Sustainability and Energy Efficiency Statement

Eagle Quarter, Newbury

Prepared for Lochailort Newbury Limited
March 2021

EAGLE QUARTER.

envision

LOCHAILORT
BUILDING COMMUNITIES

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EXECUTIVE SUMMARY

1. This Energy & Sustainability Statement, incorporating a BREEAM Pre Assessment has been prepared by Envision on behalf of Lochailort Newbury Limited (the applicant), and is submitted to support a planning application for the phased redevelopment of the Kennet Centre comprising (i) partial demolition of existing buildings (ii) flexible-use commercial space (iii) headquarters office building (iv) 402 dwellings plus residents' ancillary facilities (v) access, car parking and cycle parking (vi) landscaping & open space (vii) sustainable energy installations (viii) associated works.

2. The primary purpose of this document to explain how the scheme can meet with the energy and sustainability policies held within West Berkshire Council's local development framework.

3. Envision have undertaken a review of the relevant policies and worked with the design team to determine and agree the relevance and approach that should be taken to fulfil each policy.

Summary of Sustainability Strategy

4. This sustainability strategy demonstrates how the proposed development exceeds the requirements of sustainability policies held within West Berkshire Council's local development framework as follows:

1 BREEAM

The proposed development includes non-domestic uses, comprising primarily office (B1) floorspace. With regards to the office portion, an initial predictive assessment has been made against the BREEAM New Construction criteria 2018 to consider the ability for this use (which represents the predominant commercial floorspace) to meet BREEAM Excellent as required by Policy CS15. The predicted score and achievable credits are discussed more in Section 4 and Appendix II which show that the office portion is expected to achieve an 'Excellent' rating.

2 Energy & CO_2 Emissions

Policy CS 15 of the West Berkshire Local Plan requires all domestic and non-domestic development to achieve a 20% reduction in regulated and unregulated carbon emissions through the use of renewable energy, after the application of energy efficiency measures. An Energy Statement is set out in Section 5 of this report demonstrating how this target could been significantly exceeded, with the development targeting a 48.63% reduction in carbon emissions, including a targeted 44.13% reduction through the use of renewable energy. This could be achieved through the use of efficient design measures, and a palette of sustainable technologies including ground source heating and roof mounted PV on the office and multi-storey car park (MSCP).

The potential sitewide savings as measured against a Part L 2013 baseline are presented in figure A1.

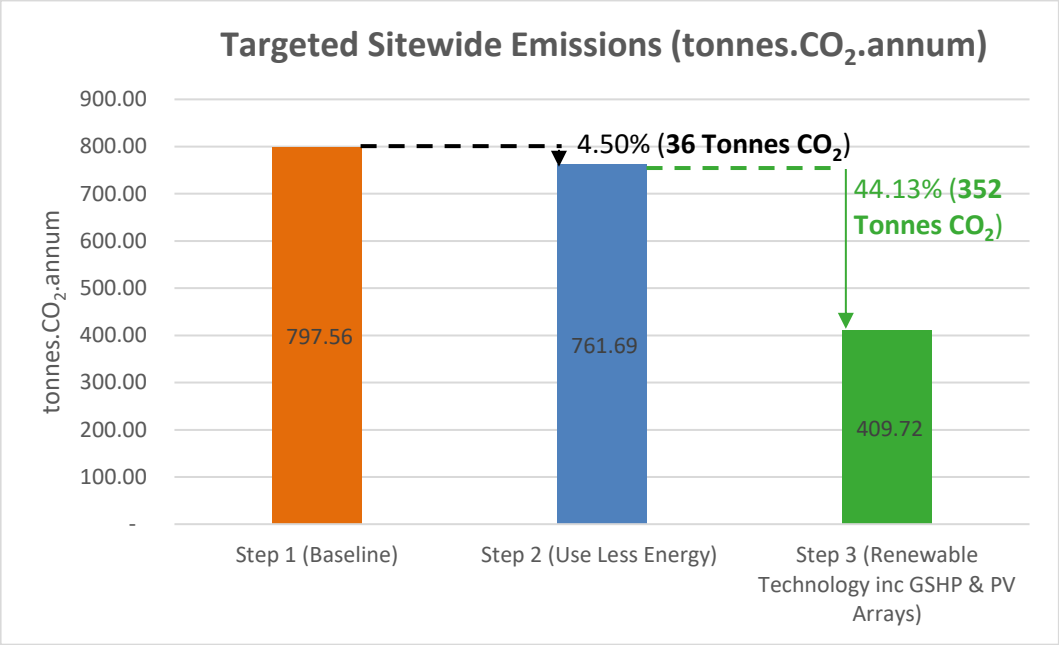


Figure A.1 – Targeted emissions Savings against Building Regulations (2013), SAP 10 The site Energy Strategy is illustrated diagrammatically in figure A2.

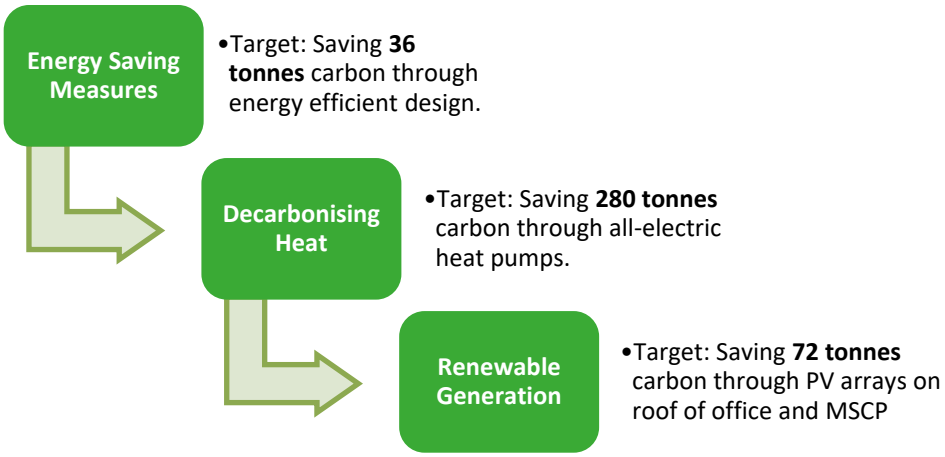


Figure A2 – Targetted Savings Associated with Heat Pumps and Renewable Energy

Whilst planning policies in West Berkshire are measured against a Building Regulations compliant baseline, it is also material to note that the proposed development will replace an extremely inefficient and outdated 1970's shopping centre. Whilst details are not available to make a detailed comparison, based on the size and use of the building, the existing Kennet Centre is predicted to currently emit approximately 3,040 tonnes of CO_2 per annum using CIBSE Guide F benchmark figures.

The scheme put forward is targeted to emit 410 tonnes per year, a six-fold reduction in emissions (Figure A3). Furthermore the all-electric scheme will be futureproofed for future grid decarbonisation, which is in full accord with future homes standards helping to meet West Berkshire.

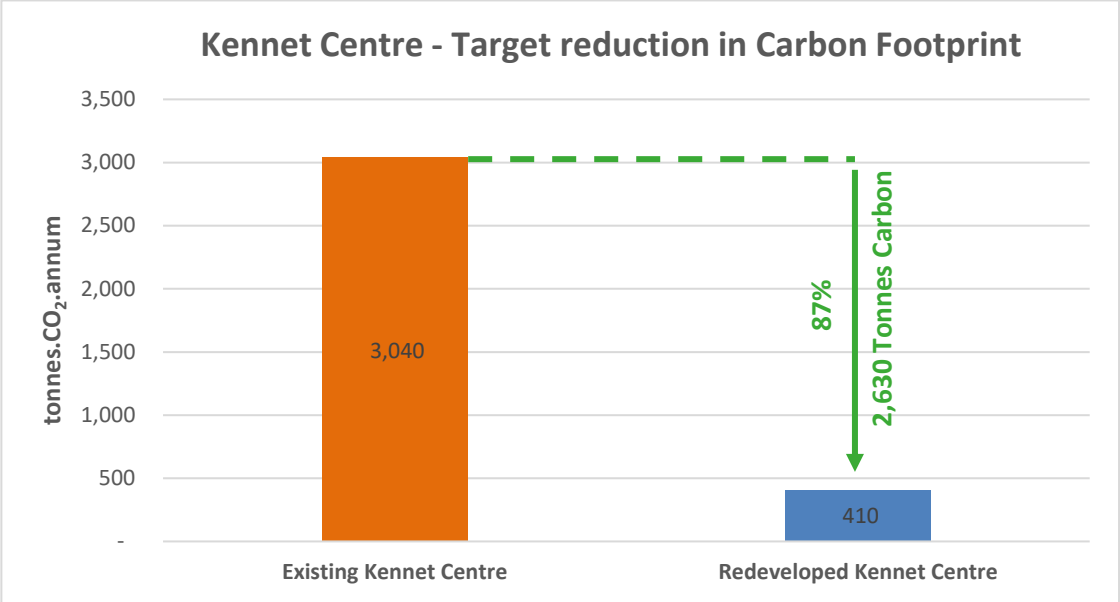


Figure A3 – Comparison between existing Kennet Centre and Proposed Eagle Quarter Development

3 Water Conservation

Due to the intensification of development on the site, the scheme is expected to result in an increase in water use by comparison to the existing situation. The residential units would incorporate water efficient fittings to limit water use to achieve a water use of at most 110 litres per person per day. The commercial office development will incorporate measures with the aim to improve water efficiency by 40% compared to a typical building baseline.

