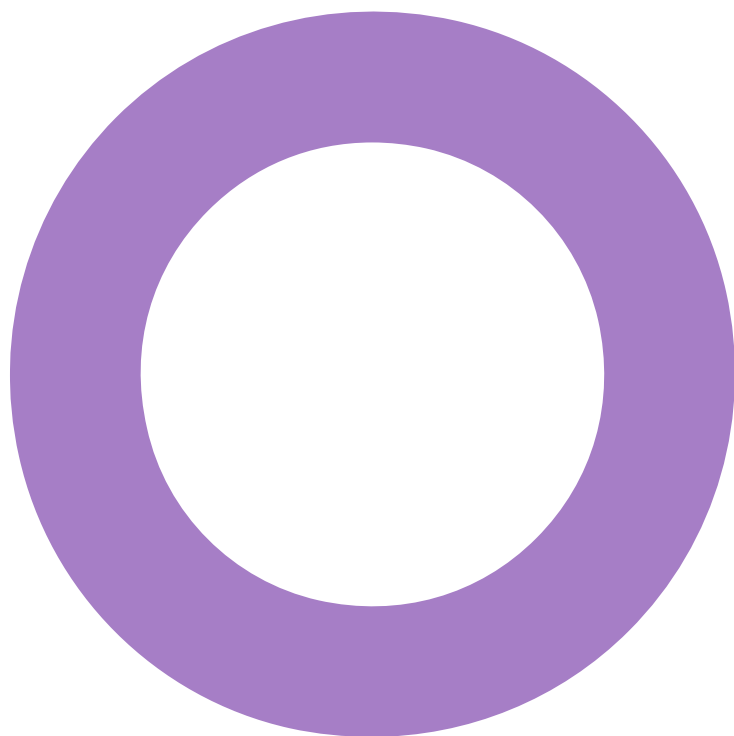


Thamesfield Retirement Village. Thamesfield Phase 2. Retirement Villages Group.

SUSTAINABILITY
ENERGY AND SUSTAINABILITY STATEMENT

REVISION 03 – 21 NOVEMBER 2024



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
01	20/10/2023	Draft Planning Issue	A. Lane	J. Drane	T. Spurrier
02	14/12/2023	Planning Issue	A. Lane	J. Drane	T. Spurrier
03	21/11/2024	Update to Planning Issue	J. Drane	R. Horder	M. Wilkinson

This document has been prepared for Retirement Villages Group only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

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Executive Summary.

This report provides a summary of the sustainability targets and approach as well as the energy strategy, inputs and analysis undertaken on the development and forms part of the full planning application for the proposed development at Thamesfield, Henley on Thames, hereafter referred to as the 'Proposed Development'.

The Proposed Development

Thamesfield is an established and operational Integrated Retirement Community (IRC) providing extra care retirement accommodation and associated communal facilities. The Site currently comprises 37 extra care units (use class C2).

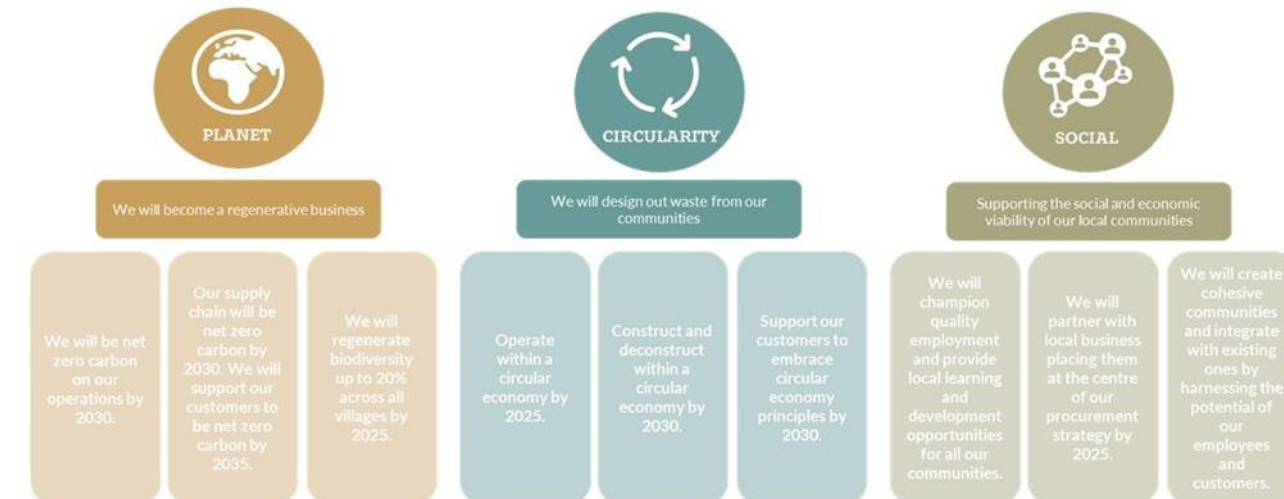
Sustainability Strategy

RVGs mission to create positive life choices for older people - built on community, wellbeing, and flexibility. they strive to support people to live their best lives for longer, while ensuring the planet, and our healthcare system, offer the same opportunities to future generations.

The strategy is a blueprint that will reshape us as a sustainability leader within our sector. The strategy enables us to take a holistic approach across three core pillars of sustainability: "Planet", "Circularity" and "Social". Under each pillar we have set objectives and targets that will enable us to drive meaningful sustainable outcomes and systemic change for our business, residents, supply chain, investors and wider society. At the same time, we see this as an opportunity to return economic, environmental and social value.

Figure 4 below outlines RVGs Corporate ESG commitments that help to drive Sustainable outcomes not only across their new and existing developments but also their business as a whole.

Key Sustainable Features



The following list details the key sustainable features to be incorporated into the report:

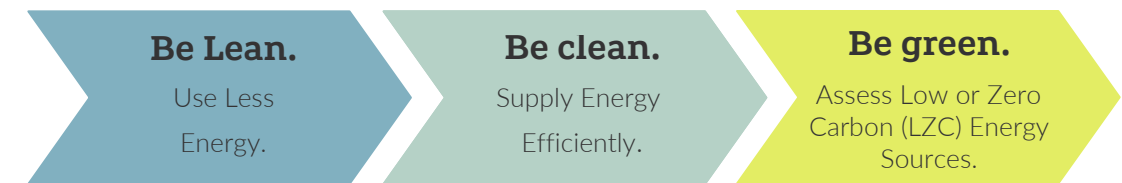
- The Proposed Development will incorporate an all-electric, low carbon energy strategy complete with Exhaust Air Heat Pump DHW Solution.
- The scheme will significantly reduce energy consumption through an on-site photovoltaic (PV) array of 38.5kWp.
- A strategy to reduce, reuse and recycle materials in alignment with the principles of circular economy throughout design, construction and operation will be applied, minimising waste generation and the use of virgin materials.
- The Proposed Development will achieve a CO₂ emissions reduction and a primary energy reduction well in excess of Building Regulations Part L 2021.
- Landscaping enhancements will be considered and incorporated where practical.

Energy Strategy

The Energy Strategy takes a holistic approach to energy demand reduction, and carbon emission reductions. Principles of the Energy Hierarchy are followed in terms of ensuring the design is energy efficient prior to incorporation of low and zero carbon energy sources.

Passive design and energy efficiency measures will provide the cornerstone to the energy demand and CO₂ emission reduction achieved for the Proposed Development.

The baseline scenario, which each step of the Energy Hierarchy will be compared against, is established by the Part L Target Emission Rate. The energy hierarchy includes the following three steps:



Be Lean: High energy efficient building fabric and building services have been utilised to reduce carbon emissions and energy demand through good practice passive measures.

Be Clean: Incorporation of an onsite CHP system has been deemed to be unsuitable, therefore a heat network and CHP technology have been discounted.

Be Green: A number of renewable technologies have been appraised in terms of their technical, physical and financial feasibility, for incorporation within the development. Roof mounted PV and DHW Exhaust Air Heat Pumps (EAHP) was considered the most appropriate technology.

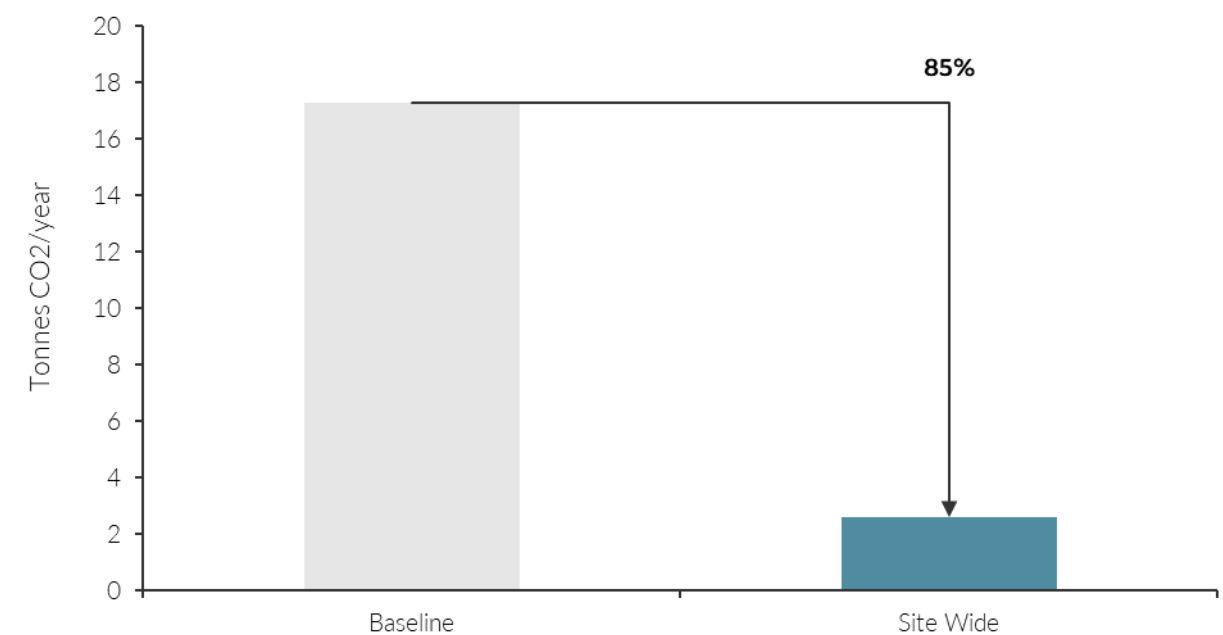


Figure 1: Sitewide - Regulated carbon emissions summary.

Proposed site-wide energy strategy.

Overall, it is anticipated that the development will achieve up to an **85 % reduction in CO₂ emissions** beyond the Building Regulations Part L 2021 'baseline' This exceeds the planning policy target.

1. Introduction.

1.1 Purpose of this Report

This strategy has been developed on behalf of RVG, hereafter referred to as ‘the Applicant’. The following strategy forms part of the full planning application for the proposed development at Thamesfield, hereafter referred to as the ‘Proposed Development’.

Development Description

Thamesfield is an established and operational Integrated Retirement Community (IRC) providing extra care retirement accommodation and associated communal facilities. The Site currently comprises 37 extra care units (use class C2).

Site name: Thamesfield Retirement Village, Wargrave Road, Remenham, RG9 2LX.

Client: Retirement Villages Group (RVG)

Full Description of Existing Site:

The application site is located within the village of Remenham, directly opposite Henley-on-Thames. The site is bordered by the river Thames to the southwest, and Wargrave Road to the northeast. To the northwest there are retirement properties known as Remenham Row and to the southeast is the Eyot Centre. The site is broadly square in shape and comprises approximately 0.88ha of land. Vehicular and pedestrian access to the site is currently directly off Wargrave Road.

Thamesfield is a retirement village comprising 35 extra care units (use class C2) and 12 care rooms/suites. It contains two distinct buildings - the main building which covers the northern part of the site and Thamesfield Lodge which is located in the eastern corner. The main building comprises three elements: the original Stucco Fronted building which fronts on to the Thames and late 20th century extension to the north; the 1993 extension which is adjacent to the northern boundary of the site and the 1995 extension which is broadly centrally located within the site. A mix of hard and soft landscaping cover the remainder of the site including car parking, a croquet lawn and a landscaped lawn down to the banks of the river Thames.

