the coast, when it is both cold and windy pedestrians may experience some level of thermal discomfort, however it is anticipated that the external spaces will only be used for shorter periods at a time when the general weather conditions are unpleasant and that the street created will offer shelter from stringer winds. Similarly, in warmer summer days, when wind is not strong enough to reduce heat stress, the streets can provide shading from the harsher sun and improve comfort.

These thermal comfort studies were complemented by wind tunnel tests that informed the integration of mitigation features at pedestrian scale.

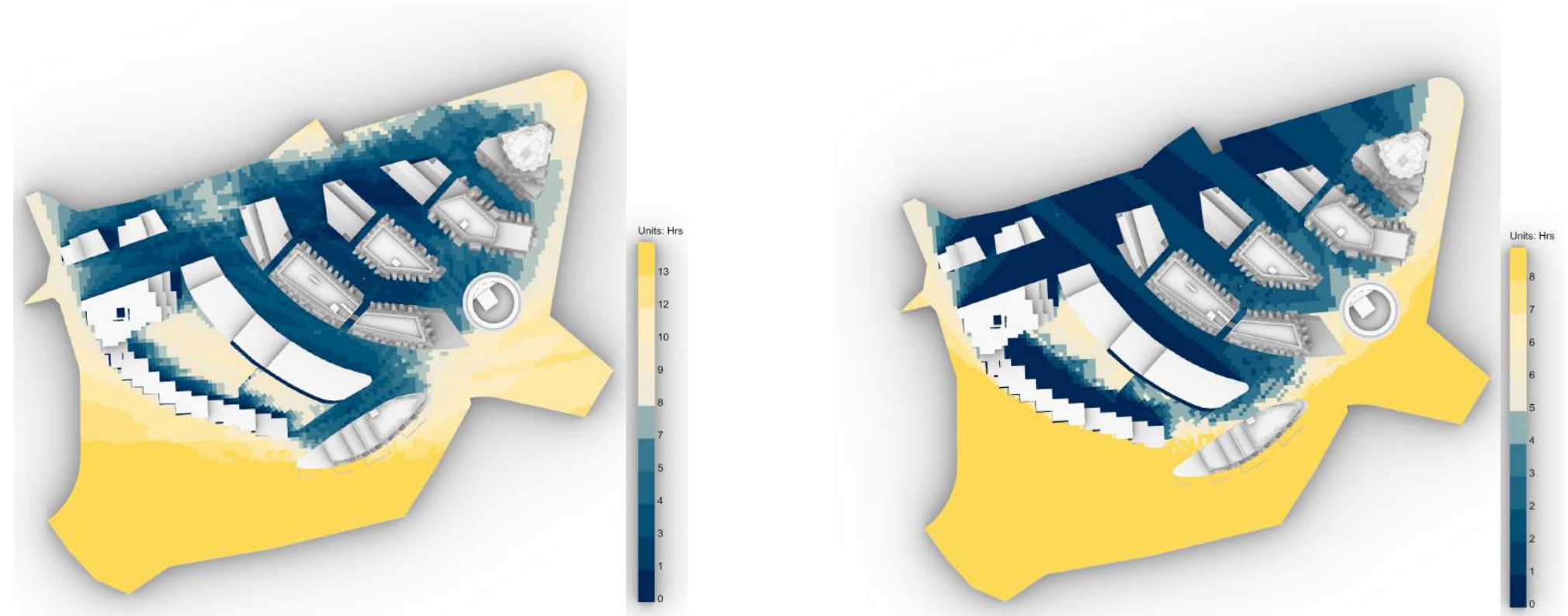


Figure 4.1 Sun hours study on March 21st (left) and December 21st (right)

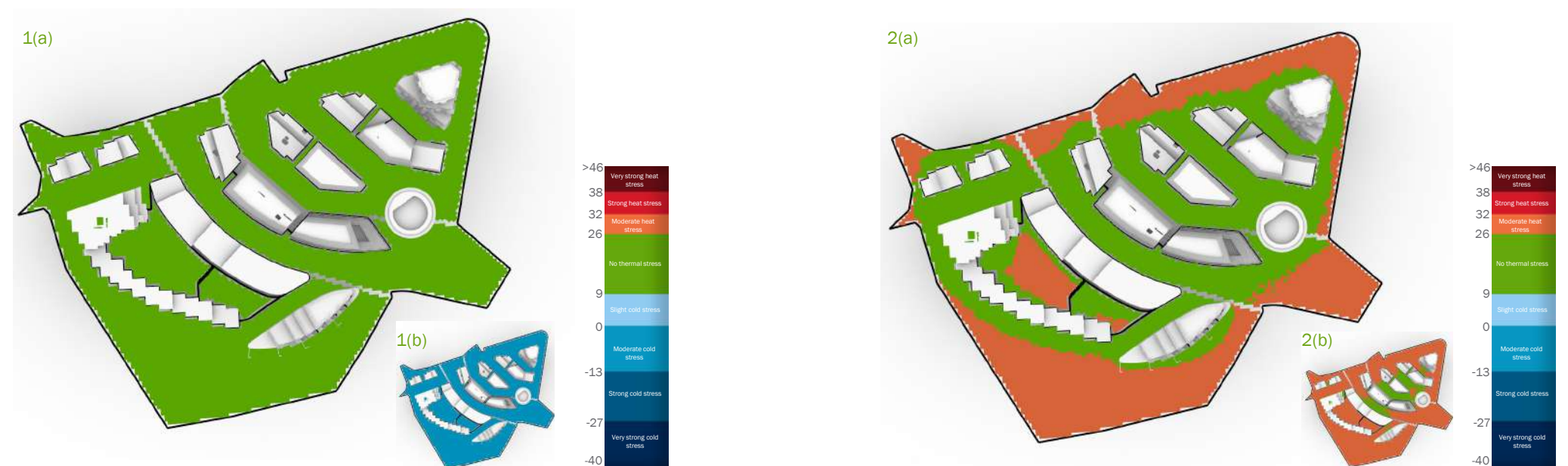


Figure 4.2 Sample UTCI studies: Sunny winter day (1(a) Without wind, 1(b) With wind) and Sunny Summer day (2(a) With wind, 2(b) Without wind)

5 Energy strategy

The proposed design and operational philosophy prioritise the reduction of in-use energy consumption and associated carbon emissions. It adopts numerous passive, active and renewable measures to achieve carbon reduction proposals in line with the aspirations of the outline planning application.

To minimise CO₂ emissions, the design strategy has followed the energy hierarchy detailed in Places and Policies Local Plan. In order of priority, the steps include:

- 1. Reducing the energy load of the development;
- 2. Maximising the energy efficiency of the building fabric;
- 3. Delivering energy from renewable sources;
- 4. Delivering energy from low carbon technologies; and
- 5. Any continuing use of fossil fuels to be clean and efficient for heating and co-generation.