4 Flood Risk & Surface Water Management

The Environment Agency maps confirm that part of the site is in Flood Zone 2 Due to the proximity of the site to the River Kennet. This places its flood risk between a 1 in 100 year and 1 in 1000 year probability. A Flood Risk Assessment has been undertaken to assess the risks and presents mitigations. A drainage strategy has been developed which includes green roofs, as well as permeable paving to attenuate water to prevent flooding to any buildings based on a 1:100 year flood event plus a 40% allowance for climate change.

5 Biodiversity

In line with the requirements of Policy CS 17 & CS 18, the existing site has little ecological value and therefore there is an opportunity to provide a net gain in biodiversity. This landscape and ecology proposals for the site include a number of measures to deliver a net-gain in biodiversity, including green roof(s), native wildflower planting and bird boxes.

6 Materials & Waste

The development will address waste in accordance with the UK Waste Hierarchy, which is both a legal requirement and a guide to sustainable waste management. An initial demolition method statement has been prepared to consider opportunities to manage materials sustainability. In due course an audit would be undertaken on the buildings to maximise the potential for reuse of components and constituent materials. This would limit the amount of material requiring end of life disposal in landfill. In later stages of the project the contractor will be required to operate a Site Waste Management Plan, which will demonstrate how at least 90% of the non-hazardous waste (by tonnage) can be diverted from landfill. Targets will be driven by best practices, including those arising from BREEAM.

The procurement of materials for the development will promote sustainability, including by use of low impact, locally and/or sustainably sourced. Where possible, the applicant intends to use innovative construction solutions to lower the scheme's impact. This includes the use of modular bathrooms to reduce embodied carbon. The development will be brought forward in accordance with a Sustainable Procurement Plan, having consideration to life cycle impacts, and the selection of materials with recognised environmental product declarations and environmental procurement standards.

7 Sustainable Transport

The planning application is supported by a Transport Statement which details a range of sustainable transport measures for the scheme. The development site is in a highly sustainable location and the new development will include a new pedestrianised street 'New Street' providing a crucial missing link between the railways station and town centre. In addition, 610 cycle spaces are proposed across the site.

The site's extremely high accessibility to town centre facilities means car parking will be limited to 83 spaces for the Build-to-Rent apartments (including 5 disabled spaces and electric charging facilities) and will be controlled by a car parking management plan to encourage walking, cycling and the use of public transport. Additional measures to be included are a 3-4 vehicle car club along with additional electric vehicle charging to the existing multi-storey car park.

8 Pollution

A Geo-environmental Desk Study Report and Ground Investigation Report prepared as part of this application did not identify any significant contamination that would propose a risk to identified receptors.

In addition, the following pollution prevention measures will be incorporated into the design:

i. The proposed development will aim to minimise any impact on surrounding properties with regards to light pollution - the lighting will avoid upward light spillage through following the ILE guidance on the Reduction of Obtrusive Light design guidance;

ii. The development is not expected to yield significant noise impacts in surrounding areas. The ground-source heat pump proposed as part of the site's preferred energy strategy will not result in any external noise. Plant enclosures for external ventilation will be appropriately attenuated.

5. The above measures are considered to demonstrate alignment with sustainability policies in the West Berkshire Council Core Strategy, specifically policies CS 13, CS 15, CS 16, CS17 & CS 18.

1 INTRODUCTION

1.1 Envision has been appointed by Lochailort Newbury Limited (the applicant), to prepare a Sustainability & Energy Efficiency Statement, incorporating a BREEAM Pre Assessment to support a planning application for the phased redevelopment of the Kennet Centre comprising (i) partial demolition of existing building (ii) flexible-use commercial space (iii) headquarters office building (iv) 402 dwellings plus residents' ancillary facilities (v) access, car parking and cycle parking (vi) landscaping & open space (vii) sustainable energy installations (viii) associated works

Scope

1.2 This Sustainability & Energy Efficiency Statement provides information on the predicted carbon emissions of the development and includes an analysis of the potential contribution that renewable and low carbon technologies could contribute towards reducing the energy and associated CO_2 emissions for the scheme.

1.3 This Sustainability & Energy Efficiency Statement sets the parameters of design but remains at a strategic level. The calculations in this document are an indication of system size and carbon emissions based on guidance documents, approved software and practical experience. They are not design calculations but establish the broad viability and feasibility of various technologies for the proposed development.

1.4 This statement is structured as follows:

- Section 2 provides a description of the site and the development proposals;
- Section 3 provides a description of the main sustainability & energy policies relevant to the application;
- Section 4 provides a sustainability statement incorporating BREEAM review, structured against the requirements of the sustainability policies examined in Section 3;
- Section 5 provides an energy assessment, structured against the requirements of the energy policies examined in Section 3; and
- Section 6 provides a concluding summary.

2 CONTEXT AND PROPOSALS

2.1 The site is located in the centre of Newbury, on land currently occupied by the Kennet Centre. The site area is 2.2 hectares and is bound by Cheap Street to the east, Market Street to the south and Bartholomew Street to the west. Figure 2.1 shows the site location.

Figure 2.1 – Site Location

The Proposed Development

2.2 This Sustainability & Energy Efficiency Statement accompanies and supports an application for full planning permission for the comprehensive redevelopment of *The Kennet Centre* in Newbury town centre. The application comprises:

1. Partial demolition of the existing Kennet Centre, removing all buildings currently on the site other than the multi-storey car park and Vue cinema wing, which will be retained, refurbished and enhanced;
2. Erection of a new headquarters office building on Market Street with a gross internal floor area of approximately 4000m² (43,000sqft);
3. New flexible-use commercial units in the form of:
   (a) A new incubator tech-hub building of approximately 2000 m² (21,500sqft) gross internal area designed to attract start-up and growing small-to-medium enterprises, but also with the potential to provide additional floorspace to the new headquarters office building if required.
   (b) Ground floor units fronting a new pedestrianised street targeted at independent, local and artisan retailers which start from 37m2 (400sqft) and offer the potential to

be combined or split as necessary to meet the needs of retail, café, restaurant, leisure, workshop or other occupiers;

(c) Craft carts, street food stalls, pop-up stands and other similar "retail incubator" commercial opportunities within the new onsite public realm;

4. 379 dwellings for private rent in a range of types and sizes, plus ancillary residents' facilities which include:
   (a) Reception & concierge
   (b) Residents' lounge
   (c) Residents' gym, including a squash court
   (d) Private dining room
   (e) Workspace
   (f) A variety of rooftop terraces
   (g) Car and cycle parking
   (h) Back-of-house facilities for onsite management and maintenance
5. A further 23 dwellings;
6. Sustainable energy installations which negate the need for onsite use of fossil fuels;
7. A new pedestrianised street between Market Street, Bartholomew Street and Market Place which will provide a vibrant new linked between the railway station and town centre;
8. Improvements to the existing Kennet Centre multi-storey car park, including an additional level of car parking, new lifts, additional electric vehicle charging points, and a new pedestrian link into the development;
9. Improvements to the existing Vue cinema wing, including a new pedestrian link into the development; and
10. Associated works, including a new pedestrian crossing on Market Street.

2.3 The extent of the application is illustrated in figure 2.2 which shows the ground floor site plan.

Figure 2.2 – Site Plan – Ground Floor (Image courtesy of Collado Collins)

Lochailort Track Record

2.4 Lochailort is committed to delivering low-carbon solutions for its developments. The recent Thames Quarter development in Reading is **26%** more energy efficient than the Building Regulations require, saving 82.4 tonnes of CO_2 every year through its onsite Combined Heat & Power plant.