The surrounding area comprises a diverse mix of uses, including residential, sports and hospitality. The site is a short distance (c. 300m) from Henley Bridge and, as such, is well located in respect of the facilities and services within Henley.

The following constraints and designations are relevant to the site:

- The site is entirely within Flood Zone 3.
- The site is within the Green Belt.
- Park Palace and Temple Combe Grade II* Registered Park and Garden, which is also designated as a Local Wildlife Site, is located at approximately 320m to the east of the site.
- The site is within Remenham Henley Bridge Conservation Area and is opposite the Henley Conservation Area on the western side of the River Thames.
- The site is on a ‘Green Route’; and there are a number of trees covered by a Tree Preservation Order (TPO-0206-1981).



Figure 2: Site Location (Credit: Design Engine Architects)

Figure 3 below shows the proposed Level 00 layout

Table 1: Area schedule.

Space Type	Space Use/Name Proposed Area Schedule dated 23.08.2023	Floor area (NSA) for Energy Modelling purposes.
Domestic ADL1	New Replacement Block C	1362.5 m ²
Non-domestic ADL2	Communal Residential Areas: Multi-Function Room & Laundry.	105.3 m ²
Total		1467.8 m ²

Figure 3: Level 00 of the proposed development (Credit: Design Engine Architects)

2. Overview of Policy and Drivers.

The strategy will respond first and foremost to the Universal Challenges of the Climate Emergency, Biodiversity Crisis facing humanity, and Health and Wellbeing, in addition to national and local policy which will shape the baseline of performance, with the UN Sustainable Development Goals alongside best practice principles of masterplan design, delivery, and operation shaping the eventual strategy.

2.1 Global Challenges.

People the world over face three universal challenges to which any sustainable development must respond effectively to be successful.

These are as follows:



Climate change

In 2019, the Intergovernmental Panel on Climate Change (IPCC) confirmed via publication that, in order to mitigate the most devastating impacts of climate change, the world must demonstrate net zero carbon emissions by 2050. Reflecting this urgent call for action, the Committee on Climate Change published *Net Zero – The UK’s contribution to stopping global warming*, identifying a route for the UK to achieve the net zero target. The UK government then joined a number of other nations in declaring a **Climate Emergency** and the target was ratified into law, meaning the UK has a legally binding obligation to reduce its emissions to zero by 2050 at the latest.

The built environment contributes around 40% (UKGBC) of our national greenhouse gas emissions footprint, so any new development must minimise its footprint on day 1 and demonstrate a realistic route to achieving net zero carbon in future in order to align with our commitments to national decarbonisation.



Biodiversity

As a consequence of the warming climate, deforestation and habitat destruction, pollution and other human processes, the world is experiencing a **biodiversity crisis**. It is estimated that human action is causing the rate of extinction to be around 1,000 times what could be considered a natural background rate and future projections estimate that 30% to 50% of all current species could be extinct by the middle of the century.

Within the UK, the need to provide homes and amenities for an ever-growing population is putting strain on our local ecosystems. The State of Nature Report shows that the UK is one of the most nature-depleted countries in the world, and the UK Government responded to this in 2021 with the introduction of the Environment Act, which sets new, long-term environmental targets to protect and enhance the country’s natural world. Sustainable development must therefore mitigate its impact on local habitats, plants, and wildlife and contribute to a net gain in local biodiversity.



Health and wellbeing

Less of a crisis and more of a revolution, the understanding of the **importance of health and wellbeing** to happiness, productivity, community, and prosperity has become increasingly well-founded in recent years. Where someone lives and works is the primary influence on whether they are healthy and well and through the design of new development, people can be motivated to embrace active, healthy lifestyles and facilitated to be sociable, community-driven, and content.

2.2 National Policy

Building Regulations: Approved Document Part L

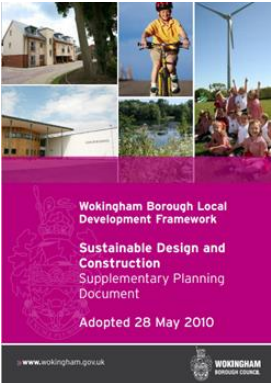
Approved Document Part L (2021, England edition), here forward referred to as ADL 2021, is the Building Regulation relating to the conservation of fuel and power in buildings. ADL 2021 has two parts, Part L1 relates to dwellings and Part L2 relates to buildings other than dwellings.

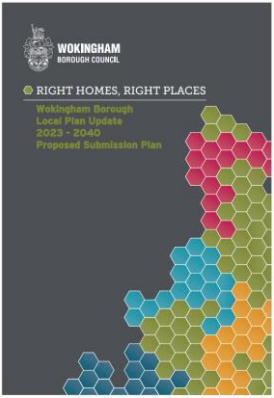
Part L of the Building Regulations is the mechanism by which government is driving reductions in the regulated CO₂ emissions from refurbished, change of use and new buildings. For new buildings ADL 2021 has four performance metrics as follows:

- Primary energy target
- CO₂ emissions target
- Fabric Energy Efficiency (FEE) target
- Minimum standards for fabric and fixed building services

Local PolicyTable 2 presents a summary of the key targets and requirements found in the Wokingham Borough Council Core Strategy with regards to energy and sustainability.

Table 2: Summary of local policies for energy and sustainability.

Policy	Relevant Policy Requirements
WBC SPD: Sustainable Design and Construction 	WBC: Sustainability Checklist - Measuring and Demonstrating Sustainability, Sustainable Design and Energy Efficiency. - On-site Renewable/Energy Generation - Water Resource Management - Flood Risk Management - Biodiversity - Waste, Recycling and Composting Facilities - Sustainable Transport - Health, Safety and Well-being - Sustainable Construction Key Targets: - Looking at glazing ratios in coordination with daylight/sunlight and solar gain (Part O compliance) - A ‘fabric first’ approach has been taken in order to reduce the energy demand and CO₂ emissions from the Proposed Development. - Targeting 10% over Part L for renewable energy – from the use of PV and Exhaust Air Heat Pumps. - Water efficiency measures are being targeted to interrogate a reduction in potable water use from the 105 litres per person per day.
WBC Right Homes, Right Places (2023-2040) Proposed Submission Plan	Climate change 1. Make the fullest contribution possible to the mitigation of, and adaptation to, climate change and the transition to a low-carbon economy. Getting around 2. Reduce the need to travel and widen travel choice, by providing local opportunities to access learning and employment, services and facilities, through ensuring that options for walking, cycling and public transport are attractive, accessible for all, convenient and safe, and by enabling digital connectivity.

Policy	Relevant Policy Requirements
	3. Improve strategic transport connectivity by walking, cycling, wheeling, public transport and road, both between places within and outside of the borough. Natural, built and historic environment 4. Maintain and strengthen the sense of place by securing quality designed development through protecting and enhancing the distinctive historic environment, landscape character, townscape character and biodiversity value, assisting vibrancy, and by keeping settlements separate. 5. Promote quality and innovation in the design of buildings and public spaces, ensuring they are attractive, accessible, welcoming and meet needs of all groups in the community

2.3 Client Vision.

RVGs mission to create positive life choices for older people - built on community, wellbeing, and flexibility. they strive to support people to live their best lives for longer, while ensuring the planet, and our healthcare system, offer the same opportunities to future generations.

The strategy is a blueprint that will reshape us as a sustainability leader within our sector. The strategy enables us to take a holistic approach across three core pillars of sustainability: “Planet”, “Circularity” and “Social”. Under each pillar we have set objectives and targets that will enable us to drive meaningful sustainable outcomes and systemic change for our business, residents, supply chain, investors and wider society. At the same time, we see this as an opportunity to return economic, environmental and social value.

Figure 4 below outlines RVGs Corporate ESG commitments that help to drive Sustainable outcomes not only across their new and existing developments but also their business as a whole.



Figure 4: RVGs Corporate ESG Commitments.Energy Strategy.

3. Energy Strategy.

3.1 Energy Hierarchy.

The Energy Strategy takes a step-by-step approach to energy demand reduction, and carbon emission reductions. Principles of the Energy Hierarchy are followed in terms of ensuring the design is energy efficient prior to incorporation of low and zero carbon energy sources.

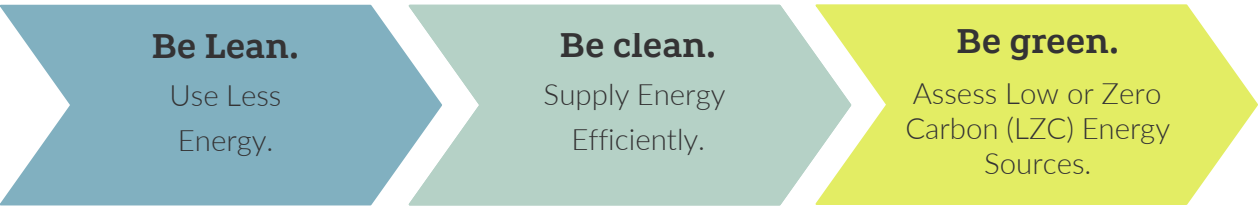


Figure 5: The Energy Hierarchy

The strategic approach to the design of the Development has been to reduce demand for energy prior to the consideration of integrating Low or Zero Carbon (LZC) technologies, since controlling demand is the most effective way of reducing energy requirements and CO₂ emissions.

Further reductions are ensured through the specification of high efficiency building services to limit losses in energy supply, storage, and distribution.

After the inclusion of passive design and energy efficiency measures, various options have been investigated to reduce CO₂ emissions associated with energy supply.

The feasibility of LZC technologies has been investigated in line with the policy aspirations and as part of the Energy Strategy submitted in support of the application.

3.2 Definitions and limitations

Definitions:

The following definitions should be understood throughout this statement:

- **Energy demand:** the ‘room-side’ amount of energy which must be input to a space to achieve comfortable conditions. In the context of space heating, this is the amount of heat which is emitted by a radiator, or other heat delivery mechanism.
- **Energy requirement:** the ‘system-side’ requirement for energy (fuel). In the context of a space heating system using a gas boiler, this is the amount of energy combusted (e.g., gas) to generate useful heat (i.e., the energy demand).
- **Regulated CO₂ emissions:** the CO₂ emissions emitted as a result of the combustion of fuel, or ‘consumption’ of electricity from the grid, associated with regulated sources (those controlled by Part L of the Building Regulations).

Limitations:

The appraisals within this statement are based on Part L calculation methodology and should not be understood as a predictive assessment of likely future energy requirements or otherwise. Occupants may operate their systems differently, and / or the weather may be different from the assumptions made by Part L approved calculation methods, leading to differing energy requirements.

4. Cooling and overheating.

In tandem with the energy and CO₂ emissions appraisal, an assessment has been undertaken to determine the risk of summertime overheating, and subsequently consider measures for the minimisation of cooling demand and mitigating risk of overheating.

4.1 Cooling hierarchy.

The following cooling hierarchy has been followed to limit the effects of heat gains in summer:

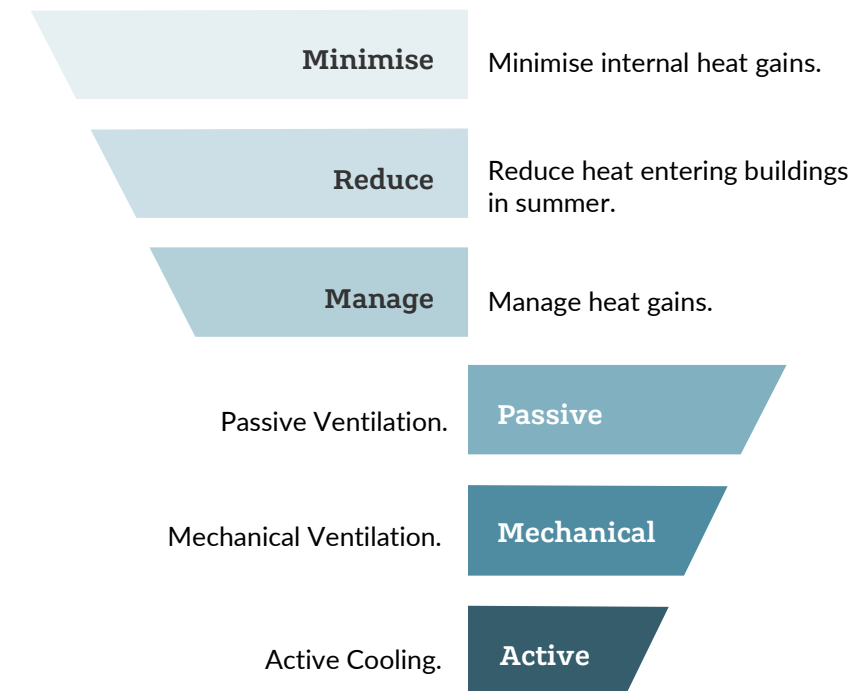


Figure 6: Cooling hierarchy.