The Proposed Development consists of a mixture of residential and commercial units. However, as the development is majority residential (405 new residential units totalling around 44000 m²) with a smaller area of commercial units totalling around 7,500 m², the energy assessment and carbon assessment should be compliant with requirements for residential developments.

The following section provides details of the proposed energy strategy and provides the results of the carbon calculations.

5.1 Outline planning application

As mentioned in Section 2, the Proposed Development is submitted as a Reserved Matters Application and must meet the commitments stated within the original OPA 2015 (ref. Y12/0897/SH). Relating to energy in particular, the OPA stated the following:

“The development will seek to achieve, and where possible, exceed the national requirement for residential developments to meet the energy requirements of CSH level 4 from 2013 and carbon compliance, equivalent to Code 5, in 2016”.

Code for Sustainable Homes level 4 translates to 25% reduction over Part L1A 2010. However, since then, this documentation has been discontinued and would not be a suitable benchmark for the development.

The current building regulations, ADL1 2021 narrows the gap between efficient building design and their point of comparison, the ‘Notional Building’. On this, a building compliant with ADL1 2021 would require up to 30% carbon reduction over the outgoing current Part L 2013 compliant building. In contrast to the scale of this change, the switch from Part L 2010 to Part L 2013, was estimated to yield a 6% reduction in regulated carbon emissions.

With this in mind and to establish a suitable carbon reduction, the Proposed Development will target compliance with Part L1 2021, which represents a 36% improvement over Part L1A 2010 (the original regulation at the time of the OPA), thus surpassing the OPA target. Section 5.5 explains the calculations used to demonstrate this and the results achieved.

5.2 Building fabric and systems design

The Proposed Development adopted core principles that focus on minimising energy demand and efficient building fabric. The following section outlines the passive and active design strategies to reduce energy demand. These strategies address points one and two of the energy hierarchy.

5.2.1 Passive design measures

Integrating passive design principles from the outset makes the building less reliant on heating, ventilation and air conditioning (HVAC) systems and reduces the need for artificial lighting. Therefore, the following passive design measures have been incorporated:

- Highly insulated building fabric to minimise heat loss during cold seasons. The thermal performance of the building fabric draws from targets established by PassivHaus standard (Table 5.1)
- Low air permeability to reduce leakage through the façade
- Façade optimisation studies have been carried out to inform window-to-wall ratios to reduce solar gain without compromising daylight penetration.
- External balconies have been incorporated as amenity space for dwellings whilst doubling as passive shading for units adjacent or below.
- Solar-controlled glazing is specified on all façades.
- Operable windows to allow for natural ventilation to be utilised, and dwelling having dual aspect to enhance natural ventilation effectiveness where possible.
- Exposed thermal mass to regulate internal temperature fluctuations

Table 5.1 Residential Building Fabric Performance

Fabric Element	Part L 2021 Regulations	PassivHaus Standard	Folkstone F,G & H Target
U value (W/m²K)			
External Walls	0.18 W/m²K	0.15 W/m²K	0.15 W/m²K
Roof	0.11 W/m²K	0.15 W/m²K	0.11 W/m²K
Terrace	0.16 W/m²K	0.15 W/m²K	0.16 W/m²K
Ground Floor / Exposed Floor	0.13 W/m²K	0.15 W/m²K	0.15 W/m²K
Windows	1.2 W/m²K	0.8-1.0 W/m²K	1.0 W/m²K
Air tightness			
Air Permeability @50Pa	5 m³/hr. m²	<3 m³/hr. m²	3 m³/hr. m²
Vertical glazing			
g-value	-	-	0.50
VLT	-	-	0.70

5.2.2 Active design measures

Active systems will be the predominant contributor to the energy consumption of the buildings. By improving the energy efficiency of HVAC, domestic hot water (DHW), and lighting systems, the need for energy in operation during the lifetime of the building will be reduced.

The Proposed Development includes the following active design measures to reduce energy demand.

Energy-efficient lighting

Availability of daylight in the dwellings will reduce the need for artificial lighting and the associated internal gains in most rooms. However, the need for artificial lighting cannot be eliminated. Therefore, to reduce the energy use for lighting and cooling, lighting systems will be specified to achieve high efficiency with LED lighting throughout.

In landlord areas and back-of-house (BOH) spaces, lighting controls will include automated on-off switching based on presence and absence detection. The parasitic loads associated with the lighting controls will be minimised through the selection of low power sensors and the adoption of time-switch controls.

Heating, cooling and ventilation

The heating and hot water strategy is based upon centralised air source heat pumps (ASHP) feeding heat interface units within apartments serving a wet underfloor heating system. Cooling will be delivered via the same ASHP to cooling interface units serving fan coil units in the apartments.

The Proposed Development’s residential areas have been designed to have localised mechanical ventilation with heat recovery (MVHR) units for optimum energy, air quality and thermal comfort performance. All MVHR units will be selected to have high heat recovery efficiencies and low specific fan powers. To maximise airflow, each unit will be equipped with a ‘normal’ and ‘boost’ selector switch within the kitchen.

Vertical transport

Energy efficient lifts will be installed in the building to reduce emissions related to vertical transport systems.

Equipment and appliances

Where it is provided within the shell and core base build installation, energy efficient equipment and appliances will be preferred to reduce unregulated energy use and ensure savings in operation.

Metering and building management system

Beyond the individually metered dwellings, Separate accessible energy sub-meters will be installed to facilitate the monitoring of substantial energy use and function areas within the building. A building management system (BMS) will be installed in the building to monitor and control the building services thus enabling optimal operation.

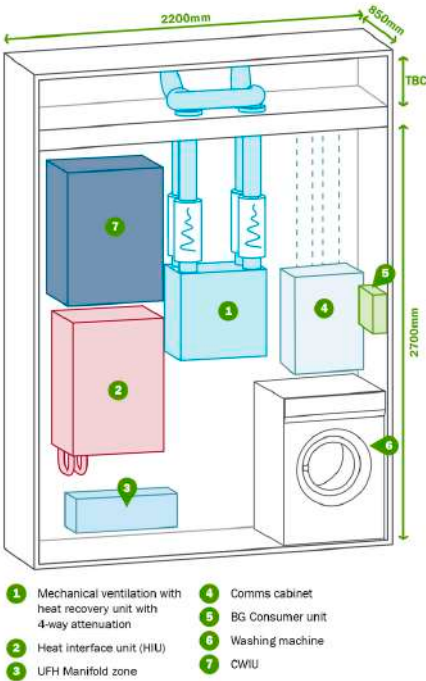


Figure 5.1 Example of dwelling utility cupboard containing heating, cooling and ventilation equipment

5.3 Low and zero carbon technologies

After incorporating suitable passive and active design measures, the Proposed Development sought opportunities to employ renewable energy technologies, in order to reduce its regulated and operational carbon emissions. These strategies address points three and four of the energy hierarchy.