Figure 2.3 – Thames Quarter Development (Site & CHP)

3 ENERGY & SUSTAINABILITY POLICY CONTEXT

3.1 A key mechanism for delivering the principles of low-carbon development lies within the UK planning system, which is implemented through national guidance along with regional and local planning policies. A review of all the relevant policy documents was undertaken in order to gain an understanding of the guiding policies for energy, CO_2 reductions and sustainable design.

National Planning Policy Framework

3.2 The revised National Planning Policy Framework (NPPF) was published in February 2019. It sets out the framework for all planning policy in England and how these are expected to be applied. The NPPF sets out a presumption in favour of sustainable development, and the need to support economic growth through the planning system.

3.3 Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives:

- an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
- a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

3.4 Planning plays a key role in helping shape places to radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development. The NPPF does not include detailed measures on sustainable design codes and standards to apply, although expects that when setting any local requirement for a building's sustainability, local planning authorities should do so in a way consistent with the national technical standards.

West Berkshire Local Plan Requirements

3.5 The most relevant policies which need to be considered when assessing the scheme's compliance to sustainability policy are those provided within local development documents. West Berkshire Council (WBC) is currently working its Core Strategy Development Plan Document (2006 – 2026) which was adopted in July 2012.

3.6 The policies and guidance pertinent to the energy and sustainability of new-build development in the WBC Local Plan are:

Policy CS15: Sustainable Construction and Energy Efficiency

3.7 This policy requires proposals for new development, including the construction of new buildings to comply with the following;

3.8 New residential development will meet the following minimum standards of construction:

1. From 2016: All development - Code for Sustainable Homes Level 6[1]

3.9 New non-residential development will meet the following minimum standards of construction:

1. From 2013: All development - BREEAM Excellent

3.10 Major development shall achieve the following minimum reductions in total CO_2 emissions (regulated and unregulated energy use) from renewable energy or low/zero carbon energy generation on site or in the locality of the development as long as a direct physical connection is used, unless it can be demonstrated that such provision is not technically or economically viable. The percentage reductions in CO_2 emissions should be based on the estimated CO_2 emissions of the development after the installation of energy efficiency measures related to either the Code for Sustainable Homes, BREEAM or equivalent method has been applied.

Residential Development:

1. From 2014: A 20% reduction in CO_2 emissions;
2. From 2016: Zero Carbon.[2]

Non-Residential Development:

1. From 2014: A 20% reduction in CO_2 emissions;
2. From 2019: Zero Carbon. [3]

[1] On Wednesday 25th March 2015 a Written Ministerial Statement was issued which sets out the conclusions to the government's Housing Standards Review with the change being the withdrawal of Code for Sustainable Homes (save for legacy projects), therefore this standard cannot be applied.

[2] This requirement was set at the time of writing in line with stated Government aspirations, which as noted under WBC Policy CS 15 is subject to change. The governments stated aspiration was subsequently withdrawn and therefore in line with pre-app consultation and precedent set by WBC the project will aim for a 20% reduction in CO_2 emissions (regulated and unregulated).

[3] As above.

Policy CS13: Sustainable Construction and Energy Efficiency

3.11 Development that generates a transport impact will be required to:

1. Reduce the need to travel. Improve and promote opportunities for healthy and safe travel.
2. Improve travel choice and facilitate sustainable travel particularly within, between and to main urban areas and rural service centres.
3. Demonstrate good access to key services and facilities.
4. Minimise the impact of all forms of travel on the environment and help tackle climate change.
5. Mitigate the impact on the local transport network and the strategic road network.
6. Take into account the West Berkshire Freight Route Network (FRN).
7. Prepare Transport Assessments/Statement and Travel Plans to support planning proposals in accordance with national guidance.

Policy CS16: Flooding

3.12 The sequential approach in accordance with the NPPF will be strictly applied across the District. Development within areas of flood risk from any source of flooding, including Critical Drainage Areas and areas with a history of groundwater or surface water flooding, will only be accepted if it is demonstrated that it is appropriate at that location, and that there are no suitable and available alternative sites at a lower flood risk.

3.13 On all development sites, surface water will be managed in a sustainable manner through the implementation of Sustainable Drainage Methods (SuDS) in accordance with best practice and the proposed national standards and to provide attenuation to greenfield run-off rates and volumes, for all new development and re-development and provide other benefits where possible such as water quality, biodiversity and amenity.

Policy CS17: Biodiversity & Geodiversity

3.14 Habitats designated or proposed for designation as important for biodiversity or geodiversity at an international or national level or which support protected, rare or endangered species, will be protected and enhanced. The degree of protection given will be appropriate to the status of the site or species in terms of its international or national importance.

3.15 In order to conserve and enhance the environmental capacity of the District, all new development should maximise opportunities to achieve net gains in biodiversity and geodiversity in accordance with the Berkshire Biodiversity Action Plan and the Berkshire Local Geodiversity Action Plan. Opportunities will be taken to create links between natural habitats and, in particular, strategic opportunities for biodiversity improvement will be actively pursued within the Biodiversity Opportunity Areas identified on the Proposals Map in accordance with the Berkshire Biodiversity Action Plan.

Policy CS18: Green Infrastructure

3.16 New developments will make provision for high quality and multifunctional open spaces of an appropriate size and will also provide links to the existing green infrastructure network. Specific standards for provision within new developments will be identified in the Site Allocations and Delivery DPD and through the masterplanning for strategic sites.

3.17 Developments resulting in the loss of green infrastructure or harm to its use or enjoyment by the public will not be permitted. Where exceptionally it is agreed that an area of green infrastructure can be lost a new one of equal or greater size and standard will be required to be provided in an accessible location close by.

4 SUSTAINABILITY STATEMENT

4.1 This section provides an account of the sustainability benefits of the proposed development, and how relevant policy has been addressed in the development proposals. The following headlines are considered in this section:

1. BREEAM Review
2. Energy and CO_2 reduction linked to BREEAM.
3. Water Conservation.
4. Flood Risk & Surface Water Management.
5. Biodiversity.
6. Materials and Waste.
7. Sustainable Transport.
8. Pollution Prevention.

BREEAM Review

4.2 Policy CS15 of West Berkshire's Local Plan requires that new development within the area achieves the Building Research Establishment's Environmental Assessment Method (BREEAM) standard of 'Excellent' for non-residential major developments. BREEAM assessments provide a sustainability rating for non-domestic buildings by giving consideration to a range of criteria. This includes principles of Management, Health & Well Being, Energy, Transport, Water, Materials, Waste, Land Use & Ecology and Pollution. Innovation credits are also available, representing new or exemplary performance in a specific sustainability issue.

4.3 The primary portion of the development that is assessable by BREEAM consists of c. 7,000m² of office with the developer constructing to a base-build level along with installing core building services (shell & core).

Target Levels

4.4 As required by Policy CS 15, the target for the proposed works is 'Excellent' which is equal to or greater than 70%. BREEAM scoring bands are shown below.

Table 4.1 – BREEAM Scoring Bands

Target	Score
UNCLASSIFIED	<30
PASS	≥30
GOOD	≥45
V GOOD	≥55
EXCELLENT	≥70
OUTSTANDING	≥85

Mandatory Credits

4.5 The majority of credits within BREEAM New Construction are tradable, meaning that there is some flexibility to how a specific target can be achieved. BREEAM also includes a number of mandatory standards, which must be met in order to achieve Excellent. These credits are shown in the table below. The predictive assessment makes reference to these where appropriate.

Table 4.2 – Mandatory Credits

BREEAM Issue	Minimum Standard for Excellent
MAN 03 – Responsible Construction Practices	One credit (responsible construction management)
MAN 04 – Commissioning & Handover	One credit (commissioning) & Criterion 11 (Building User Guide)
MAN 05 – Aftercare	Once credit (commissioning implementation)
ENE 01 – Reduction of Energy Use & CO_2	Four credits
ENE 02 – Energy Monitoring	Once credit (sub-metering)
WAT 01 – Water Consumption	Once credit
WAT 02 – Water Monitoring	Criterion 1
MAT 03 – Responsible Sourcing of Construction Products	Criterion 1
WST 03 – Operational Waste	Once credit.

Assessment Scope

4.6 The predictive assessment(s) presented within this report for the office use are made against the BREEAM New Construction criteria (2018 v3) and tailored to suit the criteria. The assessment has been undertaken based on a shell and core approach.

4.7 In order to complete the assessment, a number of parameters need to be fixed. These define the criteria, and effectively remove erroneous credits for the assessment procedure. The following scope has been selected for the assessment:

Table 4.3– Assessment Parameters

Parameters	Offices
Project Scope	Shell & Core
Building Type	Offices
Building Type – Sub Group	Office B1
Heating and Cooling	Yes
Commercial Scale Refrigeration	No
Internal / External Soft Landscaping	Yes
Unregulated Water Demands	Yes
Unregulated Energy Demand Systems	Yes
Lifts / Escalators	Yes
Vehicle Wash	No

4.8 An analysis of all available BREEAM credits, and credits deemed achievable for the scheme is contained in Appendix II.