4.2 Commercial Mitigation strategy.

Minimising internal heat gains

The following mitigation methods will be implemented to minimise the internal heat generation through energy efficient design at the Proposed Development:

- Energy efficient lighting (i.e. LED) with low heat output.
- Insulation to heating and hot water pipework and minimisation of dead-legs to avoid standing heat loss.
- Energy efficient equipment with low heat output to reduce unnecessary heat gain.

Reducing the amount of heat entering the building in summer

The following mitigation methods will be implemented to reduce the amount of heat entering the building in summer within the Proposed Development:

- Facades have been developed with suitable glazing-to-solid ratios, with particular focus on south facing orientations. Glazing ratios for the commercial development complete with internal blinds ensure we have no Criterion 3 Solar gain failures. See BRUKL in appendix B.
- Suitable g-values will be specified to further control solar heat gains as required; and

- Buildings will have the capability for internal blinds to be installed to improve occupant comfort.

Manage heat gains

- Opportunities to expose thermal mass to help to further regulate internal temperatures will be explored where possible, although the potential use of cross-laminated timber (CLT) slabs does mean that the main office floor soffits will be thermally lightweight.

Passive ventilation

The potential for passive ventilation via opening facades to facilitate a mixed-mode ventilation strategy has been considered within the facade design and will be evaluated further during the next stage of design.

Mechanical ventilation

Mechanical ventilation is an important element of building services, to maintain good indoor air quality throughout the day by providing fresh air and extracting vitiated air. Providing fresh air minimises the risk of stale and stagnant air and limits the risk of condensation and mould growth as well as benefitting the occupants' physical and mental wellbeing. Heat recovery mechanisms will be provided to save heating energy.

Mechanical ventilation plant will be located away from pollution sources, typically at roof level. It is anticipated that the design flow rates specified will aid the regulation of internal temperatures in summer months.

Active cooling

As the final step active cooling is specified in order to keep internal temperatures within acceptable limits. The façade and building services have the ability to enable a VRF fan coil unit cooling solution.

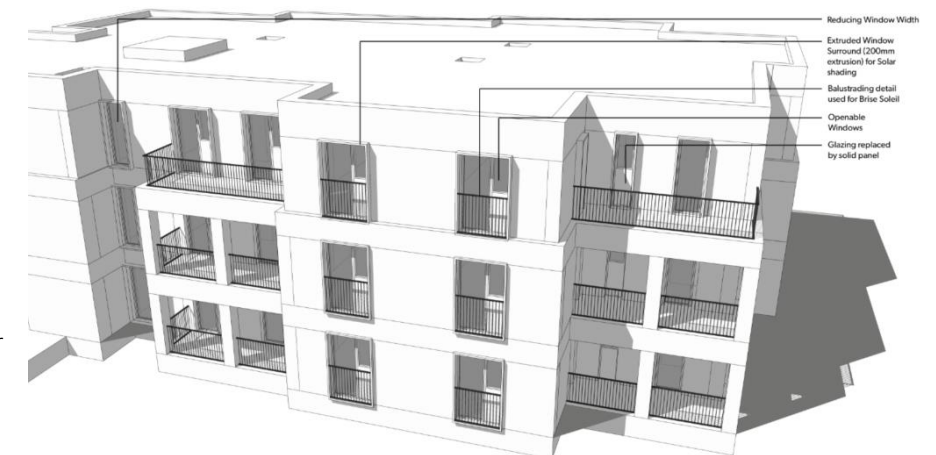
4.3 Part O: Residential Assessment methodology.

Thermal comfort methodology has been used to assess the occupied spaces within a representative sample of 5 No. Dwellings to determine their risk of overheating during the summer period (May to September inclusive).

The spaces have been assessed against criteria stated within CIBSE Technical Memorandum 59 (TM59): Design methodology for the assessment of overheating risk in homes, in accordance with the dynamic thermal modelling method.

During design development passive design principles have been adopted to reduce overheating risk which include:

1. Juliette Balcony Doors side panel reduced by 200mm.
2. Single windows reduced Width by 200mm.
3. Both now have solid lower casements where once glazed.
4. Shading extrusions and balcony railings.



The assessment has utilised dynamic simulation modelling to anticipate the internal temperatures likely to be experienced within the apartments during the summer months.

The model developed for this study consists of the following input parameters to determine the thermal conditions within the occupied spaces:

- Fabric performance,
- Ventilation strategy,
- Internal gains,
- Occupancy profiles, and;
- External weather conditions taken from CIBSE London weather centre future climate data:
DSY1_London_2020High50 (Design Summer Year 1: 2020, high emissions scenario (50th percentile)).

For further information on the calculation parameters see Specific TM59 report in Appendix C and Glazing ratios for the development are provided in Appendix A.

4.4 Overheating results.

CIBSE TM59 is shown to be satisfied when the following criteria are achieved:

- Criterion A is achieved when the threshold temperature is not exceeded for more than 3% of the occupied hours.
- Criterion B is achieved when the operative temperature in bedrooms (from 10 pm to 7 am) does not exceed 26 °C for more than 1% of annual hours.

The results for the overheating assessment are shown below for each occupied space within the sample apartments assessed.

Table 3: Natural Ventilation CIBSE TM59 results

Sample Dwellings	TM59 Criterion A Rooms that are passing	TM59 Criterion A Rooms that area failing	Pass %
15 Zones/Rooms	15	0	100
5 Zones/Living + Kitchen	5	0	100
Sample Dwellings	TM59 Criterion B Rooms that are passing	TM59 Criterion B Rooms that area failing	Pass %
10 Zones/Bedrooms	10	0	100

Note: This requires bedroom windows to be fully openable during the daytime without restrictors. Where this is not possible the lower casement of the bedroom glazing will need to be made opaque.

Compliant via natural ventilation via openable windows by implementing:

- Percentage of glazing for apartments is circa <25% floor area.
- Triple Glazing with g-Value 0.40

Due to noise constraints identified in the acoustic survey, we have evaluated the use of acoustic louvered opening or attenuated passive measures, however these we're not feasible due to:

- % Free area required was too high.
- The thermal performance of a large façade acoustic louvres was too poor effecting the DFEE.
- The size of the attenuation to achieve the sound power reduction was not possible within reveal depth.

A tempered air solution has been proposed working at a ventilation rate of 80l/s.

Table 4: Mechanical Ventilation CIBSE TM59 results

Sample Dwellings	TM59 Criterion Rooms that are passing	TM59 Criterion Rooms that area failing	Pass %
15 Zones/Rooms	15	0	100

4.4.1 Communal Corridor Overheating Check

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.

The modelling demonstrated the corridors of the Proposed Development pass this test.

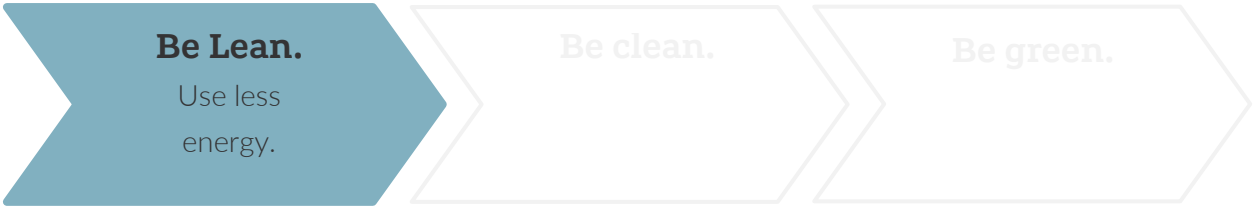
Table 5: CIBSE TM59 results for communal corridors.

Communal Corridor Check	% Annual hours above 28°C	Result
Sample Corridor 2 nd floor– Naturally Ventilated via openable windows day only. 1-2ACH	1.5	Pass
Sample Corridor 2 nd floor– Naturally Ventilated via openable windows day only. 1-2ACH	1.6	Pass

Detailed results charts are provided in Appendix C.

5. Be Lean.

Passive design and energy efficiency measures form the basis for the reduction in overall energy demand and carbon emissions for the Proposed Development. This energy strategy aims to reduce the energy demand initially by optimising the envelope and building services within the development.



5.1 Passive design and energy efficiency features

Passive Design measures are those which reduce the demand for energy within buildings, without consuming energy in the process.

These are the most robust and effective measures for reducing CO₂ emissions as the performance of the solutions, such as wall insulation, is unlikely to deteriorate significantly with time, or be subject to change by future property owners. In this sense, it is possible to have confidence that the benefits these measures will continue at a similar level for the duration of their installation.

	Fabric performance A ‘fabric first’ approach has been taken in order to reduce the energy demand and CO₂ emissions from the Proposed Development. The overriding objective for the façade design of all of the new building elements will be to achieve the optimum balance between providing natural daylighting benefits to reduce the use of artificial lighting, the provision of passive solar heating to limit the need for space heating in winter and limiting summertime solar gains to reduce space cooling demands. Thermal Insulation The new elements will Proposed Development will benefit from an efficient thermal envelope. Typically, demand for space heating can be dominant in dwellings, whilst space heating is less dominant in commercial spaces such as retail (lighting dominant). Heat losses and gains will be controlled by the optimisation of the fabric, i.e., ensuring appropriate levels of glazing to control winter heat loss and summer heat gain. Reducing the thermal transmittance of the building envelope where appropriate will help to reduce both heating and cooling requirement and result in lower energy requirements.
	Space cooling No cooling is proposed for the dwellings. Some cooling will be provided for the non-domestic elements, efficient systems are proposed in line with the standards outlined in the Non-Domestic Building Services Guide (2021). For Part O compliance Tempered Air Unit has been included into the MVHR package to mitigate overheating when windows need to remain closed due to acoustic reasons.
	Mechanical ventilation MVHR units are an important addition to the building services to maintain good indoor air quality. Providing fresh air minimises the risk of stale and stagnant air and limits the risk of condensation and mould growth.

	Coupled to a heat exchanger, the warmth in extracted air can be recovered and delivered to the supply air. In this mode, the MVHR unit reduces space heating demand. The heat recovery mechanism will be provided with a bypass to avoid returning hot air to the dwellings in summer months.
	Natural daylight and lighting strategy Lighting tends to provide a significant contribution to regulated CO₂ emissions. As such, the implementation of energy efficiency lighting design is paramount to reducing overall emissions for these spaces. Therefore, it is anticipated that the Proposed Development will be supplied with efficient electric lighting ‘Light Emitting Diodes’ (LED) or similar low energy lamps. The lighting specification for the Proposed Development will be carried out in conjunction with lighting control systems incorporating daylight linkage and presence detection. As well as reduced energy requirement that will be achieved by implementing these strategies, the contribution to the cooling requirements and internal heat gains will be reduced. This will further reduce the total energy requirements and CO₂ emissions of each building.

5.2 Fabric Permeability

Fabric permeability is a measure of how ‘leaky’ a structure is. Air leakage can occur in both directions i.e. both out of, and into a building. The volume of air that either enters or leaves the building leads to additional energy demand as generally the air either cools (in winter) or heats (in summer) the building. An air permeability of 3.00m³/m².h at 50Pa is proposed for the building.

Table 6 below summarises the fabric parameters of the Proposed Development for the development’s domestic elements.