Considering the geometry, orientation, context, and the predicted energy demand of the Proposed Development, the following renewable energy technologies are proposed for Folkstone Plots F,G and H:

- Air source heat pumps sized to meet the heating and cooling loads
- Rooftop mounted photovoltaic array for electricity generation (see Figure 5.2)

5.4 Fossil fuel-free development

The all-electric design means there is no fossil fuel for continuous use within the development: all heating and hot water generation is provided via electrical heat pumps. There is no gas connection envisaged for the development and no co-generation is proposed.

5.5 Carbon savings

Atelier Ten have performed energy assessments for a representative sample of residential units in compliance with the relevant planning policy requirements. The calculations used Stroma SAP 10.2 guidance, in line with the national calculation methodology for assessing the energy performance of domestic buildings required by the Building Regulations Part L 2021.

To comply with the latest regulation new dwellings need to comply with three mandatory targets:

- Dwelling CO₂ Emission rate (DER) - the annual emissions rate per floor area (kgCO₂/m²/yr)
- Dwelling Fabric Energy Efficiency (DFEE) - the energy performance of the dwelling, based on fabric parameters (kWh/m²/yr)
- Dwelling Primary Energy Rate (DPER) - the primary energy use of the dwelling (kWh/m²/yr)

The calculation methodology generates a 'notional' building with targets for these three criteria, and the proposed building is required to meet or improve upon these targets. The units selected for analysis are representative of the overall residential mix of the development, taking different orientations and external boundary conditions into consideration.

These calculations are based on the Stage 2 information for architectural and services design and as such are subject to change as the design progresses.

5.5.1 Analysis results

By incorporating the relevant passive and active design strategies and renewable technologies, the proposed design achieves a 58% improvement in DER over the target emission rate (Figure 5.3). This significantly surpasses the original OPA target of 25% reduction required against Part L 2010, and also align with Part L 2021 targets.

The SAP assessment also appraises the efficiency of the dwelling fabric efficiency, namely the external walls, roof, floor, windows, and doors. As shown in Figure 5.4, the dwelling sample tested performs 1% better than the target FEE.

The Target Primary Energy Rate takes into account the energy needed for a dwelling. This includes the energy required for heating, hot water, lighting, ventilation, and cooling systems within the building. This metric also considers the energy required at the power plant or energy source - the primary energy factor. The carbon reduction calculated for primary energy compared to the notional scenario is 17%, as per Figure 5.5.



Figure 5.2 Preliminary PV area allocation (red areas are plant, green are for PV)



Figure 5.4 Indicative Fabric Energy Performance (Part L 2021)

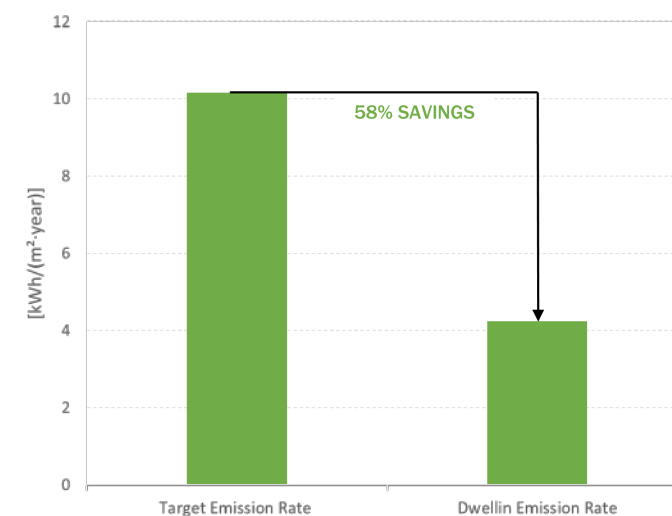


Figure 5.3 Indicative Regulated Carbon Reduction (Part L 2021)

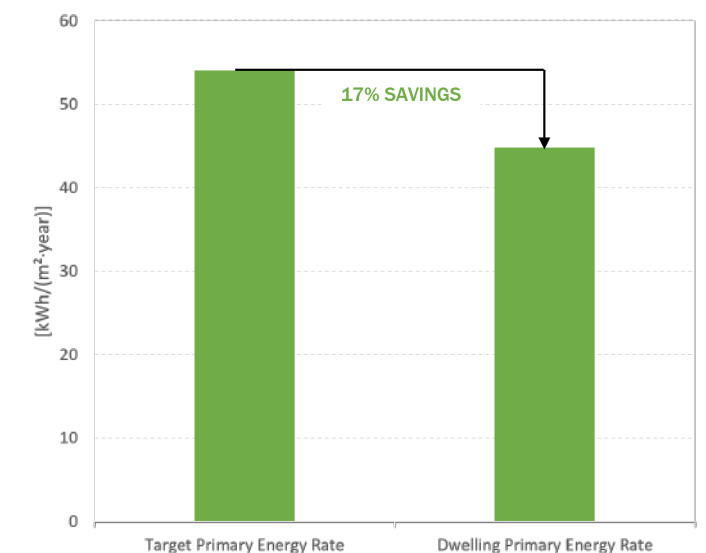


Figure 5.5 Indicative Primary Energy Reduction (Part L 2021)

6 Conclusion

The development adopts a holistic approach to its sustainable design, construction and operation; the Proposed Development is well-positioned to establish itself as a contemporary, sustainable development, meeting the requirements of the outline planning policy and exceeding the Building Regulations standards wherever it is technically, functionally and economically viable.

The proposed sustainable design and energy strategies reinforce the ambition of the development to reinvigorate the site and create a the new sustainable neighbourhood that will achieve a high quality environment contributing to occupant well-being and community living.

In response to outline planning consent (ref. Y17/1099/SH), key measures of the sustainability and energy strategies developed and detailed throughout this statement include the following:

Energy and whole life carbon

- The development adopts an energy hierarchy of lean, clean green to reduce operational energy and carbon emissions.
- The development has been designed to surpass carbon targets set by Building Regulations Part L 2021
- In line with the outline planning application the development exceeds the OPA targets for on-site carbon emissions reductions by achieving a 58% reduction over the Part L1 2021 notional building. This includes the incorporation of the following renewable technologies:
 - Air source heat pumps for heating and cooling with mechanical ventilation heat recovery.
 - Rooftop photovoltaic panels
- Align the Proposed Development to industry-leading benchmarks for operational and embodied carbon.

Water reduction

- The Proposed Development will achieve a water consumption of 105 litres/person/day through low flow and water-efficient fixtures.
- Incorporate grey water recycling to reduce the development’s water demand.