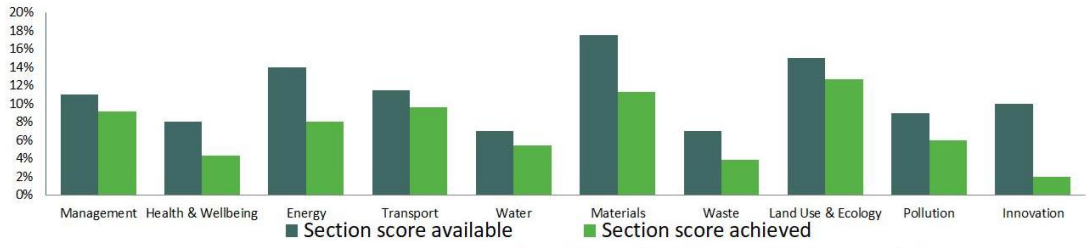
Predicted Score

4.9 A BREEAM Pre-Assessment for the development detailing all credit requirements has been included in Appendix II, the pre-assessment confirm that an 'Excellent' rating may be achieved for the office portion in line with Policy CS15.

Overall Building Performance

Building name	Commercial Office
BREEAM rating	Excellent
Total Score	72.30%
Min. standards level achieved	Excellent level

Building Performance by Environment Section



Environmental Section	No. credits available	No. credits Achieved	% credits achieved	Section Weighting	Section Score
Management	18	15	83.33%	11.00%	9.16%
Health & Wellbeing	11	6	54.55%	8.00%	4.36%
Energy	21	12	57.14%	14.00%	8.00%
Transport	12	10	83.33%	11.50%	9.58%
Water	9	7	77.78%	7.00%	5.44%
Materials	14	9	64.29%	17.50%	11.25%
Waste	11	6	54.55%	7.00%	3.81%
Land Use & Ecology	13	11	84.62%	15.00%	12.69%
Pollution	12	8	66.67%	9.00%	6.00%
Innovation	10	2	20.00%	10.00%	2.00%

Fig 4.1 – Office Predicted Score

4.10 The office area represents the main floor area for the building and is the element which is to be certified against BREEAM. The ground floor flexible-use commercial units (Use Class E) are small, and it is essential to deliver flexibility for the future occupiers. Whilst BREEAM will not be formally applied to these units, various site wide principles, including connection to the centralised energy network will be obligations on future tenants.

Energy and CO_2 Reduction

4.11 West Berkshire Council (WBC) has declared a climate emergency and seeks to attain carbon neutrality by 2030. WBC's target of neutrality aims to reduce and cap annual total emissions to less than 350 kilotonnes across the entire district by 2030, before the application of local energy generation, carbon offsetting and carbon sequestration projects to neutralise the remaining emissions. As part of this, the council commits that its own operations will be completely carbon neutral by 2030. WBC will also support the uptake of low carbon and renewable energy generation across the district.

4.12 The scale of the challenge is significant. West Berkshire produced 1,294.5 kilotonnes of CO_2 in 2017, or 8.2 tonnes of CO_2 per resident per year. Whilst progress has been made - West Berkshire has seen a 26.4% reduction since 2005 levels - it is relevant to note that Reading Borough saw decreases of 41.5% in the same period, with emissions per resident approximately 3.6 tonnes. Indeed, West Berkshire has the highest emissions of all unitary authorities within the area.

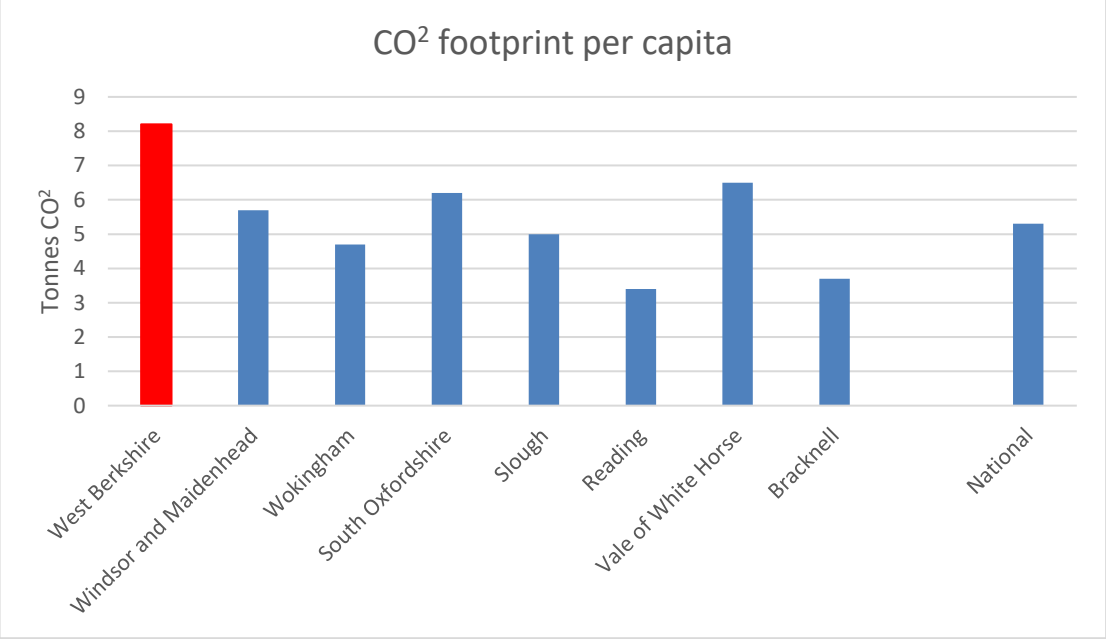


Figure 4.2 – West Berkshire Emissions

4.13 From the outset the applicant has sought to address the impact that new development can have in West Berkshire by putting forward an innovative and considerate approach to energy and decarbonisation.

Route to achieving targets

4.14 Section 5 of this report provides the full energy statement, which demonstrates how the scheme will exceed local policy set out in Policy CS 15. At the concept design stage, the calculations in support of the Energy Statement are illustrative of the performance expected; and would be developed as further detail emerges, in particular in relation to the Ground Source Heating options.

4.15 Policy CS 15 of the West Berkshire Local Plan requires all domestic and non-domestic development to achieve a 20% reduction in regulated and unregulated carbon emissions through the use of renewable energy, after the application of energy efficiency measures. An Energy Statement is set out in Section 5 of this report demonstrating how this target could been significantly exceeded, with the development targeting a 48.63% reduction in carbon emissions, with a 44.13% reduction through the use of renewable energy. This could be achieved through the use of efficient design measures, the utilisation of ground source heating and roof mounted PV on the office.

4.16 The sitewide savings as measured against a Part L 2013 baseline are presented in Figure 4.3

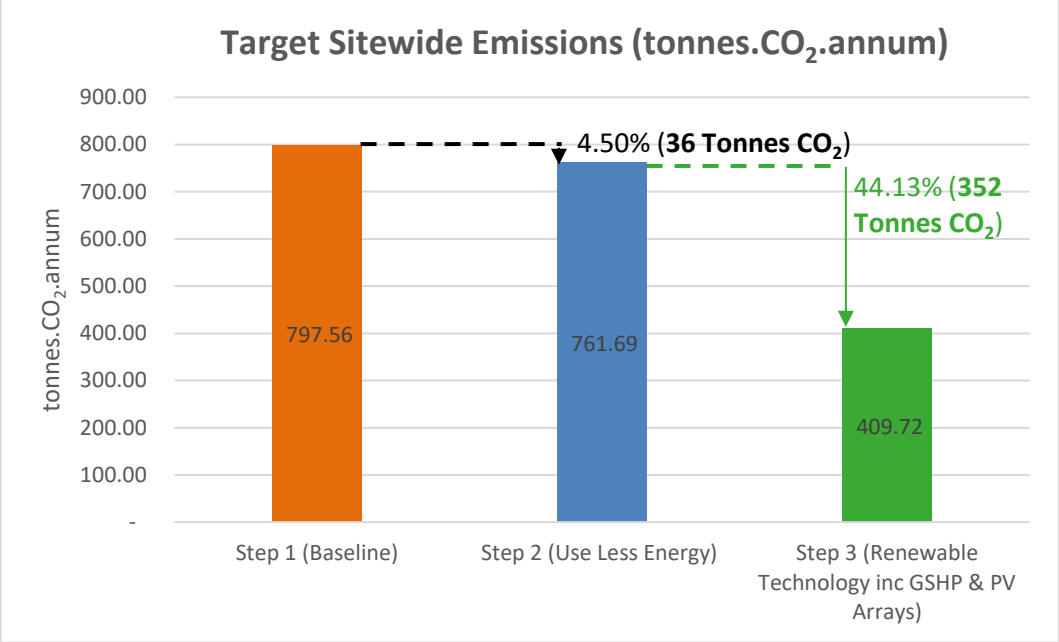


Figure 4.3 – Target Emissions Savings against Building Regulations (2013), SAP 10