Table 6: Proposed Development Domestic fabric parameters

Elements		Domestic	Non-Domestic
External walls	U-Value (W/m ² K)	0.14	0.14
Floors	U-Value (W/m ² K)	0.18	0.18
Roofs	U-Value (W/m ² K)	0.18	0.18
Windows / Glazed Doors	U-Value (W/m ² K)	0.80 (Triple Glazing)	0.80 (Triple Glazing) 1.20 ((Double Glazing Rooflights)
	g-value	0.40	0.40
Party walls	U-Value (W/m ² K)	Solid or Fully Filled Cavities with Sealed Edges	n/a
Air permeability	m ³ /(h.m ²) at 50 Pa	3.00	3.00
Thermal Mass Parameter (kJ/m ² .K)	-	175	-
Thermal bridging	y-Value Range	0.07-0.12	-
Sheltered Wall	U-Value (W/m ² K)	0.18	-
Party Wall	Zero Heat Loss	Fully filled and sealed.	-
Opaque Doors	U-Value (W/m ² K)	1.00	1.00

5.3 Active measures.

In addition to the passive design measures, the following energy efficiency measures will be included in the Proposed Development in order to limit the demand for primary energy. Table 7. below includes the building services parameters to be included in the preliminary Part L calculation for both the domestic and non-domestic elements.

Table 7. Proposed Development Mechanical Information

	Domestic	Non-Domestic
Heating	Direct Electric	VRF Heating – SCOP 3.20
Cooling	Tempered Air only.	VRF Cooling SEER 4.5 (Multi-Function)
Ventilation	Nuaire MRXBOXAB-ECO Balanced Mechanical Ventilation with Heat Recovery	Multi-Function: SFP 1.6 – 80% HR
DHW	Dimplex EDEL 200 (EAHP)	POU Electric
Lighting	100% efficient lighting at 90lm/W	110 lm/W as per MEP Scheme Design.

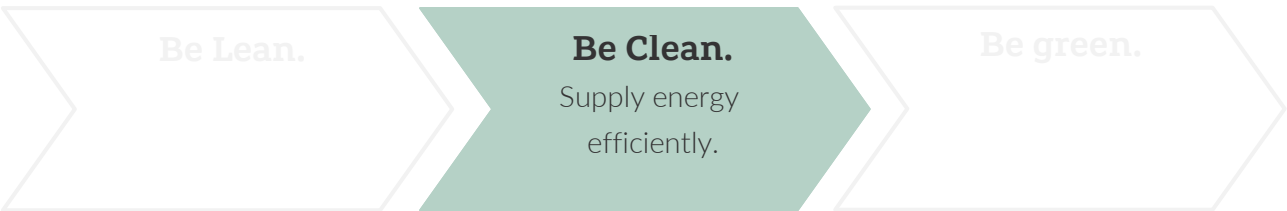
Utilising the passive and active elements as listed within this Section the dwellings achieve compliance with the fabric energy efficiency requirements of Part L 2021.

Table 8: Dwelling Fabric Energy Efficiency

	Dwelling fabric energy efficiency (DFEE) kWh/year	Target fabric energy efficiency (TFEE) kWh/year	Percentage variance
Area-weighted average:	32.78	36.85	11.1%

6. Be Clean.

This stage of the energy hierarchy refers to the use of heat networks or on-site Combined Heat and Power (CHP) in order to provide energy and reducing consumption from the national grid and gas networks, through the generation of electricity, heating and cooling on-site.



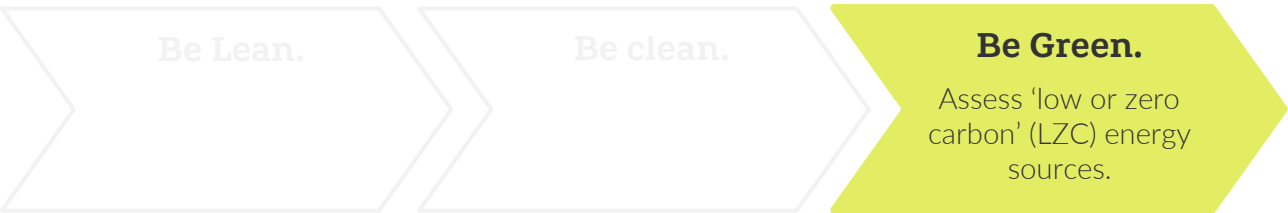
6.1 Be Clean: network and technologies.

In line with policy aspirations, the following sections summarise the considerations of the low-carbon energy supply measures that have been considered, and those which will be implemented at the Proposed Development.

	Decentralised heat and energy networks Offsite heating network There are currently no District Heat Networks (DHNs) in close proximity to the Proposed Development, therefore at present a connection is not possible.
	Combined heat and power (CHP) Changes to the carbon factor of grid electricity have meant that previously favoured systems such as Combined Heat and Power (CHP) are becoming much less carbon efficient. In fact, CHP systems are now expected to lead to greater carbon emissions than conventional gas-fired boilers due to their lower efficiency. Due to the decarbonisation of the electricity grid, schemes using CHP engines for the delivery of heating energy at the Proposed Development leads to a net increase in carbon emissions (over the baseline). Furthermore, CHP engines are an on-site source of particulate pollutants which will adversely affect local air quality. In light of grid decarbonisation and increased focus on air quality, CHP is therefore not proposed.

7. Be Green.

The final step of the energy hierarchy explores the feasibility of Low and Zero Carbon (LZC) technologies to allow for the production of renewable energy onsite in order to offer a further reduction in carbon emissions.



7.1 Low and zero carbon (LZC) technology assessment.

Renewable or zero carbon technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available, however, not all of these are commercially viable or suitable for city locations.

	Photovoltaics Photovoltaic panels harness energy from daylight and convert this into useful energy in the form of electricity. A PV system requires viable roof space in order for the system array to be installed and function effectively. Suitability to Proposed Development: Areas have been identified on the roof of Block B that would house approximately 38.5kWp; 8-10kWp of PV serving the landlords systems and contributing to the carbon reductions of the Amenity areas and incorporate into the L2 calculation; and the remaining split between the dwellings ~1.6kWp. On the basis that a solar PV array can provide a significant reduction in CO ₂ a PV array is considered appropriate for the Proposed Development.
	Solar thermal Solar Thermal Panels are similar to PV Panels in that they harness energy from solar. This technology however converts solar into thermal energy that can offset the demand on hot water generation systems. Suitability to Proposed Development: As above, roof area is available for solar panels. However, it would be to prioritise solar PVs, since the electrical output from PV panels will be more suitable for implementation with the electrical led Energy Strategy and building energy usage. Therefore, solar thermal is not proposed for the development.
	Ground source heat pumps Ground Source systems work to extract heat or cooling energy from the ground. They are generally slightly more efficient than air source systems, as the ground temperature is more stable over the course of the year relative to air temperature. There are four common varieties of ground source systems: - Vertical, open loop, direct cooling (i.e., without heat pump) - Vertical, open loop, with heat pump - Horizontal, closed loop, with heat pump

	– Vertical, closed loop, with heat pump Regardless of the type of ground source heat loop used, all would require extensive below ground works to bury and install the system on site. Ground Source Heat Pumps are not considered a feasible option and are not proposed.
	Air source heat pumps Air source heat pumps (ASHP) use thermodynamic principles to convert heat from the air into useable heat within the building. Unlike some other sources of renewable energy, heat pumps do require energy (typically electricity or gas) to pump and compress refrigerant through the system. However, under the Renewable Energy Directive 2009/28/EC they are classified as renewable technologies provided that the final energy output significantly exceeds the primary energy input required to drive the heat pump. ASHP need to be located externally with access to the ambient air, typically at roof level. Suitability to Proposed Development: The main benefits of ASHPs are that they can provide both heating and cooling as the heat pump can be operated in reverse, and they are suitable for centralised heat networks. They are easy to install (more so than GSHP) and require very little maintenance once installed. This solution requires a large outdoor space at roof or ground level to accommodate ASHPs to provide a portion of the heat demand. ASHPs are considered an appropriate technology for areas of the Proposed Development. On the residential this is explicitly for the DHW production via EAHPs.
	Wind turbine For efficient operation and to yield high energy output, wind turbines require a smooth laminar flow of air. The Proposed Development is located within a dense urban environment therefore the wind flow profile is erratic and consequently, is not conducive to high annual yields. Suitability to Proposed Development: Moreover, mounting wind turbines on the roofs of the Proposed Development could result in unacceptable vibration and resonance being felt within the occupied spaces. The turbines are also likely to generate noise which may be a nuisance to neighbouring properties. This scenario could result in the turbines being switched off. Considering the impacts described above, the limited CO₂ emission benefit and visual impact of wind turbines on the character and appearance of the area, the use of micro wind turbines will not be implemented at the Proposed Development.
	Biomass Biomass boilers burn wood fuel or other bio-fuel sources to generate heat. These boilers can operate at high efficiencies, comparable to condensing gas boilers. However, they require a large fuel store to maintain continuous operation during the winter months. As such, area take for such plant is high. Furthermore, fuel deliveries in city-centre locations can prove difficult and security of fuel supply is an important consideration. Suitability to Proposed Development: The calculations indicate that the use of a biomass boiler could yield good, regulated CO₂ emissions savings however this would also lead to in an increase of NO_x emissions from the Site and require a store footprint for the biomass fuel which would take up additional building footprint.

	As such, the use of biomass boilers at the Proposed Development is considered to be unsuitable.
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7.2 Photovoltaic panel incorporation

The Proposed Development will include approximately 180 sqm of PV panels. These will be at a 20° inclination facing southeast. This equates to 110 no. 1.85m x 1m south facing panels on the roof accessible flat roof of building. These panels will provide approximately 38.5 kWp of energy.

This reduces the carbon output of the landlord Amenity areas and the dwellings compared to the baseline scheme.



Figure 7. Roof PV Layout.

7.3 Proposed heating infrastructure.

With the recognition that the generation of electricity is much greener now than it used to be due to the decarbonisation of the grid, along with the reduction of the electricity carbon factors, a decentralised direct electric and Air Source Heat Pump (ASHP) system is considered an appropriate heat infrastructure for this development. This has been adopted as the preferred option.

8. Energy Strategy Summary.

The strategy has been developed using the ‘Be Lean, Clean and Green’ energy hierarchy which utilises a fabric first approach to maximise reduction in energy through passive design measures.

The following table provides a summary of the energy strategy for the Proposed Development for both the dwelling and site wide scale.

Be Lean	High energy efficient building fabric and building services have been utilised to reduce carbon emissions and energy demand through good practice passive measures with a 11.1% reduction on the Part L 2021 TFEЕ achieved.
Be Clean	Incorporation of an onsite district heating and a CHP system has been deemed to be unsuitable, therefore a heat network and CHP technology has been discounted.
Be Green	Utilisation of on-site renewable energy from ASHP and roof mounted PV will also be implemented at the Proposed Development to further reduce carbon emissions.

8.1 Results

Through the measures outlined in the energy strategy, it is anticipated that overall, up to an 85%reduction in CO₂ emissions can be achieved beyond the Building Regulations Part L 2021 baseline.

Table 9 details the performance levels achieved against the Part L 2021 compliance metrics for the domestic, non-domestic and overall site areas.

Table 9: Regulated carbon savings – Sitewide data

	Building/ Dwelling Primary Emission Rate (BPER/ DPER)	Target Primary Energy Rate (TPER)	% Reduction over the Target Primary Energy Rate (TPER)	Building/ Dwelling Emission Rate (BER/ DER)	Target Emission Rate (TER)	% Reduction over Target Emission Rate (TER)
	kWh/m ²	kWh/m ²		kgCO ₂ e/m ²	kgCO ₂ e/m ²	
Residential	27.84	66.84	58.3%	2.14	12.69	83.1%
Non-Residential	-45.59	1.59	-	-3.27	0.33	-
Site Wide						85%

Please refer to Appendix A for the sample SAP reports and Appendix B for the BRUKL document.

Figure 8 below demonstrates the site wide carbon reduction.