Health and well-being

- Optimise the façade design for good access to daylight and appropriate thermal comfort levels.
- Active transport is promoted through the incorporation cycle storage spaces and potential cycle hub.
- Promote the use of electrical vehicles by providing EV charging points.
- Openable windows are provided in all dwellings to allow natural ventilation of spaces and reduce overheating risk. Cooling is also provided to ensure thermal comfort.

Pollution

- An ‘All Electric’ servicing strategy allows the Proposed Development to accomplish an air quality ‘neutral’ Site.
- Vehicular strategy to minimise air pollution associated with vehicular traffic within the development.

Waste

- Incorporate circular economy principles into the proposed design, where feasible.
- Meet the following construction resource efficiency and diversion from landfill figures:
 - Construction waste: 13.9 m³ per 100 m²
 - Diversion from landfill by volume: Demolition: 80% Non-demolition: 95%
- The Proposed Development will incorporate a waste management strategy combined with suitably site waste storage areas.

Land use and ecology

- The Proposed Development will seek to minimise the impact on any existing biodiversity and target a significant biodiversity net gain by providing multiple terraces and extensive landscaping across the masterplan site.

Community

- The Proposed Development will provide a number of community enhancements, including the Goodsyard, landscaped public spaces, the outdoor amphitheatre and a range of leisure, retail and dining offerings.

Appendices

Appendix A SAP calculations sample dwellings

Appendix B Part O overheating reports

Appendix A SAP calculations sample dwellings

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Tue 30 Jan 2024 17:17:49

Project Information			
Assessed By	Sapdemo Ateliertenlondonltd	Building Type	Flat, Detached
OCDEA Registration	STRO037626	Assessment Date	2023-11-27

Dwelling Details			
Assessment Type	As designed	Total Floor Area	80 m ²
Site Reference	G1-B5-401	Plot Reference	G1-B5-401 1BED
Address	CT20 1QH		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	11.11 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	3.97 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	59.98 kWh _{PE} /m ²	
Dwelling primary energy	42.46 kWh _{PE} /m ²	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	24.3 kWh/m ²	
Dwelling fabric energy efficiency	24 kWh/m ²	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.15	South West (0.15)	OK
Party walls	0.2	0	Party Walls (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	N/A	N/A	N/A
Windows, doors, and roof windows	1.6	1	1 (1)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: South West	18.395	0.15	
Exposed wall: North West	22.95	0.15	
Party wall: Party Walls	60.48	0 (!)	
Exposed roof: Exposed Roof	0	0 (!)	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	5.0525	South West	0.9	1 (!)
2, Windows (1)	4.53	South West	0.9	1 (!)
3, Windows (1)	4.53	North West	0.9	1 (!)
4, Windows (1)	5.0525	South West	0.9	1 (!)

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Not government-approved scheme	0.055	Not Provided
External wall	E4: Jamb	Not government-approved scheme	0.045	Not Provided

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E7: Party floor between dwellings (in blocks of flats)	Not government-approved scheme	0.24	Not Provided
External wall	E9: Balcony between dwellings - wall insulation continuous	Not government-approved scheme	0.18	Not Provided
External wall	E18: Party wall between dwellings	Not government-approved scheme	0.1	Not Provided

3 Air permeability (better than typically expected values are flagged with a subsequent (!))				
Maximum permitted air permeability at 50Pa		8 m ³ /hm ²		
Dwelling air permeability at 50Pa		3 m ³ /hm ² , Design value (!)		OK
Air permeability test certificate reference		Not Provided		

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	259.0%
Emitter type	Underfloor
Flow temperature	
System type	
Manufacturer	
Model	
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer and at least two room thermostats	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting	
Minimum permitted light source efficacy	75 lm/W
Lowest light source efficacy	95 lm/W
External lights control	N/A

8 Mechanical ventilation	
System type: Balanced whole-house mechanical ventilation with heat recovery	
Maximum permitted specific fan power	1.5 W/(l/s)
Specific fan power	1.5 W/(l/s)
Minimum permitted heat recovery efficiency	73%
Heat recovery efficiency	90%
Manufacturer/Model	
Commissioning	Not Provided / Not Provided

9 Local generation	
Technology type: Photovoltaic system (1)	
Peak power	0.39 kWp
Orientation	Horizontal
Pitch	Horizontal
Overshading	Modest
Manufacturer	Not Provided
MCS certificate	
10 Heat networks	
N/A	
11 Supporting documentary evidence	
N/A	
12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Tue 30 Jan 2024 17:12:25

Project Information			
Assessed By	Sapdemo Ateliertenlondonltd	Building Type	Flat, Detached
OCDEA Registration	STRO037626	Assessment Date	2023-11-27

Dwelling Details			
Assessment Type	As designed	Total Floor Area	125 m ²
Site Reference	G1-B4-301	Plot Reference	G1-B4-301 3 BEDS
Address	CT20 1QH		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	14.97 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	6.73 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	79.52 kWh _{PE} /m ²		
Dwelling primary energy	70.58 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	53.3 kWh/m ²		
Dwelling fabric energy efficiency	51.1 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.15	South West 1 (0.15)	OK
Party walls	0.2	0	Party wall (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.11	Roof (0.11)	OK
Windows, doors, and roof windows	1.6	1	1 (1)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: South West 1	14.06	0.15	
Exposed wall: West 2	16.84	0.15	
Exposed wall: North West 3	8.74	0.15	
Exposed wall: North East 4	0.06772999999999997	0.15	
Exposed wall: North West 5	0	0.15	
Exposed wall: North East 6	36.48	0.15	
Party wall: Party wall	66.76	0 (!)	
Exposed roof: Roof	158	0.11	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	3.7	West	0.9	1 (!)
2, Windows (1)	3.7	North West	0.9	1 (!)
3, Windows (1)	17.43227	North East	0.9	1 (!)
4, Windows (1)	7.4	North West	0.9	1 (!)
5, Windows (1)	3.7	North East	0.9	1 (!)
6, Windows (1)	3.78	North East	0.9	1 (!)