4.17 The site Energy Strategy is illustrated diagrammatically in Figure 4.4 below:

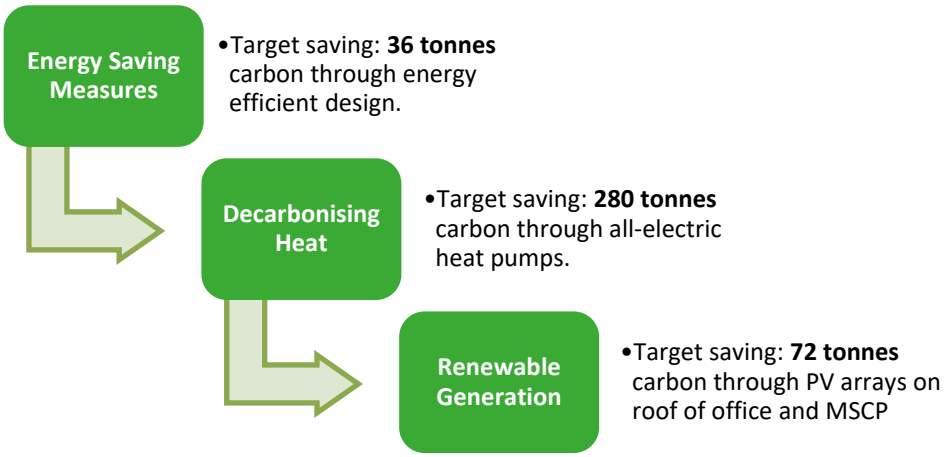


Figure 4.4 – Savings Associated with Heat Pumps and Renewable Energy

4.18 The scheme will include the installation of a Ground-Source Heat Pump (GSHP), providing efficient and renewable heating and cooling throughout the development site. The efficient, all electric system provides the scheme with a flexible and future proofed solution to meet with net zero in the future. Figure 4.3 shows how the scheme will benefit from future grid decarbonisation.

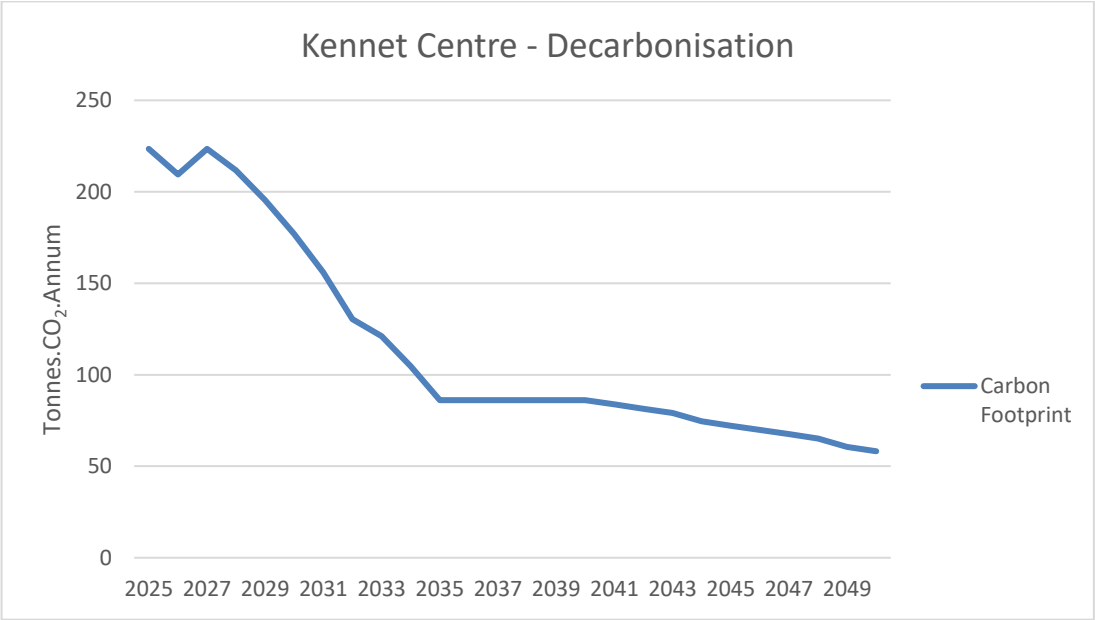


Fig 4.5 – Projected Decarbonisation

4.19 The energy assessment has been based on SAP 10 emission factors, reflecting the continuing decarbonisation of the National Grid.

Comparison with the existing Kennet Centre

4.20 The energy strategy presented demonstrates how the scheme could significantly exceed the requirements of policy within West Berkshire, which is measured from a Part L 2013 compliant baseline. It is material to note that the existing Kennet Centre (the real-world baseline) is predicted to account for up to 3,040 tonnes of CO_2 per annum[4]. The proposed development

[4] This figure has been calculated based on CIBSE Guide F benchmarks for the varying uses in the existing Kennet

is targeted to emit a fraction of this (410 tonnes on a sitewide basis including MSCP PV) on its opening year and will be on track to further decarbonise to net zero with a fully electrified heating solution.

4.21 As detailed below, the target is an **87%** reduction in carbon emissions in the opening year, compared to the existing Kennet Centre – equivalent to 2,630 tonnes of carbon dioxide saved every year, which will increase year-on-year as the National Grid continues to decarbonise.

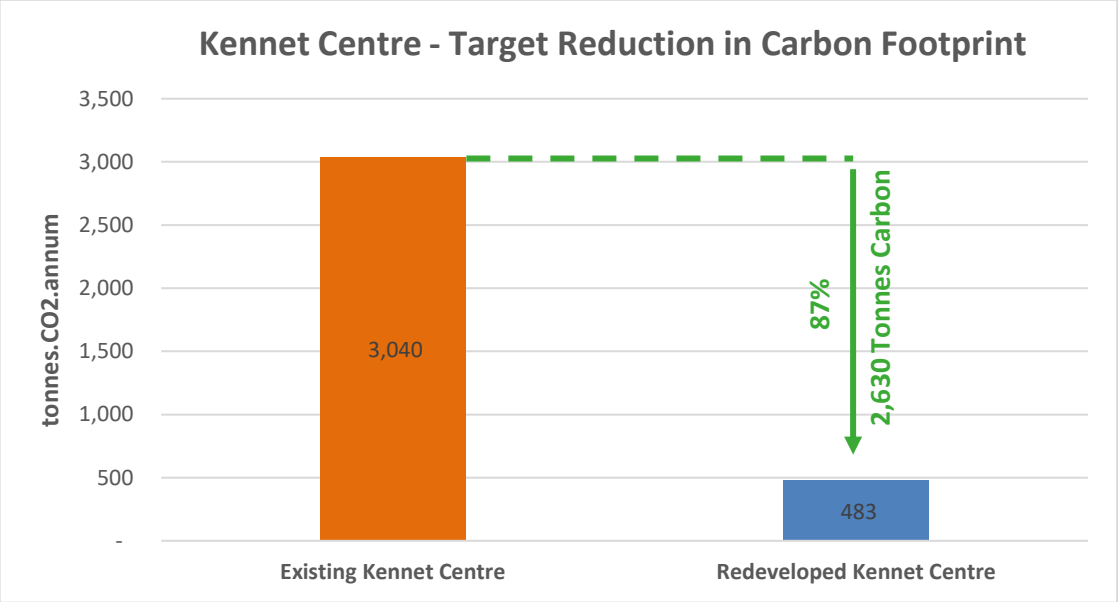


Fig 4.6 – Comparison to existing Kennet Centre

4.22 The redevelopment of the Kennet Centre will therefore help West Berkshire to meet its climate declaration objective.

4.23 The office accommodation will also perform better than existing stock within Newbury. For example, the closest existing offices to the site are the council's own offices on Market Street, which (along with their West Street offices) consume over 2 million kWh of energy per year, equivalent to 845 tonnes of $CO_2$5 and are F and G rated buildings. The council has sought to address this and has installed rooftop solar PV on its Market Street office (20/00656/REG3). The office scheme proposed, will include a 133 KWP PV array and will be EPC A rated. The target is to omit significantly reduced emissions (121 tonnes per annum), regulated and unregulated and for this to reduce further as the grid continues to decarbonise.