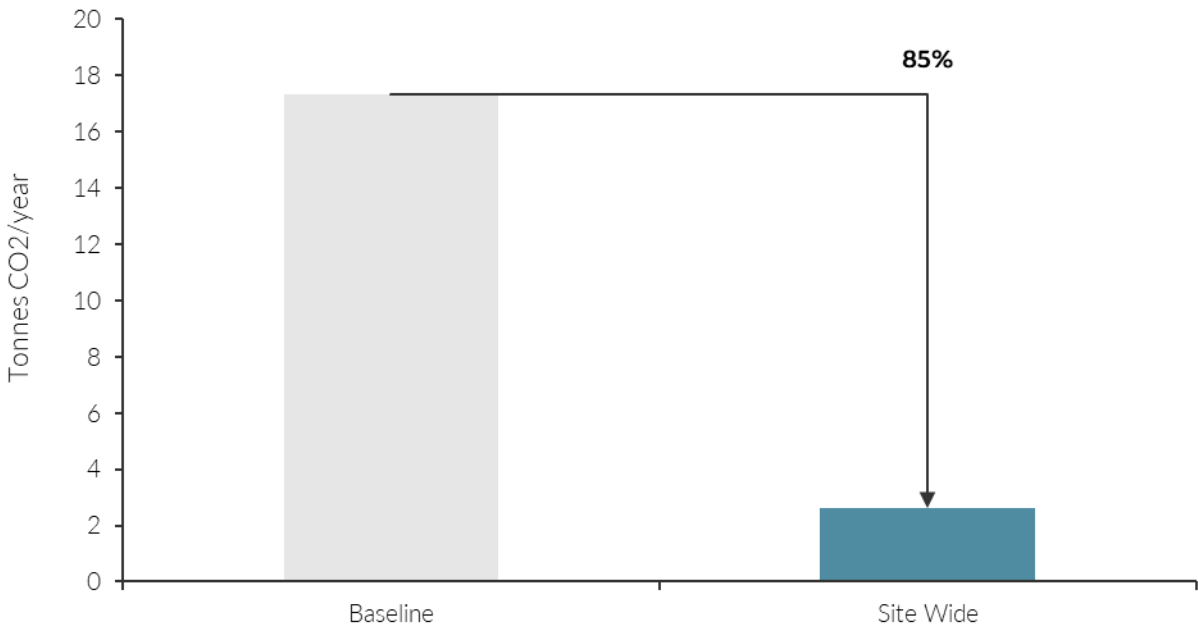


Figure 8 Sitewide regulated carbon reduction.

The energy strategy for the Proposed Development has addressed the key elements of Wiltshire Local Plan on energy and will make a positive contribution to reducing the county's CO₂ emissions.

9. Approach to Sustainability.

The following strategy addresses a wide range of sustainability subject areas and covers various headline sustainability categories. The strategy confirms the applicable policies and the Applicant's aspirations and measures of sustainability that would be implemented at the Proposed Development.

The design of the Proposed Development is based on sustainable design and construction principles as informed by planning requirements and industry best practice. It is on this basis that we are utilising a sustainability framework based on five defined factors, i.e., the people, the buildings, the social network, the natural environment, and the economic aspects as illustrated in Figure 9 to capture the multi-faceted sustainability benefits and values that the Proposed Development could bring to the following areas:

- Application Site,
- Local community,
- Surrounding businesses, and
- Future building users.

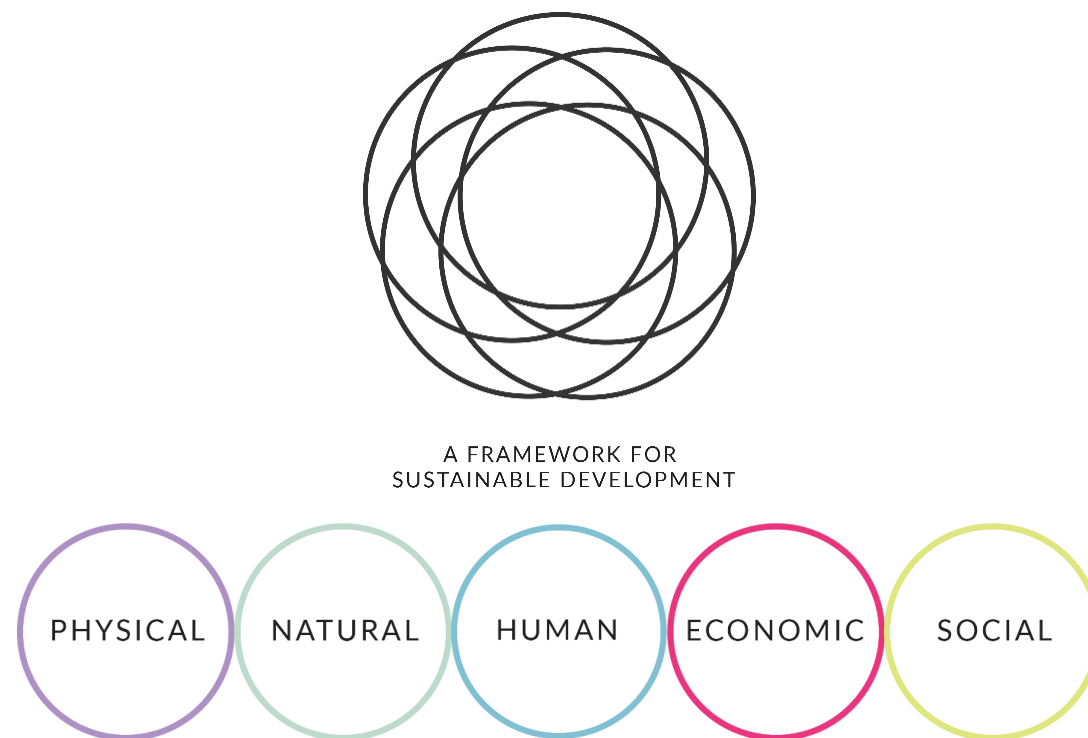


Figure 9: Framework for Sustainable Development

- **Physical: fit for the future** – buildings that are robust and equipped to navigate future environmental challenges.
- **Natural: positive impact** – integrity is maintained through design and operation through enhancement of ecological assets and responsible resource management.
- **Human: Occupant Wellness** – putting people at the heart of the design process and ensuring that the physical and mental wellbeing of occupants and visitors is catered for.
- **Economic: Enable new Opportunities** – ensuring that priority is given to local small / medium enterprises and independent service providers as means of boosting the local economy.
- **Social: Active Community** – creating a safe and sociable place for people to live and interact, enhancing existing communities and fostering new connections.

- **Physical: Fit for the Future** – buildings that are robust and equipped to navigate future environmental challenges.

The Delivery Framework

Working with all key stakeholders, an overall vision for the development has been defined. Workshops have been held in collaboration with the client and project team to help create a charter including innovative initiatives and key objectives to be delivered as a result of the project.

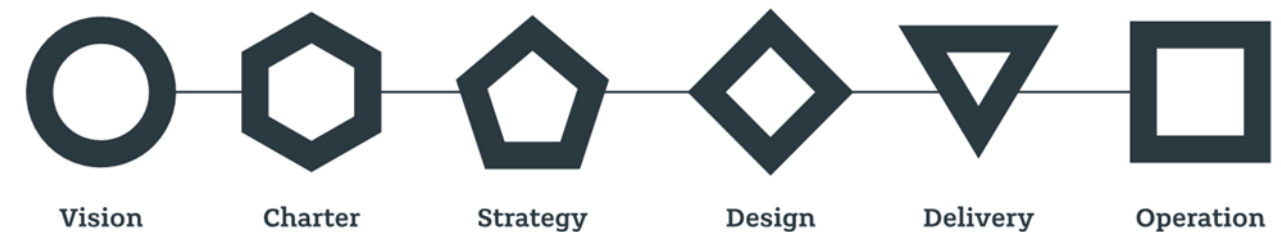


Figure 10 Sustainability strategy – Delivery phase (inception to completion).

10. Sustainability Strategy.

The design of the Proposed Development is based on high sustainability aspirations and is compliant with industry best practice. In addition, it also attempts to push the boundaries of conventional construction by deploying innovative methods and approaches during design and construction. The strategy for the Proposed Development addresses key sustainability challenges and opportunities, responds to the requirements of the applicable policies, and implements the Applicant's aspirations.

It embraces the Five Capitals framework, responding to the challenges of climate, biodiversity and health and wellbeing, UN sustainable development goals and Applicant vision, aiming to create long term value and generate a flow of environmental, social and economic benefits. Each Capital has been contextualised to the specific needs, challenges and opportunities arising from the Proposed Development, resulting in five themes.

Wiltshire Climate Change Pre-App Feedback

A pre-app consultation was undertaken where for planning there was a requirement for submission of a Sustainability Strategy - with a plan annotating how design maximises resilience (see NDG para. 135 -149).

10.1 Physical Capital: Fit for the future.

Energy strategy

The Proposed Development is targeting energy and carbon emission reductions over the existing pre-refurbishment building. The following energy efficiency measures have been incorporated into the design to meet the targeted CO₂ emissions reductions.

- Low carbon heating and cooling via ASHP/VRF.
- Good fabric performance – Low U-Values and implementation of Triple Glazing.
- Modern building services including high efficiency ventilation plant with variable speed fans and high levels of heat recovery.
- Efficient low-energy lighting throughout all spaces with low heat output to minimise risk of high internal heat gains.
- Inclusion of Photovoltaics for the Landlord Amenity space.

Flood risk management and sustainable drainage

Based on information from the Environment Agency has indicated that the site is located within Flood Zone 2/3 and has a high probability of flooding from rivers and the sea.

Flood zone 2

Locations in flood zone 2 have a medium probability of flooding. This means in any year land has between a 1% and 0.1% chance of flooding from rivers and between a 0.5% and 0.1% chance of flooding from the sea. Flood zone 2 developments need a flood risk assessment as part of their planning application.

Flood zone 3

Locations in flood zone 3 have a high probability of flooding. This means in any year land has a 1% or more chance of flooding from rivers, or a 0.5% or more chance of flooding from the sea. Flood zone 3 developments need to submit a flood risk assessment as part of their planning application.

Flood defences

There are flood defences in part or all of the location you selected. Flood defences reduce the probability of flooding from a specific source (a river or the sea) do not completely stop the chance of flooding because there may be a flood that is bigger than the one the defence is designed to protect against (this is called overtopping), or the defence can fail may provide reduced protection over time because of climate change increasing flood risk in the future. There are different types of flood defence. They include:

- culverts
- embankments

- flood walls

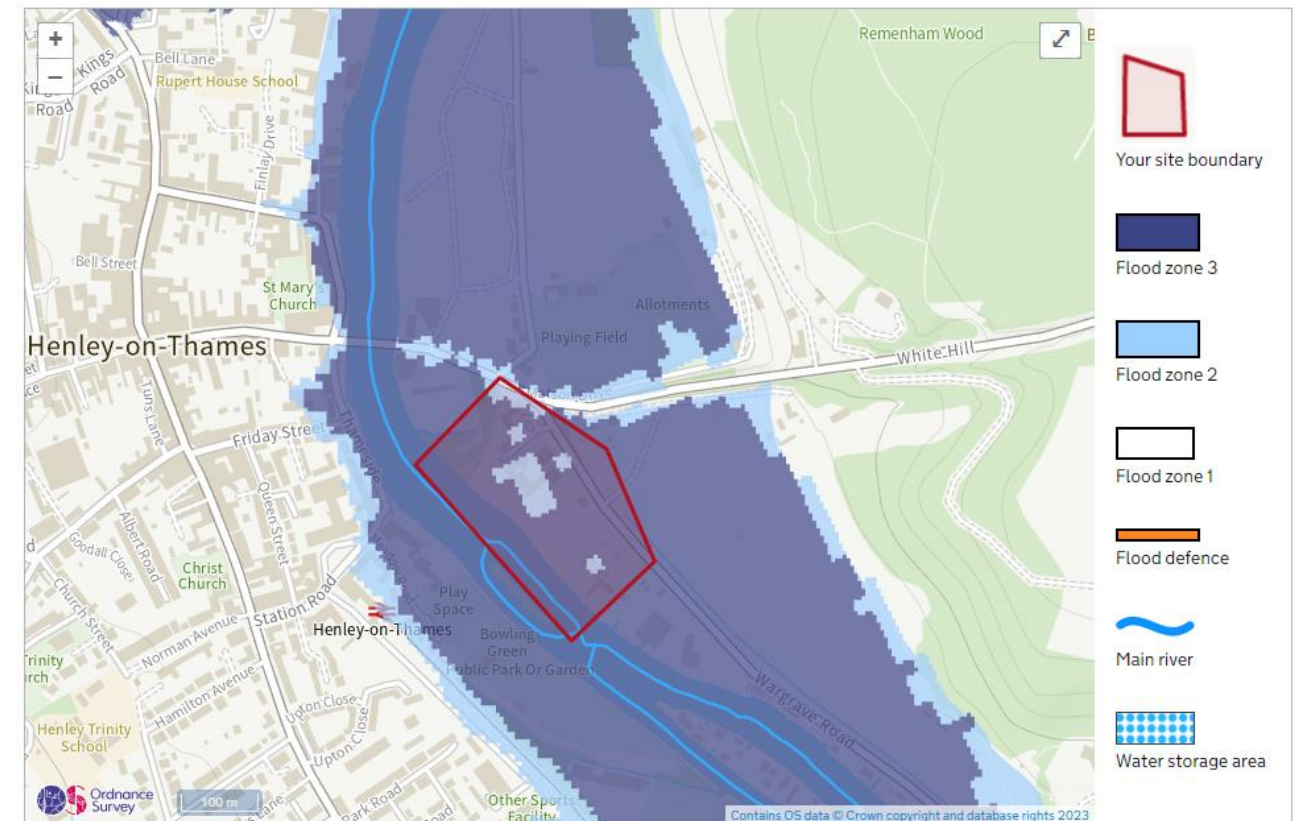


Figure 11 Flood Risk Map (Credit: <https://flood-map-for-planning.service.gov.uk/>)

The map shows the flood risk to your site and the surrounding area. The flood zones in the map show the areas of land at risk of flooding. They only show flood risk from rivers and the sea are based on present day flood risk; they do not show how it may change in future because of climate change ignore the effect any flood defences shown could have.