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Not government-approved scheme	0.055	Not Provided
External wall	E3: Sill	Not government-approved scheme	0.1	Not Provided
External wall	E4: Jamb	Not government-approved scheme	0.045	Not Provided
External wall	E7: Party floor between dwellings (in blocks of flats)	Not government-approved scheme	0.24	Not Provided
External wall	E10: Eaves (insulation at ceiling level)	Not government-approved scheme	0.12	Not Provided
External wall	E24: Eaves (insulation at ceiling level - inverted)	Not government-approved scheme	0.15	Not Provided
External wall	E16: Corner (normal)	Not government-approved scheme	0.15	Not Provided
External wall	E17: Corner (inverted - internal area greater than external area)	Not government-approved scheme	0 (!)	Not Provided
External wall	E18: Party wall between dwellings	Not government-approved scheme	0.1	Not Provided
External wall	E25: Staggered party wall between dwellings	Not government-approved scheme	0.24	Not Provided
3 Air permeability (better than typically expected values are flagged with a subsequent (!))				
Maximum permitted air permeability at 50Pa		8 m ³ /hm ²		
Dwelling air permeability at 50Pa		3 m ³ /hm ² , Design value (!)		OK
Air permeability test certificate reference		Not Provided		
4 Space heating				
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity				
Efficiency	207.0%			
Emitter type	Underfloor			
Flow temperature				
System type				
Manufacturer				
Model				
Commissioning				
Secondary heating system: N/A				
Fuel	N/A			
Efficiency	N/A			
Commissioning				
5 Hot water				
Cylinder/store - type: N/A				
Capacity	N/A			
Declared heat loss	N/A			
Primary pipework insulated	N/A			
Manufacturer				
Model				
Commissioning				
Waste water heat recovery system 1 - type: N/A				
Efficiency				
Manufacturer				
Model				
6 Controls				
Main heating 1 - type: Programmer and at least two room thermostats				
Function				
Ecodesign class				
Manufacturer				
Model				
Water heating - type: N/A				
Manufacturer				
Model				

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	1.5 W/(l/s)	
Specific fan power	1.5 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	90%	OK
Manufacturer/Model		
Commissioning	Not Provided / Not Provided	
9 Local generation		
Technology type: Photovoltaic system (1)		
Peak power	0.39 kWp	
Orientation	Horizontal	
Pitch	Horizontal	
Overshading	Modest	
Manufacturer	Not Provided	
MCS certificate		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Appendix B Part O overheating reports

Approved Document O report
Overheating risk in residential buildings
for

Building details

Project name:	Date: 08-01-2024 15:35:45
Location: Folkestone, United Kingdom	
Address:	
Building use:	
Are there any security, noise, or pollution issues:	

Designer's details

Designer's name:
Designer's organisation:
Designer's address:

Dynamic thermal model

Software: IESVE version 2022.4.1.0	
Weather file: Southampton_DSY1_2020High50_.epw	
Results file: Scenario 0.aps	
Number of rooms analysed: 62	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy:	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	NO
Designer's signature:	

Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy criterion A, T_{max} is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
G5-802-902-Living	Pass	-	-	-
G5-802-902-Kitchen	Pass	N/A	-	-
G5-802-902-Bedroom2	Pass	Pass	-	-
G5-802-902-WC	Pass	N/A	-	-
G5-802-902-Living	Pass	N/A	-	-
G8-811-Bedroom2-02	Pass	Pass	-	-
G8-811-Store-02	Pass	N/A	-	-
G8-811-WC-02	Pass	N/A	-	-
G8-811-Store-01	Pass	N/A	-	-
G8-811-WC-01	Pass	N/A	-	-
G8-811-Bedroom2-01	Pass	Pass	-	-
G8-811-Lobby	Pass	N/A	-	-
G8-811-Living-Kitchen	Pass	N/A	-	-
F1-411-WC-01	Pass	N/A	-	-
F1-411-Store-01	Pass	N/A	-	-
F1-411-Bedroom-01	Pass	Pass	-	-
F1-411-En-suite-01	Pass	N/A	-	-
F1-411-WC-02	Pass	N/A	-	-
F1-411-Bedroom-02	Pass	Pass	-	-
F1-411-WC-03	Pass	N/A	-	-
F1-411-Store-02	Pass	N/A	-	-
F1-411-Bedroom-03	Pass	Pass	-	-
F1-411-Lobby	Pass	N/A	-	-
F1-411-Living-Kitchen-01	Pass	N/A	-	-
F3-501-En-suite-01	Pass	N/A	-	-
F3-501-Bedroom-01	Pass	Pass	-	-
F3-501-Store-01	Pass	N/A	-	-
F3-501-WC-01	Pass	N/A	-	-
F3-501-Lobby	Pass	N/A	-	-

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
F3-501-Kitchen-Living-01	Pass	N/A	-	-
F3-501-En-suite-02	Pass	N/A	-	-
F3-501-Store-02	Pass	N/A	-	-
F3-501-Bedroom-02	Pass	Pass	-	-
F4-303-WC-01	Pass	N/A	-	-
F4-303-Living-Kitchen-01	Pass	N/A	-	-
F4-303-Bedroom-01	Pass	Pass	-	-
F4-303-En-suite-01	Pass	N/A	-	-
F4-303-Lobby	Pass	N/A	-	-
F4-303-En-suite-02	Pass	N/A	-	-
F4-303-Bedroom-02	Pass	Pass	-	-
G2-504-Bedroom-01	Pass	Pass	-	-
G2-504-Bedroom-02	Pass	Pass	-	-
G2-504-En-suite-01	Pass	N/A	-	-
G2-504-Lobby	Pass	N/A	-	-
G2-504-Living-Kitchen	Pass	N/A	-	-
G2-504-WC-01	Pass	N/A	-	-
G6-904-Living-Kitchen	Pass	N/A	-	-
G6-904-WC-01	Pass	N/A	-	-
G6-904-WC-02	Pass	N/A	-	-
G6-904-Bedroom-01	Pass	Pass	-	-
G6-904-Bedroom-02	Pass	Pass	-	-
G6-904-Lobby	Pass	N/A	-	-
G6-904-En-suite-01	Pass	N/A	-	-
G6-904-Store-01	Pass	N/A	-	-
G7-603-Bedroom-01	Pass	Pass	-	-
G7-603-Bedroom-02	Pass	Pass	-	-
G7-603-En-suite-01	Pass	N/A	-	-
G7-603-Study-01	Pass	Fail	-	-
G7-603-WC-01	Pass	N/A	-	-
G7-603-Lobby	Pass	N/A	-	-
G7-603-Kitchen-Living	Pass	N/A	-	-
G7-Bedroom-03	Pass	Pass	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
G5-802-902-Living	1989	29	1.5	Pass
G5-802-902-Kitchen	1989	31	1.6	Pass
G5-802-902-Bedroom2	3672	43	1.2	Pass
G5-802-902-WC	0	0	0	Pass
G5-802-902-Living	1989	36	1.8	Pass
G8-811-Bedroom2-02	3672	22	0.6	Pass
G8-811-Store-02	0	0	0	Pass
G8-811-WC-02	0	0	0	Pass
G8-811-Store-01	0	0	0	Pass
G8-811-WC-01	0	0	0	Pass
G8-811-Bedroom2-01	3672	30	0.8	Pass
G8-811-Lobby	0	0	0	Pass
G8-811-Living-Kitchen	1989	23	1.2	Pass
F1-411-WC-01	0	0	0	Pass
F1-411-Store-01	0	0	0	Pass
F1-411-Bedroom-01	3672	21	0.6	Pass
F1-411-En-suite-01	0	0	0	Pass
F1-411-WC-02	0	0	0	Pass
F1-411-Bedroom-02	3672	22	0.6	Pass
F1-411-WC-03	0	0	0	Pass
F1-411-Store-02	0	0	0	Pass
F1-411-Bedroom-03	3672	40	1.1	Pass
F1-411-Lobby	0	0	0	Pass
F1-411-Living-Kitchen-01	1989	30	1.5	Pass
F3-501-En-suite-01	0	0	0	Pass
F3-501-Bedroom-01	3672	28	0.8	Pass
F3-501-Store-01	0	0	0	Pass
F3-501-WC-01	0	0	0	Pass
F3-501-Lobby	0	0	0	Pass
F3-501-Kitchen-Living-01	1989	47	2.4	Pass
F3-501-En-suite-02	0	0	0	Pass
F3-501-Store-02	0	0	0	Pass
F3-501-Bedroom-02	3672	37	1.0	Pass
F4-303-WC-01	0	0	0	Pass
F4-303-Living-Kitchen-01	1989	21	1.1	Pass
F4-303-Bedroom-01	3672	13	0.4	Pass
F4-303-En-suite-01	0	0	0	Pass