Centre; retail, circulation and office.

[5] Combined DEC annual Energy consumption for West Street House and Market Street = 633,015kWh + 1,372,958.40 kWh = **2,005,973.40 kWh**

Water Conservation

4.24 The south of England is one of the driest parts of the country. Climate change is likely to reduce the amount of annual rainfall received, making water conservation a longer-term priority for the council.

4.25 By 2050, rainfall levels are expected to have decreased and it is therefore important to build water efficiency into building stock and minimise the need for major infrastructure enhancements to meet these pressures as well as growing demands. Under these scenarios and with the expected high population growth, unless adaptation interventions are made, deficits are expected to be already widespread by the 2050s.

4.26 The UK is expected to be in deficit by up to 16% of the total water demand in the 2050s and of up to 29% in the 2080s leading to major impacts on cost and resource levels.[6]

4.27 In general water use on the site is expected to increase as a result of the intensification of development. The development will include boosted cold-water supplies to the domestic areas.

Residential Units

4.28 Best-practice sustainable design requires that for residential development, design should minimise the use of main water by incorporating water saving measures and equipment. The development will seek to exceed the mandatory water efficiency requirements as laid out under Requirement G2 of Part G of Building Regulations.

Commercial Units

4.29 With regards to the office portion of the development, improved water efficiency is a key aspect of the development strategy. The table below details the proposed sanitaryware performance for all fittings in the office.

4.30 The baseline (typical) standards against which performance is measured have been established by a range of published sources of information as detailed in BREEAM[7].

Table 4.3 – Proposed Office Sanitaryware

Component	Baseline Performance	Proposed Office Performance	Improvement over baseline (%)
	6 litres flush	3.5	41.6%
	10 litres/minute	4	60%

[6] HR Wallingford. CCRA2: Updated projections for water availability for the UK Final Report [Internet]. 2015.

[7] Grant N, Thornton J. AECB Water Standards: Delivering buildings with excellent water and energy performance - Volume 2: The water standards technical background report (version 1.0.0). 2009.

	7.5 litres/bow/hour	1.5	80%
	12 litres/minute	6	50%
	10 litres/minute	6	40%

4.31 The above table represents an example specification, which will be reviewed and updated during detail design. In addition, the practical measures that will be integrated into the non-domestic mechanical design to reduce water loss include:

- Leak detection systems; and
- Sanitary supply shut off in WCs.

4.32 With regards to the retail units, the future tenant will undertake the fit out works of each unit, which will include the provision of sanitary equipment. Each tenant will install water efficient equipment following the principles of BREEAM.

4.33 At a sitewide level, the office and each retail unit will include a pulsed water meter at boundary and in line within the building to enable remote meter readings and facilitate leak detection.

Flood Risk and Surface Water Management

4.34 Policy CS16 (Flooding) confirms development will be permitted where it meets a number of criteria, including; demonstrating development is appropriate in the location, not impacting on flood storage capacity, not having a detrimental impact on flooding or increasing flood risk elsewhere, and ensuing safe access/egress in a flood event.

4.35 A site-specific Flood Risk Assessment has been prepared by Robert Bird & Partners which details the following:

1. The site lies within Flood Zone 2 which is designated by the EA to be at risk of flooding from fluvial sources for events with between a 1 in 100 year and a 1 in 1000-year annual probability of occurring.
2. The majority of the site lies in an area designated by the EA to be at very low risk of surface water flooding during extreme rainfall events.

4.36 As the site lies in Flood Zone 2 and does not lie within a Critical Drainage Area, it is considered to have a low risk of flooding. The following recommendations in the site layout and design from the WBC SFRA to mitigate flood risk are applicable on the site:

1. Safe access and egress are provided form the development during the 1 in 100-year storm event from any source of flooding;
2. Finished floor levels should be raised above 1 in 100-year fluvial storm events where possible whilst consideration is made to keep the development accessible to all;
3. Use of basements to be avoided.

4.37 A Sustainable Drainage System (SuDs) analysis of the existing and proposed catchment areas for the site has been undertaken. The total site area of the buildings to be redeveloped is 1.64ha, with this entire area currently being impermeable brownfield land.

4.38 Due to the highly constrained nature of the site, it will not be possible to reduce surface water discharge from the site to greenfield runoff rates – as agreed with WBC a 50% reduction in discharge rates from the existing case should be achieved during the design to include allowing for the 1:100-year rainfall rate with a 40% climate change allowance.

4.39 To achieve the above targets, the following SuDs measures have been proposed:

1. Permeable Paving allowing for 285m³ of water run-off storage;
2. Attenuation Tanks allowing for 348m³ of water run-off storage; and
3. Green Roof(s) with final sizes to be confirmed at detail design.

4.40 The above measures demonstrate that the development is in accordance with all the requirements laid out under Policy CS16 of the WBC Local Plan.

Biodiversity

4.41 Policy CS 17 relates to Biodiversity & Geodiversity and Policy CS 18 relates to Green Infrastructure. The site has been subject to an Ecological Impact Assessment (EIA) prepared by Ecological Planning & Research Ltd. A combined Ecological Appraisal and Preliminary Roost Assessment for bats was undertaken on the 30th July 2020. Overall, the habitats on Site were found to be of little nature conservation value, being comprised almost solely of buildings and hardstanding, however they had potential to support protected species including bats and nesting birds.

4.42 There are no statutory designated sites of nature conservation interest within the site, however there are several designated sites located either immediately adjacent to the site or within close proximity, including the River Kennet SSSI which is located 100m to the north of the site and the River Lambourn SAC and SSSI which is located 1.2km from the site boundary. With regard to the River Kennet SSSI, during demolition and construction on Site there is the potential for accidental pollution and dust to impact the Kennet River. All works will be overseen by a Construction Environmental Management Plan (CEMP) and will be conducted to best practice guidelines to minimise the risk of pollutants contaminating the water course.

4.43 With regards to the proposed developed delivering a biodiversity net gain, the following forms part of the development proposals:

1. The specification for the green roofs will be designed to create a diverse habitat utilising a seed mix of native wildflowers and sedum species, such as the Kadas “London Living

Roof Mix" (Kadas, 2010) which will be adjusted to be locally appropriate for the Newbury area;

2. The Podium Gardens and Roof Terrace spaces will provide opportunities to incorporate a variety of additional gains for wildlife;
3. Integrated bird boxes will be incorporated into the design.

4.44 The proposals are therefore considered to be in accordance with relevant polices for biodiversity.

Waste & Materials

4.45 Waste, both through construction and building operation, can have a detrimental effect on a building's overall sustainability and environmental performance. The Government's Resources strategy promotes efficient waste management practices and circular economy principles.

4.46 With regards to construction waste, a Resource Waste Management Plan has been developed to consider options for waste minimisation in line with best practices from BREEAM. This includes targets for:

1. 90% of non-demolition waste (by tonnage) will be diverted from landfill.
2. A target for waste generation of 8 tonnes per every 100m² of floor area will be established for construction waste.

4.47 With regards to operator's waste, waste storage has been allocated to the unit and will be managed via direct contract to private waste contractors.

Material Use

4.48 Maximising the sustainability of all the materials used in the build will be an important factor from the outset. The design team will commit to the following criteria to ensure as low an environmental impact as possible;

1. Materials Specification

Where possible building materials will be selected to minimise environmental impact. An LCA Impact assessment will be undertaken on the Stage 3/4 design to consider opportunities for materials substitutions. The LCA assessment supports BREEAM scoring. Examples of measures that will be considered include the use of recycled materials in concrete aggregates, albeit this will be subject to further feasibility testing during detailed design.

2. Using modern methods of construction

The scheme will employ modular building components where possible to increase the speed construction and manage waste and embodied emissions of materials brought to site. The applicant intends to use modular bathrooms within the scheme and will explore additional opportunities for these construction techniques during design development.

3. Procuring Materials Responsibility

Following the appointment of the main contractor, consideration will be given to the responsible sourcing of main construction materials. The contractor will be required to operate a Sustainable Procurement Plan and their suppliers will preferentially hold an Environmental Management System (EMS), and where possible accredited to ISO 140001. In addition, all timber in the scheme will be FSC and procured in accordance with the UK Government's 'Timber Procurement Policy'.

4. Designing for Durability and Resilience

The design of the building will ensure protection of exposed elements, therefore minimising the frequency of replacement and maximising materials optimisation. This will include measures to protect damage in areas of high pedestrian and vehicular traffic.