Flood defences

Flood defences have been built to protect against flooding from rivers or the sea (shown as an orange line on the map). Flood defences reduce, but do not completely stop the chance of flooding because they can be overtopped or fail.

Flood Risk Assessment

To assess the risk of fluvial flooding from the River Thames, hydraulic modelling was undertaken by JBA in 2022. Hydraulic modelling results indicated that:

- Water enters the site (from overtopping of the River Thames' banks) for all of the modelled flood scenarios (i.e. 30-year, 100-year, 100-year +31% CC and 1,000-year)
- Flood depths of up to 1.89m are predicted to occur within the site during the 100-year with 31% climate change 'design' flood event.
- During the 100-year with 31% climate change fluvial flood event, the peak water levels will range between 32.24 and 32.29m AOD on site and will exceed the existing floor levels of 2 existing buildings.
- During the 100-year with 31% climate change scenario, the majority of the site falls within the 'low' to 'significant' hazard categories (based on Defra's Hazard-to-People categories).
- The 'design' flood level will increase by 0.77m in the event of a 25% blockage at Henley Bridge.

To mitigate against flood risk, it is recommended to:

For the new buildings;

- Raise the ground floor levels of the new buildings to a minimum of 600mm above the ‘design’ flood level.
- Install emergency generators to be used in extreme cases of flooding where the power might be affected to maintain power on site (e.g. to power medical equipment).

Sustainable transport

The main access to the site is proposed from the A321 Wargrave Road to the Northeast of the site, which also provides access to the remaining existing development.

Bus Services

The nearest bus stops are located 60m north of the site access (northbound) and 25m for the southbound stop. The 850 bus service routes via these stops at an hourly frequency. A number of additional services are available from Henley-on-Thames with several bus stops along Hart Street/Market Place.

The bus stops known as the ‘Two Brewers’ both feature bus flags. Hart Street (Stop B) also has a bus flag, raised kerb line and a dedicated bus cage. Hart Street (Stop A) in addition to the features of Stop B also has a sheltered seating area. The Market Place stop has a dedicated bus cage and bus flag.

Train Services

The nearest train station is Henley-on-Thames and is located approximately 900m walking distance from the site access. The main service from the station is to Twyford with services running every half hour.

Cycleways

Cycling also has the potential to substitute for short car trips, particularly those less than 5km, and to form part of a longer journey by public transport. In addition, the Department for Transport’s (DfT) ‘Cycle Infrastructure Design LTN1/20’ (July 2020) document states that a cycle trip distance of over five miles (8 km) is common. A 5km cycle will take approximately 19 minutes at an average speed of 268m per minute whilst an 8km cycle will take approximately 30 minutes at an average speed of 268m per minute.

Car parking

A total of 39 parking spaces are provided across the site an increase of 8 and of those 39, 36 are formal, 2 disabled bays and 1 space will be provided with active electric vehicle charging infrastructure.

Pedestrians and Cyclists.

Walking is a key mode of travel at the local level and offers the greatest potential to replace short car trips, particularly under 2km. A 2km walk equates to a walking time of 25 minutes (based on an average walking speed of 80 metres per minute.

Travel Plan

In planning terms, a Travel Plan is not required for the low level of staff working on these types of residential development and a TP has not been requested for the planning application. However, a number of travel planning measures and facilities would in any case will be implemented at Thamesfield to encourage sustainable travel.

10.2 Natural Capital: Positive impact

Ecology & biodiversity.

RPS was commissioned to undertake a Preliminary Ecological Appraisal (PEA) at land at Thamesfield Retirement Village, Wargrave Road, Henley on Thames RG9 2LX. This comprised a desk study, Phase 1 Habitat Survey, and a Preliminary Bat Roost Assessment (PBRA). There are 16 non-statutory sites located within the 2 km search radius of the site, this includes 12 Local Wildlife Sites, one potential Local Wildlife Site, one Woodland Trust

Reserve, a Biodiversity Opportunity Area and a Conservation Target Area. The closest LWS site is Branfords Woods which is 0.33km from the site boundary.

The Phase 1 Habitat Survey identified that the site predominantly comprised amenity grassland, hard standing, and buildings, with the grounds displaying areas of mixed woodland, introduced shrubs, and scattered trees. The PBRA identified four buildings (B1, B2, B3 and B6) with high potential, one building (B5) with low potential, one building (B4) with negligible potential, and two trees with moderate potential to support roosting bats. Bat droppings were found beneath external features located on B1, B3 and B6. Further surveys may be required to determine whether these buildings are currently being used by bats.

In addition to the mitigation measures outlined above, enhancement measures would also include the provision of bird boxes located within existing hedgerows and on mature trees. Boxes will comprise various designs suitable for species including: robin, wren, blue tit, great tit, coal tit, nuthatch, house sparrow and starling.

A Biodiversity Net Gain (BNG) assessment will be required using current guidance from CIEEM, et al (2019). This would involve using the recognised scoring system to assess the habitats on site prior to development and post development. There would be a requirement to show a net gain of approximately 10% and therefore it will be necessary to work with the project team to ensure high value habitats were being re-created. If biodiversity gains cannot be achieved on-site, off-site opportunities would need to be investigated.

The information gathered during the Phase 1 Habitat Survey would be used to calculate the baseline biodiversity value of the site. A masterplan/landscaping plan of the site would be used to calculate the biodiversity value of the development.

Bio Diversity Net Gain Summary

FINAL RESULTS		
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	Habitat units	0.66
	Hedgerow units	0.05
	Watercourse units	0.00
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	Habitat units	12.30%
	Hedgerow units	89.28%
	Watercourse units	0.00%
Trading rules satisfied?	Yes ✓	

External Lighting

Lighting to be installed as part of the development should be in line with Guidance Note 08/18 Bats and Artificial Lighting in the UK, the following will be required:

- LED lighting will be used, and light levels should be kept as low as possible. Metal halide, fluorescent sources should not be used;
- Lighting will be directed to where it is needed (away from boundary features and existing potential roost features);

- Only luminaires with an upward light ratio of 0% and with good optical control should be used, luminaires should always be mounted on the horizontal, i.e. no upward tilt;
- Any external security lighting should be set on motion-sensors and short (one minute) timers;
- Internal lighting within any new structures should be recessed where installed in proximity to windows to reduce glare and light spill; and
- Light sources should emit minimal ultra-violet light, peak higher than 550nm and be of a warm white spectrum (ideally <2700 Kelvin).

Water consumption

The Development will be fitted with water efficient fixtures and fittings, and water meters will be provided to enable the monitoring of water consumption.

Through the use of efficiency sanitaryware all dwellings will comply with the Building Regulations target of 110 litres/person/day.

Mains water metering will be incorporated in the design. Meters will be connected to the central Building Management System.

No rainwater or waste water recycling facilities are proposed within the buildings however facilities to collect rainwater for landscape irrigation via water butts will be provided.

Climate change adaptation

The design will contribute to adaptation and mitigation of the effects of climate change by the specification of high performing elements to minimise heat gains and losses.

The Proposed Development will be designed in accordance with the cooling hierarchy to minimise cooling demand. Mitigation measures such as an appropriate glazing ratios and g-values, high levels of insulation and minimisation of internal heat gains are targeted. A tempered air system via the MVHR has been allowed for, installation as the climate becomes warmer and mindful that we have vulnerable occupants that may need/require active cooling in future.

Measures outlined include the provision and installation of PV panels and the improvement of site water drainage through paving material selection.

Responsible sourcing

The use of construction products leads to a wide range of environmental and social impacts across the life cycle through initial procurement, wastage, maintenance and replacement. Taken together, construction products make a highly significant contribution to the overall life cycle impacts of a building. In some cases, they may even outweigh operational impacts (such as energy consumption).

Building elements will be selected to minimise environmental impact, in line with the sustainable procurement plan to be developed for the development. A full review of the materials specified for the development will be undertaken during the detailed design development stages aiming for materials to meet the following requirements where possible:

- Responsible sourcing certificates
- Environmental Product Declarations
- Low emitting materials

Insulation will be specified to have a Green Guide Rating of A where possible, and minimise Global Warming Potential (GWP), and all timber used at the Proposed Development aims to be FSC or PFC certified or similar.

Waste management

During the construction phase, the Principal Contractor, once appointed, will develop a Resource Management Plan (RMP) for the Proposed Development. This will outline opportunities to steer the direction of waste management and ensure good practice is adopted for the construction phase of the Proposed Development.

The Principal Contractor will be required to adopt the recommendation measures made in line with the waste hierarchy with the aim of maximising diversion from landfill. A Construction Environmental Management Plan (CEMP) will be developed to outline opportunities for waste management and ensure good practice will be adopted in the construction phase of the Proposed Development. The Proposed Development will be constructed in a manner which aims to protect the environment and local community through reusing, recycling and recovering waste which would otherwise be disposed of at landfill.

Refuse collection will continue as private waste collection for the recycling and general waste. However, as the development will increase the number of available units on site, it is anticipated that additional waste bins will be required. At present, the general waste bins are approximately 75% full when collected, whilst the recycling bins are 100% full.

The proposed development would result in a requirement for an additional 2no. general waste bins and 3no. recycling bins. However, in order to avoid a requirement for additional hardstanding, it is proposed that the number of private waste collections will be increased from once per week to twice per week.

Future Weekly Waste storage requirement for 49 units – 5,390L Total; 5no. 1100L bins, based on 75% existing usage – 4,042.5L Total; 4no. 1100L bins, at two collections per week – 2,021.25L Total; 2no. 1100L bins.

Future Recycling storage requirement for 49 units – 5,390L Total; 5no. 1100L bins, at two collections per week – 2,695L Total; 3no. 1100L bins.

Based on the above, with two collections per week, there is requirement for 1 additional recycling bin in comparison to the existing provision, which will be provided within the existing bin storage area. There is no change to the existing general waste storage.

10.3 Human Capital: People-centred design

People-centred Design

Human centric design centres on development that puts user needs, desires and abilities at the centre of the design process. Multiple options have been considered for the design including maximising natural daylight and limiting the use of artificial lighting within the scheme, ensuring adequate views out of the surrounding environment, ensuring appropriate thermal comfortability is maintained throughout key areas of the building. Adopting appropriate acoustic measures will be incorporated into the scheme in order to minimise disturbance for the occupants of the development.

The overarching design strategy for the village reconnects the new communal and well-being facilities into this unique landscaped setting, celebrating the vistas and providing a sensational place to live. The new buildings are designed to be calming and respectful of the immediate and local context. Their arrangement on the site will reconnect the existing residential units to vibrant a new village centre, focussed on the wellbeing of the resident. The design focus for the gardens and external spaces is to celebrate the uniqueness of the site from its lawns with extensive vistas to the rustic quarry wall that forms the backbone to the village. An abundance of places where people can sit and socialise in the grounds is complemented with good active frontages, strong connectivity between gardens and dwellings and sheltered thresholds at entrances.

Local air quality

An air quality assessment has not been requested for the planning application, however, the quality of the air within buildings can have a considerable effect on health due to the amount of time people spend indoors. All finishes installed in the building will aim to have low volatile organic compound (VOC) content. The development will be combustion free and is therefore expected to have a minimal impact on local air quality.