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
F4-303-Lobby	0	0	0	Pass
F4-303-En-suite-02	0	0	0	Pass
F4-303-Bedroom-02	3672	19	0.5	Pass
G2-504-Bedroom-01	3672	36	1.0	Pass
G2-504-Bedroom-02	3672	38	1.0	Pass
G2-504-En-suite-01	0	0	0	Pass
G2-504-Lobby	0	0	0	Pass
G2-504-Living-Kitchen	1989	30	1.5	Pass
G2-504-WC-01	0	0	0	Pass
G6-904-Living-Kitchen	1989	32	1.6	Pass
G6-904-WC-01	0	0	0	Pass
G6-904-WC-02	0	0	0	Pass
G6-904-Bedroom-01	3672	13	0.4	Pass
G6-904-Bedroom-02	3672	20	0.5	Pass
G6-904-Lobby	0	0	0	Pass
G6-904-En-suite-01	0	0	0	Pass
G6-904-Store-01	0	0	0	Pass
G7-603-Bedroom-01	3672	15	0.4	Pass
G7-603-Bedroom-02	3672	21	0.6	Pass
G7-603-En-suite-01	0	0	0	Pass
G7-603-Study-01	3672	43	1.2	Pass
G7-603-WC-01	0	0	0	Pass
G7-603-Lobby	0	0	0	Pass
G7-603-Kitchen-Living	1989	24	1.2	Pass
G7-Bedroom-03	3672	32	0.9	Pass

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
G5-802-902-Living	N/A	N/A	N/A	N/A
G5-802-902-Kitchen	N/A	N/A	N/A	N/A
G5-802-902-Bedroom2	0	0	0	Pass
G5-802-902-WC	N/A	N/A	N/A	N/A
G8-811-Bedroom2-02	0	0	0	Pass
G8-811-Store-02	N/A	N/A	N/A	N/A
G8-811-WC-02	N/A	N/A	N/A	N/A
G8-811-Store-01	N/A	N/A	N/A	N/A
G8-811-WC-01	N/A	N/A	N/A	N/A
G8-811-Bedroom2-01	1	0	1	Pass
G8-811-Lobby	N/A	N/A	N/A	N/A
G8-811-Living-Kitchen	N/A	N/A	N/A	N/A
F1-411-WC-01	N/A	N/A	N/A	N/A
F1-411-Store-01	N/A	N/A	N/A	N/A
F1-411-Bedroom-01	0	0	0	Pass
F1-411-En-suite-01	N/A	N/A	N/A	N/A
F1-411-WC-02	N/A	N/A	N/A	N/A
F1-411-Bedroom-02	0	0	0	Pass
F1-411-WC-03	N/A	N/A	N/A	N/A
F1-411-Store-02	N/A	N/A	N/A	N/A
F1-411-Bedroom-03	2	0	2	Pass
F1-411-Lobby	N/A	N/A	N/A	N/A
F1-411-Living-Kitchen-01	N/A	N/A	N/A	N/A
F3-501-En-suite-01	N/A	N/A	N/A	N/A
F3-501-Bedroom-01	0	0	0	Pass
F3-501-Store-01	N/A	N/A	N/A	N/A
F3-501-WC-01	N/A	N/A	N/A	N/A
F3-501-Lobby	N/A	N/A	N/A	N/A
F3-501-Kitchen-Living-01	N/A	N/A	N/A	N/A
F3-501-En-suite-02	N/A	N/A	N/A	N/A
F3-501-Store-02	N/A	N/A	N/A	N/A
F3-501-Bedroom-02	0	0	0	Pass
F4-303-WC-01	N/A	N/A	N/A	N/A
F4-303-Living-Kitchen-01	N/A	N/A	N/A	N/A
F4-303-Bedroom-01	4	0	4	Pass
F4-303-En-suite-01	N/A	N/A	N/A	N/A
F4-303-Lobby	N/A	N/A	N/A	N/A

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
F4-303-En-suite-02	N/A	N/A	N/A	N/A
F4-303-Bedroom-02	0	0	0	Pass
G2-504-Bedroom-01	0	0	0	Pass
G2-504-Bedroom-02	0	0	0	Pass
G2-504-En-suite-01	N/A	N/A	N/A	N/A
G2-504-Lobby	N/A	N/A	N/A	N/A
G2-504-Living-Kitchen	N/A	N/A	N/A	N/A
G2-504-WC-01	N/A	N/A	N/A	N/A
G6-904-Living-Kitchen	N/A	N/A	N/A	N/A
G6-904-WC-01	N/A	N/A	N/A	N/A
G6-904-WC-02	N/A	N/A	N/A	N/A
G6-904-Bedroom-01	0	0	0	Pass
G6-904-Bedroom-02	0	0	0	Pass
G6-904-Lobby	N/A	N/A	N/A	N/A
G6-904-En-suite-01	N/A	N/A	N/A	N/A
G6-904-Store-01	N/A	N/A	N/A	N/A
G7-603-Bedroom-01	0	0	0	Pass
G7-603-Bedroom-02	0	0	0	Pass
G7-603-En-suite-01	N/A	N/A	N/A	N/A
G7-603-Study-01	9	93	102	Fail
G7-603-WC-01	N/A	N/A	N/A	N/A
G7-603-Lobby	N/A	N/A	N/A	N/A
G7-603-Kitchen-Living	N/A	N/A	N/A	N/A
G7-Bedroom-03	0	6	6	Pass