Sustainable Transport

4.49 A Transport Assessment has been produced as part of the planning application by Stuart Michael Associates, which demonstrates that the measures to be incorporated into the development are broadly in line with Policy CS 13 of the West Berkshire Core Strategy. A summary of the measures is provided below.

4.50 The development site is surrounded by an extremely high provision of walking and cycling networks. With regards to public transport accessibility, the site is arguably in West Berkshire's most sustainable public transport location, with a significant number of bus services in the vicinity of the site, and Newbury Railway Station located 150 walking metres from the site, with local, regional and national train services.

4.51 As part of the development proposals, the following sustainable transport measures as proposed for the development:

Pedestrian Accessibility

4.52 Repairing the connectivity and pedestrian links that were lost when the Kennet Centre was constructed is a key element of the scheme's design. A new pedestrianised street will provide the crucial missing link between the railway station and the town centre, generously proportioned to be as wide as Northbrook Street and lined with new flexible-use commercial units whose local, independent and artisan occupiers will be encouraged to spill out into the street to make a vibrant, varied and interesting new pedestrian route.

Cycle Parking

4.53 Eleven separate secure storage areas are proposed, totalling 610 spaces, with a range of tiered bike racks, Sheffield stand type configurations and secure lockers for storage as well as an on-site cycle workshop.

4.54 The applicant is exploring the provision of cycle hire, electric cycle hire, electric cycle charging points, and electric scooters.

Car Parking

4.55 With regards to vehicle parking, the site's extremely high accessibility to town centre facilities means car parking will be limited and controlled by a car parking management plan to encourage walking, cycling and the use of public transport.

4.56 The proposed access onto Bartholomew Street also serves a new car park comprising 83 spaces. These includes 5 disabled spaces and electric charging facilities. In addition, 8 spaces in the existing MSCP will be upgraded with EV charging points and there will be a 3-4 vehicle car club.

Pollution Prevention

4.57 Any new development can potentially lead to detrimental environmental effects and these potential effects have been considered during the planning stages of this proposal. The development is not of the scale that would require an Environmental Impact Assessment (EIA); however, a number of technical reports have been prepared for the planning application. A Geoenvironmental Desk Study Report and Ground Investigation Report prepared as part of this application did not identify any significant contamination that would propose a risk to identified receptors.

In addition, the following pollution prevention measures will be incorporated into the design:

Avoidance of Light Pollution

4.58 The proposed development will aim to minimise any impact on surrounding properties with regards to light pollution. The proposed development will involve the reconfiguration of the site and will require new external lighting. The lighting will avoid upward light spillage through following the ILE guidance on the Reduction of Obtrusive Light design guidance.

Avoidance of Noise Pollution

4.59 The development is not expected to yield significant noise impacts in surrounding areas. The ground-source heat pump proposed as part of the strategy will not result in any external noise. Plant enclosure for external ventilation will be appropriately attenuated.

5 ENERGY STATEMENT AGAINST POLICY CS 15

5.1 As outlined in Section 3, Policy CS 15 of the West Berkshire Core Strategy details the following requirements in relation to energy use and carbon emissions:

1. Major development shall achieve a 20% reduction in total CO_2 emissions (regulated and unregulated energy use) from renewable energy or low/zero carbon energy generation on site;
2. The percentage reductions in CO_2 emissions should be based on the estimated CO_2 emissions of the development after the installation of energy efficiency measures.

5.2 This section details how the development should be designed, built and operated to minimise carbon dioxide emissions and answer the above policy questions by the application of the following hierarchy:

1. Step 1 – 'Establish the Baseline'. This establishes a sitewide carbon emissions baseline (regulated and unregulated emissions) against which the next 2 steps will show reductions against;
2. Step 2 – 'Use Less Energy'. This includes following a 'fabric first' approach in line with Policy CS 15;
3. Step 3 – 'Renewable & Low Carbon Energy'. This includes assessing low-carbon energy to achieve the 20% reduction in regulated and unregulated CO_2 emissions, in line with Policy CS 15.

Domestic Modelling Methodology

5.3 In accordance with National Calculation Methodology (NCM) guidance, the appropriate methodology for calculating the energy performance of the new-build apartments is "The Government's Standard Assessment Procedure for Energy Rating of Dwellings". This procedure was undertaken using Stroma FSAP 2012 version 1.0.5.12 which is a Department of Communities and Local Government (DCLG) approved methodology and software for undertaking SAP assessments.

5.4 The following apartment typologies were selected for analysis:

Table 5.1 – Apartment Typologies

Apartment Type	Primary Orientation	Apartment Type	Primary Orientation
1B1B-MF (N)	North	**1B1B-TF (N)**	North
1B1B-MF (S)	South	**1B1B-TF (E-W)**	East/West
1B1B-MF (E-W)	East/West	**1B2B-TF (N)**	North
1B2B-MF (N)	North	**1B2B-TF (S)**	South
1B2B-MF (S)	South	**1B2B-TF (E-W)**	East/West
1B2B-MF (E-W)	East/West	**2B4P-TF (N)**	North
2B4P-MF (N)	North	**2B4P-TF (S)**	South
2B4P-MF (S)	South	**2B4P-TF (E-W)**	East/West
2B4P-MF (E-W)	East/West	**3B5P-TF (N)**	North
3B5P-MF (N)	North	**3B5P-TF (S)**	South
3B5P-MF (S)	South	**3B5P-TF (E-W)**	East/West

5.5 As detailed in the table above, in order to provide a level of analysis reflecting the various orientations of the scheme, apartments were selected from each elevation.

Non-Domestic Modelling Methodology

5.6 The appropriate methodology for calculating the energy performance of the non-domestic portion is through a Simplified Building Energy Model (SBEM). The SBEM was produced using DesignBuilder software version 6.1.8.021, which is a DCLG approved software and methodology for undertaking SBEM.

5.7 For the purposes of this assessment, the non-domestic portion of the development was split into four no. SBEM models comprising the following areas were modelled:

1. Office block;
2. Retail/Commercial/medical units;
3. Residential amenity areas;
4. Leisure use (within amenity area).

5.8 In retail areas, as each unit is being brough forward on a shell basis, indicative retail, customer seating, office, WC, and store zones were modelled in each unit.

5.9 Plant, cycle store, and residential circulation areas have not been included in the modelling as these are considered as unheated.

Use of SAP 10 Emission Factors

5.10 The applicant has used the best practice SAP 10.0 carbon emission factor of 233 grams of CO_2/kWh for grid electricity in place of the SAP 2012 of 519 grams of CO_2/kWh. SAP 10 carbon emission factors more accurately reflect the decarbonisation that has occurred in the National Grid since the 2013 Building Regulations were adopted.

5.11 Envision has produced Part L1a compliant SAPs and Part L2a compliant SBEMs in order to determine the energy demand and consumption for the entire development, these are provided in Appendix IV & V. Using SAP 10 emission factors, the applicant has calculated the predicted carbon emissions, these calculations are provided in Appendix III.

Compliance with Policy CS 15

5.12 Policy CS 15 requires that the required carbon emission reductions are achieved for both regulated and unregulated emissions. Therefore, at each step of the three-step hierarchy as detailed above, emissions have been calculated as follows:

Regulated Carbon Emissions

5.13 Regulated carbon emissions have been calculated from the Target Emission Rate (TER) for Step 1, and the Dwelling Emission Rate (DER)/Building Emission Rate (BER) for Step 2 and 3, all as detailed on the SAP outputs and BRUKLs presented in Appendix IV & V. This is the National Calculation Methodology (NCM) for estimating regulated carbon emissions in domestic and non-domestic buildings.

Unregulated Carbon Emissions

5.14 Unregulated carbon emissions refer to the carbon associated with operational energy, i.e. plug-in equipment, I.T equipment, commercial refrigeration etc.

5.15 For domestic uses, unregulated energy has been calculated using the method prescribed under Appendix L in the Government's Standard Assessment Procedure for Energy Rating of Dwellings.

5.16 For the non-domestic uses, the 'Technical Data Sheet' detailed in each BRUKL in Appendix V details an 'Equipment' figure under the 'Energy Consumption by end Use' table. This figure represents the operational energy in the building, and has been converted to unregulated carbon emissions (using a SAP 10 grid electricity emission factor of 0.233 kg.CO_2/kWh) for each stage in the three-step hierarchy.

Step 1 - Establishing the Baseline

5.17 The total emissions savings calculated in this report are expressed against a baseline that is formed of both regulated and unregulated carbon emissions, as required by Policy CS 15. This is the Baseline against which the measures implemented must show an improvement.