Daylight & thermal comfort

The Proposed Development will target glazing ratios, VLT and g-values which maximise exposure to daylight achieving at least 70% EN Spatial Daylight Autonomy compliance, whilst considering the level of incoming solar gains in order to minimise the energy consumption necessary for cooling.

Part O (CIBSE TM59 Analysis) analysis has been completed and provides a route to compliance using Natural ventilation supplemented by background ventilation via MVHR installed to meet Part F of the building regulations. Where noise is an issue, noted in the section below, a tempered air system via the MVHR has been allowed for.

Noise

Hoare Lea has conducted an environmental noise survey the following summarises the assessment procedure and findings contained within this report:

- Environmental noise monitoring was undertaken at the proposed development site across a seven-day period between Wednesday 2nd August 2023 and Wednesday 9th August 2023.
- Background noise levels typical of the daytime and night-time have been measured and used to define building services plant noise emission limits at the nearest noise sensitive receptors.
- The nearest receptors have been identified as the proposed development itself and existing residential dwellings within Thamesfield Retirement Village and those along Wargrave Road to the north including Cognatum Retirement Property to the north.
- During the daytime and night-time, the combined building services plant noise emission contribution limit advised is 40 dB(A) and 38 dB(A) respectively, one metre from the nearest residential façade.
- An assessment of the building envelope acoustic performance is provided and indicates that the ventilation strategy should allow for full mechanical ventilation of bedrooms as the level differences required are above those achievable by simple means of natural ventilation via an open door or window.
- For a number of living rooms on certain elevations, compliance with the internal noise levels with a 5 dB relaxation applied (as detailed within the ANC's Acoustics Ventilation and Overheating Residential Design Guide) can be achieved with open windows during the daytime.
- Notional glazing requirements and indicative glazing configurations have been provided for guidance purposes only. Detailed calculations based on façade areas will be required to refine and finalise the performance requirements during the next design stage.
- On the basis of the guidance contained within this report, it is concluded that the Site is suitable for the proposed development.
- The guidance provided within this report is sufficient to satisfy the requirements of Wokingham Borough Council, in our professional opinion.

10.4 Economic Capital: Enable new opportunities.

Please review the Economic and Social Statement issued by Stantec (not available at the time of re-issue of this report).

10.5 Social Capital: Community engagement

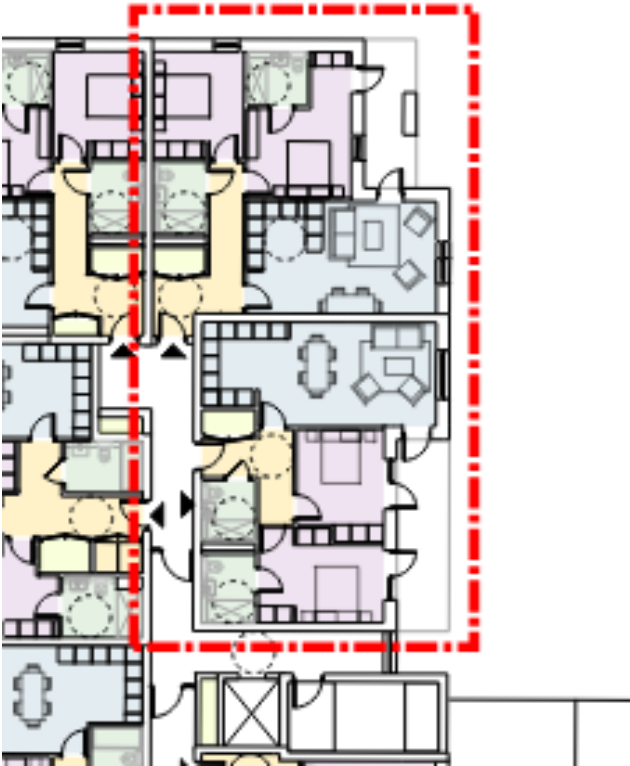
Please review the Economic and Social Statement issued by Stantec (not available at the time of re-issue of this report).

Appendix A: SAP Sample TER and DER Worksheets.

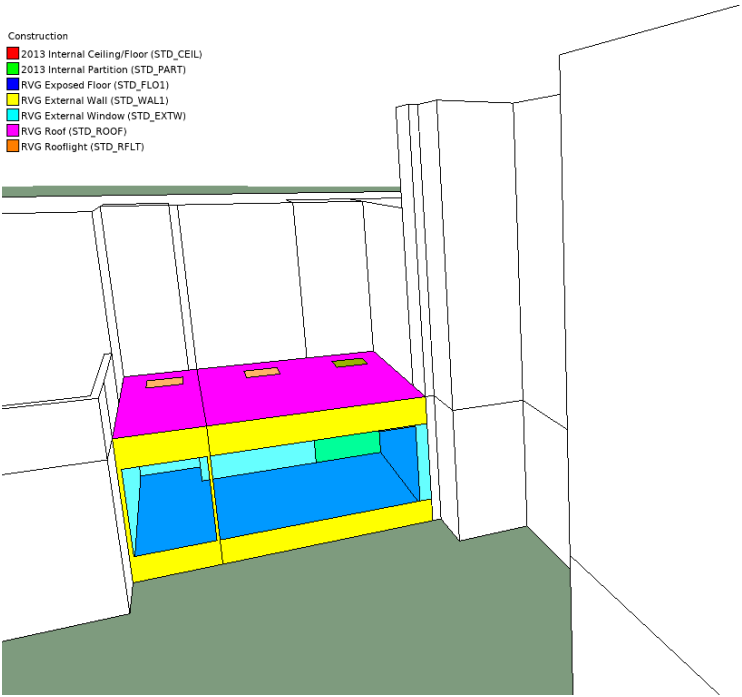
Glazing areas assessment per Dwelling.

	Glazing Area	Ext. Wall Area	%	Floor Area	%
Unit 1	10.19	53.08	19%	78.50	13%
Unit 2	10.92	34.65	32%	76.20	14%

SAP Sample Key Plan.



Appendix B: Part L2 Calculation extents for Communal Residential
Areas and associated BRUKL Report.



Construction
2013 Internal Ceiling/Floor (STD_CEIL)
2013 Internal Partition (STD_PART)
RVG Exposed Floor (STD_FLO1)
RVG External Wall (STD_WALL1)
RVG External Window (STD_EXTW)
RVG Roof (STD_ROOF)
RVG Rooflight (STD_RFLT)

BRUKL Output Document HM Government
Compliance with England Building Regulations Part L 2021

Project name
RVG Thamesfield Part L2A-JM-Rev0 As designed

Date: Wed Sep 13 13:12:40 2023

Administrative information

Building Details
Address: Address 1, City, Postcode

Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.22
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.22
BRUKL compliance module version: v6.1.e.1

Certifier details
Name: Name
Telephone number: Phone
Address: Street Address, City, Postcode

Foundation area [m²]: 105.31

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	0.33
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	-3.27
Target primary energy rate (TPER), kWh _e /m ² annum	1.59
Building primary energy rate (BPER), kWh _e /m ² annum	-45.59
Do the building's emission and primary energy rates exceed the targets?	BER =< TER BPER =< TPER

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

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.14	0.14	DJ000001:Surf[4]
Floors	0.18	0.18	0.18	DJ000001:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	DJ000001:Surf[2]
Windows** and roof windows	1.6	0.82	0.82	DJ000001:Surf[3]
Rooflights***	2.2	1.21	1.21	DJ000001:Surf[1]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building
U _{a-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

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

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- CIRCULATION

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system	NO				

2- LAUNDRY

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system	NO				

3- VRF SYSTEM

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	4.5	0	1.6	0.8
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system	YES				

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	0.91	N/A

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

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
L00-Corridor		110	-	-
L00-Laundry		55	-	-
L00-Toilet		110	-	-
L00-Store		110	-	-
L00-Multifunction Room		110	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00-Multifunction Room	NO (-76.8%)	YES

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	20.5	72.8	1.8	6.5	3.2	3.08	3.11	3	4.5
Notional	27.5	44.7	2.8	2.7	6.9	2.78	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	0.4	0	0.1	0	0	0.8	0	1	0
Notional	1.5	0	0.3	0	0	1.41	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	129.4	0	44.9	0	0	0.8	0	1	0
Notional	133.7	0	26.3	0	0	1.41	0	----	----

Key to terms

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m²]	105.3	105.3		Retail/Financial and Professional Services
External area [m²]	192.6	192.6		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	LON	LON		Offices and Workshop Businesses
Infiltration [m³/hm²@ 50Pa]	3	3		General Industrial and Special Industrial Groups
Average conductance [W/K]	45.53	50.96		Storage or Distribution
Average U-value [W/m²K]	0.24	0.26		Hotels
Alpha value* [%]	25	10		Residential Institutions: Hospitals and Care Homes
				Residential Institutions: Residential Schools
				Residential Institutions: Universities and Colleges
				Secure Residential Institutions
				Residential Spaces
			100	Non-residential Institutions: Community/Day Centre
				Non-residential Institutions: Libraries, Museums, and Galleries
				Non-residential Institutions: Education
				Non-residential Institutions: Primary Health Care Building
				Non-residential Institutions: Crown and County Courts
				General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger Terminals
				Others: Emergency Services
				Others: Miscellaneous 24hr Activities
				Others: Car Parks 24 hrs
				Others: Stand Alone Utility Block

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	9.27	6.5
Cooling	3.98	1.64
Auxiliary	1.97	4.2
Lighting	16.33	7.4
Hot water	2.84	2.57
Equipment*	44	44
TOTAL**	34.39	22.3

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	65.48	21.44
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	65.48	21.44

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	80.56	68.68
Primary energy [kWh _{PE} /m²]	-45.59	1.59
Total emissions [kg/m²]	-3.27	0.33

Appendix C: Detailed Part O Criteria and Results Graphs.

The geometry used to assess proposed dwellings was determined by drawings received from the project architect:

Table 4: Architectural Information.

Drawing Type	Document Package	Data Type	Date Received
Plans, Sections, Elevations	Draft Planning Set	PDF/DWG/REVIT	03/07/2023

CIBSE TM59 overview

Overheating in all spaces was previously quantified by the number of occupied hours annually that the internal temperature exceeds a maximum temperature irrespective of external temperature.

The CIBSE TM59 criteria for predominantly naturally ventilated spaces use both an adaptive comfort and a fixed threshold approach:

Adaptive comfort:

Adaptive comfort is where the overheating threshold is dynamic. It is based on the comparison of the anticipated internal conditions against criteria which establishes a maximum acceptable room temperature calculated from the running ‘mean’ outdoor temperature. Research has shown that comfortable room temperatures vary with the external temperature conditions and occupants are generally more accepting of warmer room temperatures if the weather is also warm outside.

Fixed threshold:

CIBSE TM59 criterion B, used to assess bedrooms only, uses a static measurement where the threshold is fixed. The risk of overheating is quantified by the number of occupied hours annually that the internal conditions exceed a maximum temperature, irrespective of external temperature. It therefore does not vary in line with the external conditions like the adaptive comfort approach. This criterion is required to be satisfied within bedrooms only.

CIBSE TM59 criteria

CIBSE TM59 considers the risk of overheating by assessing occupied spaces against two criteria detailed in the table below.

Table 5: TM59 Criteria Summary

Criterion A	<u>For Living Rooms, Kitchens and Bedrooms:</u>
	Criteria sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature. To satisfy Criterion 1, the following must not occur for more than 3% of occupied hours: The difference between the actual operative temperature, and the maximum acceptable temperature* is equal to or greater than 1 degree during May to September.

Criterion B	<u>For Bedrooms Only:</u>
	Criteria states that peak bedroom temperatures should not exceed an absolute threshold of 26 °C. To satisfy Criterion 2, the operative temperature in the bedrooms from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours (33 Hours).

* Maximum acceptable temperature: CIBSE sets a maximum acceptable temperature of 3°C above the comfort temperature (for new buildings).

Mitigation strategy.

Minimising internal heat gains

The following mitigation methods will be implemented to minimise the internal heat generation through energy efficient design at the Proposed Development:

- Energy efficient lighting (i.e. LED) with low heat output.
- Insulation to heating and hot water pipework and minimisation of dead-legs to avoid standing heat loss.
- Energy efficient equipment with low heat output to reduce unnecessary heat gain.