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
No mech vent rooms	N/A	N/A	N/A

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
G5-802-902-Living	27.43	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
G5-802-902-Kitchen	25.16	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
G5-802-902-Bedroom2	37.74	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G5-802-902-WC	8.28	TM59 - En-suite		18-23h	
G5-802-902-Living	14.95	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
G8-811-Bedroom2-02	26.57	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G8-811-Store-02	9.4	TM59 - Store			
G8-811-WC-02	6.28	TM59 - En-suite		18-23h	
G8-811-Store-01	9.38	TM59 - Store			
G8-811-WC-01	7.1	TM59 - En-suite		18-23h	
G8-811-Bedroom2-01	14.39	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G8-811-Lobby	27.04	TM59 - Circulation - in flats			18-23h
G8-811-Living-Kitchen	47.17	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
F1-411-WC-01	10.01	TM59 - Bathroom		18-23h	
F1-411-Store-01	5.94	TM59 - Store			
F1-411-Bedroom-01	21.71	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
F1-411-En-suite-01	4.64	TM59 - En-suite		18-23h	
F1-411-WC-02	9.06	TM59 - Bathroom		18-23h	
F1-411-Bedroom-02	24.3	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
F1-411-WC-03	3.92	TM59 - Bathroom		18-23h	
F1-411-Store-02	5.67	TM59 - Store			
F1-411-Bedroom-03	19.19	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
F1-411-Lobby	29.28	TM59 - Circulation - in flats			18-23h
F1-411-Living-Kitchen-01	69.8	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
F3-501-En-suite-01	10.39	TM59 - En-suite		18-23h	
F3-501-Bedroom-01	19.22	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
F3-501-Store-01	10.47	TM59 - Store			
F3-501-WC-01	3.73	TM59 - Bathroom		18-23h	
F3-501-Lobby	21.68	TM59 - Circulation - in flats			18-23h
F3-501-Kitchen-Living-01	57.93	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
F3-501-En-suite-02	5.4	TM59 - En-suite		18-23h	
F3-501-Store-02	7.05	TM59 - Store			
F3-501-Bedroom-02	18.07	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
F4-303-WC-01	4.79	TM59 - Bathroom		18-23h	
F4-303-Living-Kitchen-01	57.96	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
F4-303-Bedroom-01	18.56	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
F4-303-En-suite-01	6.13	TM59 - En-suite		18-23h	
F4-303-Lobby	22.65	TM59 - Circulation - in flats			18-23h
F4-303-En-suite-02	7.45	TM59 - En-suite		18-23h	
F4-303-Bedroom-02	20.52	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G2-504-Bedroom-01	21.95	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G2-504-Bedroom-02	21.25	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G2-504-En-suite-01	6.18	TM59 - En-suite		18-23h	
G2-504-Lobby	21.87	TM59 - Circulation - in flats			18-23h
G2-504-Living-Kitchen	45.19	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
G2-504-WC-01	7.3	TM59 - Bathroom		18-23h	
G6-904-Living-Kitchen	42.06	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
G6-904-WC-01	5.95	TM59 - Bathroom		18-23h	
G6-904-WC-02	5.99	TM59 - Bathroom		18-23h	
G6-904-Bedroom-01	17.24	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G6-904-Bedroom-02	18.3	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
G6-904-Lobby	21.01	TM59 - Circulation - in flats			18-23h
G6-904-En-suite-01	4.81	TM59 - En-suite		18-23h	
G6-904-Store-01	7.87	TM59 - Store			
G7-603-Bedroom-01	25.12	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G7-603-Bedroom-02	28.11	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
G7-603-En-suite-01	7.62	TM59 - En-suite		18-23h	
G7-603-Study-01	17.25	TM59 - Studio	Studio Occupancy	Studio Equipment	18-23h
G7-603-WC-01	3.61	TM59 - Bathroom		18-23h	
G7-603-Lobby	25.02	TM59 - Circulation - in flats			18-23h
G7-603-Kitchen-Living	86.2	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
G7-Bedroom-03	38.4	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
G5-802-902-Living	54.82	0.5167, 0.5167	5.87, 4.8	90.0, 90.0	35.01	ADO.Section_26a, ADO.Section_26a
G5-802-902-Kitchen	98.36	0.5167	17.91	90.0	64.07	ADO.Section_26a
G5-802-902-Bedroom2	63.92	0.5167, 0.5167	5.87, 5.87, 17.0	90.0, 0.0, 0.0	14.0	ADO.Section_26ab, off continuously, off continuously
G5-802-902-WC	51.3	0.5167	5.87	90.0	63.8	ADO.Section_26a
G5-802-902-Living	39.64	0.5167	2.7	90.0	16.25	ADO.Section_26a
G8-811-Bedroom2-02	34.6	0.5167, 0.5167	3.0, 5.88	90.0, 90.0	30.08	ADO.Section_26ab, ADO.Section_26ab
G8-811-Store-02	46.85	0.5167	5.88	90.0	56.3	ADO.Section_26a
G8-811-WC-02	N/A				0.0	
G8-811-Store-01	N/A				0.0	
G8-811-WC-01	50.13	0.5167	5.88	90.0	74.54	ADO.Section_26a
G8-811-Bedroom2-01	26.32	0.5167	5.87	90.0	36.71	ADO.Section_26ab
G8-811-Lobby	47.41	0.5167	5.88	90.0	19.57	ADO.Section_26a
G8-811-Living-Kitchen	39.55	0.5167, 0.5167	5.87, 5.88, 5.87	90.0, 90.0, 90.0	33.62	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a
F1-411-WC-01	N/A				0.0	
F1-411-Store-01	N/A				0.0	
F1-411-Bedroom-01	49.77	0.5167	5.25	90.0	21.76	ADO.Section_26ab
F1-411-En-suite-01	N/A				0.0	
F1-411-WC-02	N/A				0.0	
F1-411-Bedroom-02	46.89	0.5167	3.5, 3.5	90.0, 90.0	25.93	ADO.Section_26ab, ADO.Section_26ab
F1-411-WC-03	N/A				0.0	
F1-411-Store-02	N/A				0.0	