Reducing the amount of heat entering the building in summer

The following mitigation methods will be implemented to reduce the amount of heat entering the building in summer within the Proposed Development:

- Passive shading measures, with particular focus on west, east and south facing orientations. Glazing ratios for the development are provided in Appendix A.
- Suitable g-values will be specified to further control solar heat gains as required; and
- Buildings will have the capability for internal blinds to be installed to improve occupant comfort.

Manage heat gains

- Opportunities to expose thermal mass to help to further regulate internal temperatures will be explored where possible.

Passive ventilation

The potential for passive ventilation via opening facades to facilitate a mixed-mode ventilation strategy has been considered within the facade design and will be evaluated further during the next stage of design.

Mechanical ventilation

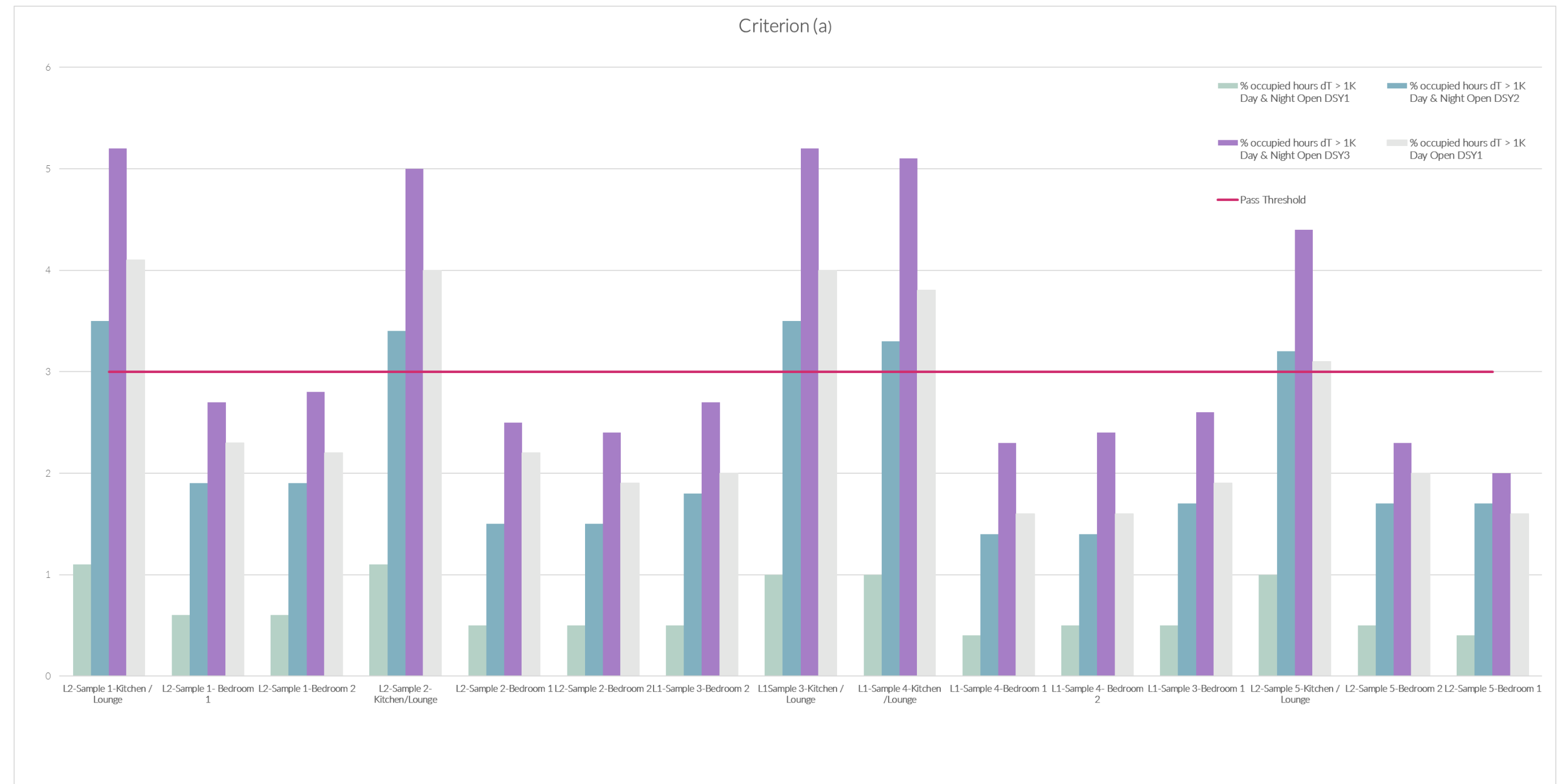
Mechanical ventilation is an important element of building services, to maintain good indoor air quality throughout the day by providing fresh air and extracting vitiated air. Providing fresh air minimises the risk of stale and stagnant air and limits the risk of condensation and mould growth as well as benefitting the occupants’ physical and mental wellbeing. Heat recovery mechanisms will be provided to save heating energy.

Mechanical ventilation plant will be located away from pollution sources, typically at roof level. It is anticipated that the design flow rates specified will aid the regulation of internal temperatures in summer months.

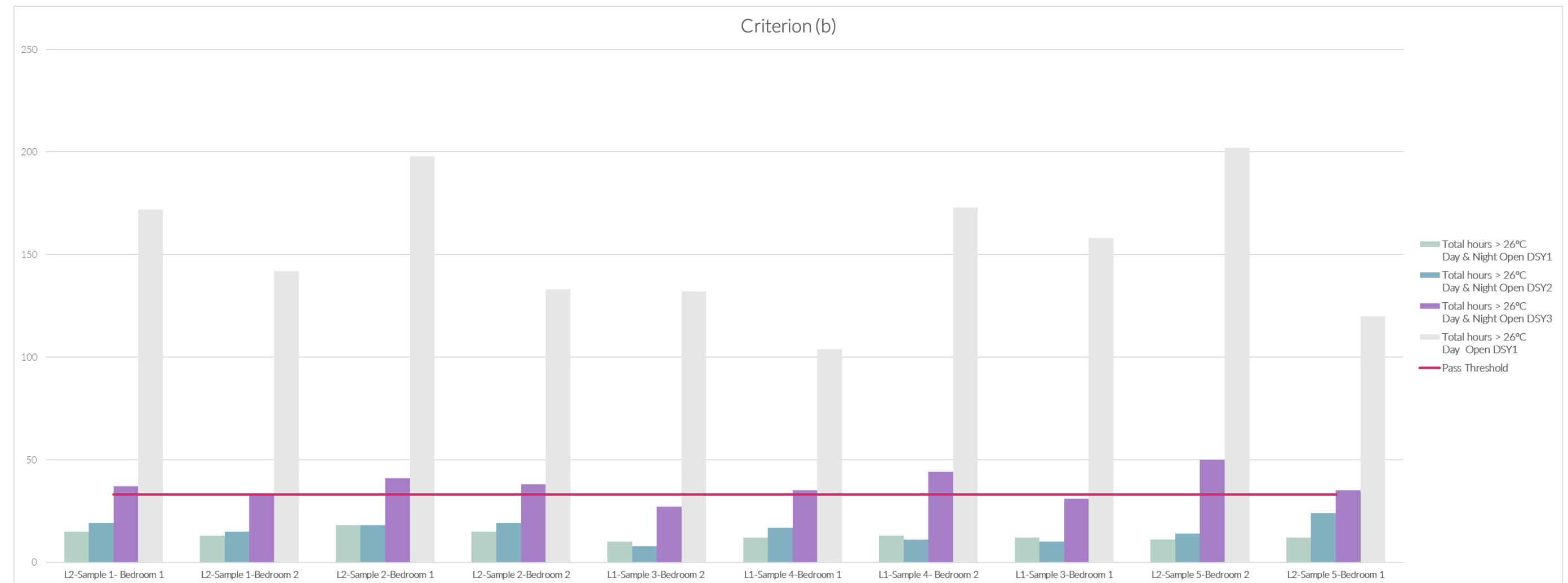
Table 6: TM59 Criteria Summary

Fixed Comfort Criterion	For Living Rooms, Kitchens and Bedrooms: Criteria sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature. Fixed comfort criterion All living rooms, kitchens and bedrooms must not exceed the maximum operative temperature threshold of 26 degrees for 3% of the total annual occupied hours.
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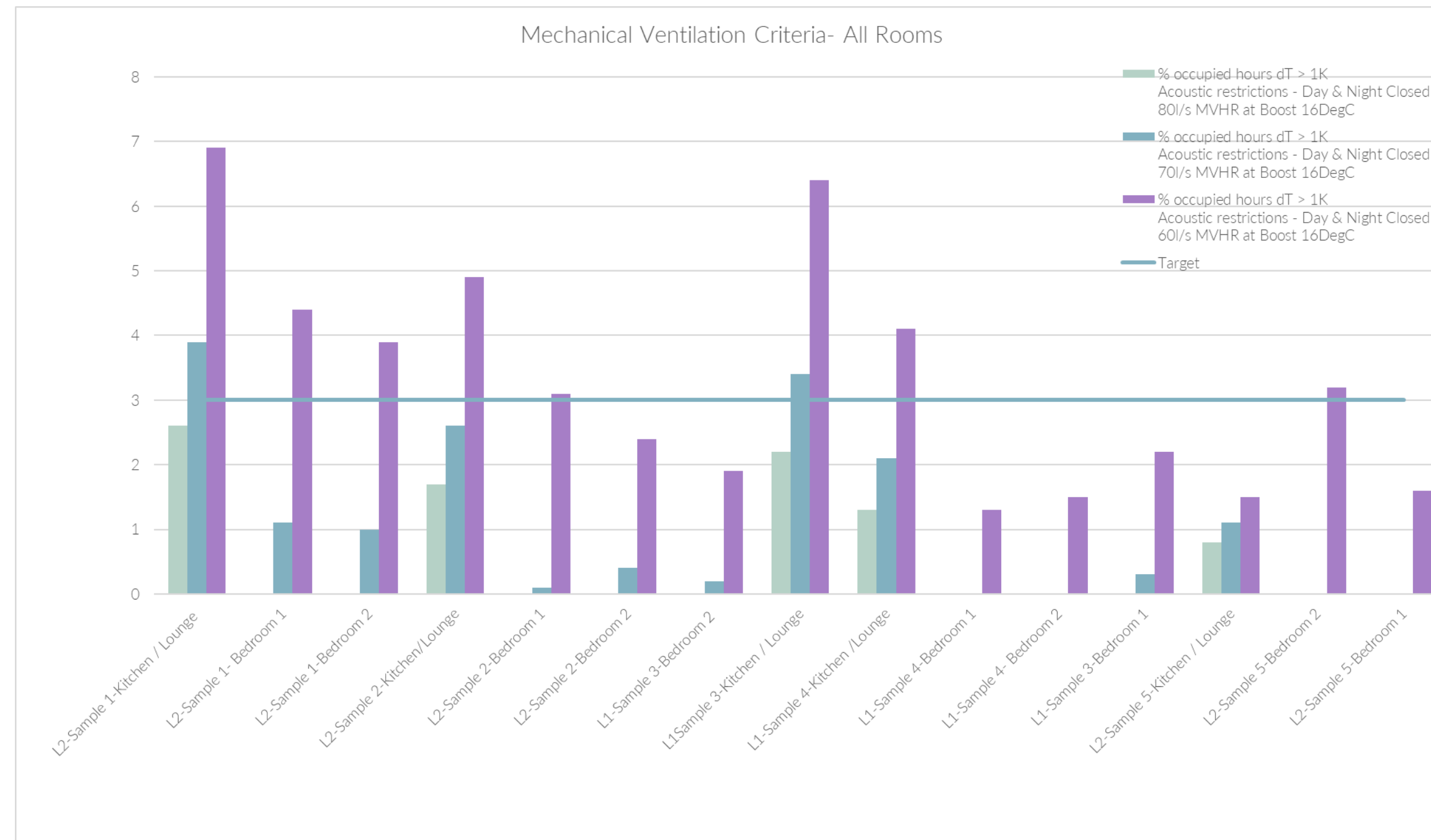
Active cooling
As the final step active cooling is specified, in order to keep internal temperatures within acceptable limits. The façade and building services have the ability to enable a fan coil unit cooling solution.



Graph 1: Criterion A Results.



Graph 2: Criterion B Results



Graph 3: Criterion Results – Tempered Air Solution



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