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
F1-411-Bedroom-03	38.19	0.5167, 0.5167	5.5, 3.5	0.0, 90.0	16.41	off continuously, ADO.Section_26ab
F1-411-Lobby	N/A				0.0	
F1-411-Living-Kitchen-01	36.64	0.5167, 0.5167, 0.5167, 0.5167	3.5, 3.5, 3.5, 4.12, 5.5, 4.25	90.0, 90.0, 90.0, 90.0, 90.0, 0.0	25.94	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, off continuously
F3-501-En-suite-01	N/A				0.0	
F3-501-Bedroom-01	44.47	0.5167	6.0	90.0	28.1	ADO.Section_26ab
F3-501-Store-01	47.46	0.5167	3.75	0.0	0.0	off continuously
F3-501-WC-01	N/A				0.0	
F3-501-Lobby	N/A				0.0	
F3-501-Kitchen-Living-01	33.08	0.5167, 0.5167	3.75, 3.75, 6.0	0.0, 0.0, 90.0	9.32	off continuously, off continuously, ADO.Section_26a
F3-501-En-suite-02	N/A				0.0	
F3-501-Store-02	0.0				0.0	
F3-501-Bedroom-02	55.45	0.5167	6.0	90.0	29.88	ADO.Section_26ab
F4-303-WC-01	N/A				0.0	
F4-303-Living-Kitchen-01	52.45	0.5167, 0.5167	6.0, 6.0	90.0, 37.5	13.2	ADO.Section_26a, ADO.Section_26a
F4-303-Bedroom-01	33.16	0.5167	3.75	37.5	7.58	ADO.Section_26ab
F4-303-En-suite-01	N/A				0.0	
F4-303-Lobby	N/A				0.0	
F4-303-En-suite-02	N/A				0.0	
F4-303-Bedroom-02	49.41	0.5167	6.0	90.0	26.32	ADO.Section_26ab
G2-504-Bedroom-01	38.09	0.5167	5.41	90.0	22.18	ADO.Section_26ab
G2-504-Bedroom-02	54.79	0.5167	5.64	90.0	23.89	ADO.Section_26ab
G2-504-En-suite-01	N/A				0.0	

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
G2-504-Lobby	N/A				0.0	
G2-504-Living-Kitchen	31.32	0.5167, 0.5167, 0.5167	2.82, 5.4, 5.41	90.0, 90.0, 90.0	27.15	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a
G2-504-WC-01	N/A				0.0	
G6-904-Living-Kitchen	68.6	0.5167, 0.5167, 0.5167, 0.5167, 0.5167, 0.5167	2.75, 1.75, 2.75, 1.5, 2.75, 2.75, 2.75, 1.5, 2.5, 2.75, 2.75, 2.75, 2.75	90.0, 90.0, 90.0, 90.0, 90.0, 90.0, 90.0, 90.0, 90.0, 90.0, 90.0, 90.0	68.47	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a
G6-904-WC-01	N/A				0.0	
G6-904-WC-02	N/A				0.0	
G6-904-Bedroom-01	28.93	0.5167	2.75, 1.75	90.0, 90.0	23.49	ADO.Section_26ab, ADO.Section_26ab
G6-904-Bedroom-02	40.31	0.5167	2.75, 2.75, 1.75	90.0, 90.0, 90.0	35.66	ADO.Section_26ab, ADO.Section_26ab, ADO.Section_26ab
G6-904-Lobby	N/A				0.0	
G6-904-En-suite-01	N/A				0.0	
G6-904-Store-01	N/A				0.0	
G7-603-Bedroom-01	50.36	0.5167	5.64	90.0	20.21	ADO.Section_26ab
G7-603-Bedroom-02	47.87	0.5167	5.64	90.0	18.06	ADO.Section_26ab
G7-603-En-suite-01	-0.0				0.0	
G7-603-Study-01	30.25	0.5167	2.82	90.0	14.71	ADO.Section_26a
G7-603-WC-01	N/A				0.0	
G7-603-Lobby	N/A				0.0	

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
G7-603-Kitchen-Living	41.17	0.5167, 0.5167	5.64, 5.64, 5.64, 5.64, 2.82	90.0, 90.0, 90.0, 90.0, 90.0	26.5	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a
G7-Bedroom-03	48.84	0.5167, 0.5167	5.64, 2.82, 5.64, 5.64	90.0, 90.0, 90.0, 90.0	46.27	ADO.Section_26ab, ADO.Section_26ab, ADO.Section_26ab, ADO.Section_26ab

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
G5-802-902-Living	0.15	0
G5-802-902-Kitchen	0.15	0
G5-802-902-Bedroom2	0.15	0
G5-802-902-WC	0.15	0
G5-802-902-Living	0.15	0
G8-811-Bedroom2-02	0.15	0
G8-811-Store-02	0.15	0
G8-811-WC-02	0.15	0
G8-811-Store-01	0.15	0
G8-811-WC-01	0.15	0
G8-811-Bedroom2-01	0.15	0
G8-811-Lobby	0.15	0
G8-811-Living-Kitchen	0.15	0
F1-411-WC-01	0.15	0
F1-411-Store-01	0.15	0
F1-411-Bedroom-01	0.15	0
F1-411-En-suite-01	0.15	0
F1-411-WC-02	0.15	0
F1-411-Bedroom-02	0.15	0
F1-411-WC-03	0.15	0
F1-411-Store-02	0.15	0
F1-411-Bedroom-03	0.15	0
F1-411-Lobby	0.15	0
F1-411-Living-Kitchen-01	0.15	0
F3-501-En-suite-01	0.15	0
F3-501-Bedroom-01	0.15	0
F3-501-Store-01	0.15	0
F3-501-WC-01	0.15	0
F3-501-Lobby	0.15	0
F3-501-Kitchen-Living-01	0.15	0
F3-501-En-suite-02	0.15	0
F3-501-Store-02	0.15	0
F3-501-Bedroom-02	0.15	0
F4-303-WC-01	0.15	0
F4-303-Living-Kitchen-01	0.15	0
F4-303-Bedroom-01	0.15	0
F4-303-En-suite-01	0.15	0
F4-303-Lobby	0.15	0
F4-303-En-suite-02	0.15	0
F4-303-Bedroom-02	0.15	0

Room name	Infiltration rate ACH	Mech vent flow rate ACH
G2-504-Bedroom-01	0.15	0
G2-504-Bedroom-02	0.15	0
G2-504-En-suite-01	0.15	0
G2-504-Lobby	0.15	0
G2-504-Living-Kitchen	0.15	0
G2-504-WC-01	0.15	0
G6-904-Living-Kitchen	0.15	0
G6-904-WC-01	0.15	0
G6-904-WC-02	0.15	0
G6-904-Bedroom-01	0.15	0
G6-904-Bedroom-02	0.15	0
G6-904-Lobby	0.15	0
G6-904-En-suite-01	0.15	0
G6-904-Store-01	0.15	0
G7-603-Bedroom-01	0.15	0
G7-603-Bedroom-02	0.15	0
G7-603-En-suite-01	0.15	0
G7-603-Study-01	0.15	0
G7-603-WC-01	0.15	0
G7-603-Lobby	0.15	0
G7-603-Kitchen-Living	0.15	0
G7-Bedroom-03	0.15	0