5.18 The Target Emission Rates for the development have been established using DCLG approved methodology and software.

5.19 The calculated carbon emissions and total energy demand for the Target Emission Rate are illustrated below. The calculated figure demonstrates a Part L1A & L2A Building Regulations 2013 compliant model – arrived at using SAP 10 carbon factors.

Table 5.2 – Target CO_2 emissions for Site (SAP 10 Performance)

	Target Regulated Emissions (tn.CO_2.annum)	Target Unregulated Emissions (tn.CO_2.annum)	Total Target Emissions (tn.CO_2.annum)
Domestic Element	365.28	134.96	500.24
Non-Domestic Element	190.65	106.67	297.32
		Total =	**797.56**

5.20 The site-wide figure of **797.56 tonnes.CO_2.yr**, calculated using SAP 10 emissions factors, is the target that must be reached and improved upon by the proposals in this Energy Assessment in order to comply with Building Regulations Part L1a & L2a 2013 and WBC Policy CS 15. This will be achieved through the implementation of fabric efficiency, energy-reduction and carbon-saving measures as outlined in the ensuing sections.

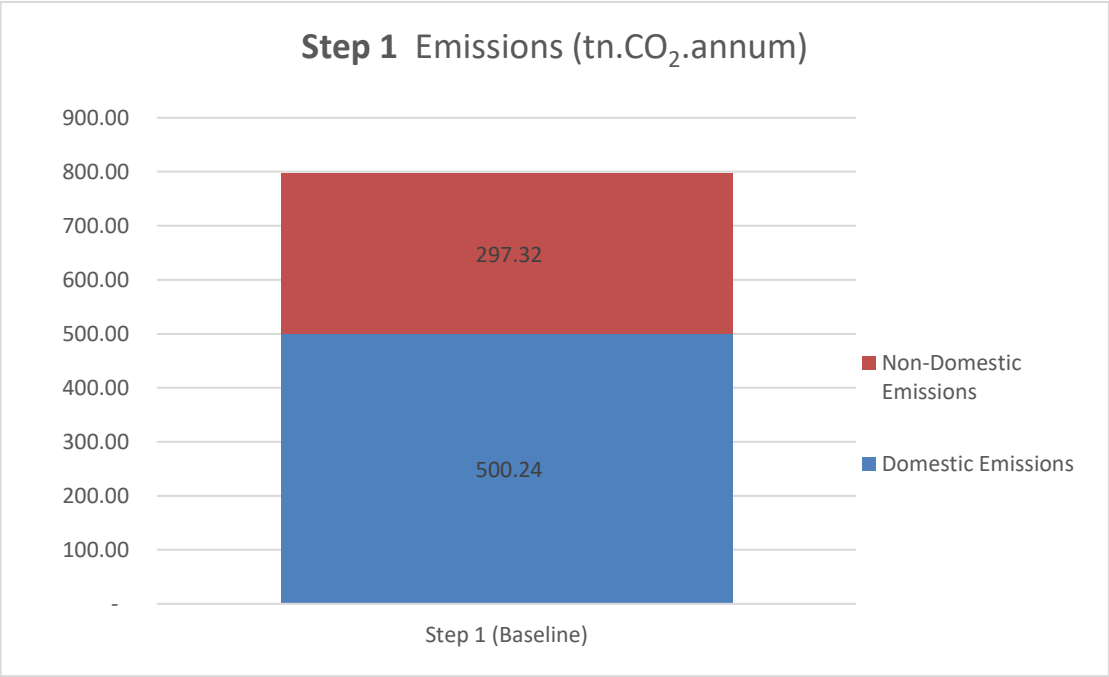


Fig 5.1 – Baseline: Target CO_2 emissions for New-Build

Step 2: Use Less Energy

5.21 Best practice low carbon design seeks a 'fabric first' approach to reducing the carbon footprint of the built environment. This is achieved through buildings using less energy by improving u-values, air-tightness and lighting efficiency amongst others. This is the first step to consider in reducing a building's carbon emissions before the efficient delivery of power, heat or renewables are considered by a design-team.

Accounting for ground floor flexible-use commercial units

5.22 This Use Class E element of the development is being brought forward on a speculative basis with the developer constructing the base-build and all fit-out elements (including building services) being the responsibility of the incoming tenants. Therefore, the minimum performance parameters set in this section constitute are assumptions and will be passed through to incoming tenants.

Fabric Efficiency

5.23 U-Values are used to measure how effective elements of a building's fabric are as insulators. That is, how effective they are at preventing heat from transmitting between the inside and the outside of a building. The lower the U-value of an element of a building's fabric, the more slowly heat is able to transmit through it, and so the better it performs as an insulator.

5.24 The table below details the u-values for the new-build apartments and commercial units:

Table 5.3 Proposed U-Values

Elements	Domestic New-Build U-Values – W/m² K	Non-Domestic New-Build U-Values – W/m² K	Comment
External Wall	0.14	0.14	
Wall to Unheated Corridor	0.16	-	Corridors assumed as unheated
Exposed Floor	0.12	0.12	
Flat Roof	0.11	0.11	
Standard Window Units	1.2 (g-value 0.5 & frame factor of 0.85)	1.2 (g-value 0.4 and LT value 0.68)	Assumed as double-glazed
External Solid Doors	2.2	1.4	Includes doors to unheated corridors.
Party Walls	0	0	Assumed as fully-filled cavity with effective edge sealing and insulation in line with layers in abutting elements.

Commentary on Glazing Technology

5.25 In order to reduce the effects of solar gain and the resultant risk of overheating, low g-values have been specified and must be specified at detailed design.

Air Permeability

5.26 The designed Air Permeability Rate (APR) has been set at 3 $m^3/h.m^2$ @ 50Pa for the domestic and 4 $m^3/h.m^2$ @ 50Pa for the non-domestic portions.

Domestic Lighting

5.27 The SAP calculation software used for assessing the development does not allow for the specification of lighting elements. However, it is assumed that the light fittings across all residential apartments will be specified as LED, low-energy with local manual switching and if appropriate, occupancy sensing.

Non-Domestic Lighting

5.28 This energy demand will be limited by the application of more efficient lighting, photocell and use of LED lighting throughout. The following lighting design requirements are therefore stipulated;

Table 5.4 – Non-Domestic Lighting Datasheet

Lighting zone	Luminaire Lumens / Circuit Watt	Light Output Ratio	Photocell Dimming (Parasitic Power – W/m²)	Occupancy Sensing – On/Off (Parasitic Power – w/m²)
Main B1 Office Areas	120	1	Yes (0.2 W/m²)	No
Customer/Amenity/Medical Areas	120	1	No	No
BOH (WC/Changing/Store)	120	1	No	Yes (0.2 W/m²)
A1/A3 Customer Areas	120	1	No	No

Domestic Space & Water Heating

5.29 In line with Policy CS 15 (which requires savings at this stage to be from energy efficiency alone and not from renewable heating sources), the heating system for each dwelling at the Step 2 stage has been assumed as a communal gas-fired heating system, with the efficiency in line with the notional building boiler efficiency (93.5%) - this is not the final heating system selection but is selected so savings from renewable heat pumps are not shown at Step 2.

5.30 Each dwelling will be provided with domestic hot water storage as follows:

1. 1-Bed Units: *150 litre cylinder with 1.19 kwh/day heat loss;*

2. 2 & 3 Bed Units: *250 litre cylinder with 1.67 kwh/day heat loss.*

5.31 The SAP assessment assumes the pipework will be fully insulated and the water heating will be timed separately.

5.32 It is assumed that all heating systems will be controlled via suitable arrangement of plumbing and electrical services.

Non-Domestic Space & Water Heating

5.33 In line with Policy CS 15 (which requires savings at this stage to be from energy efficiency alone and not from renewable heating sources), the 'Step 2' stage heating and domestic hot water (DHW) system serving all areas in the non-domestic uses has been assumed as a dual-system with the heating specified as a 93.5% efficient gas-fired boiler with cooling efficiencies entered as per the inputs detailed in the 'Step 3 section - this is not the final heating system selection but is selected so savings from renewable heat pumps are not shown at Step 2.

5.34 The heating and cooling is to be delivered via Fan-Coil Units (FCUs) with a terminal unit SFP of 0.4 W/L-s.

Domestic Ventilation Strategy

5.35 The ventilation strategy has been designed to meet with occupant requirements across the varied unit sizes in the development, whilst maintaining the energy efficiency needed to lower carbon emissions. A centralised whole-house mechanical ventilation system (Nuaire or similar and approved) is proposed for every new-build dwelling with a minimum SFP of 0.4 W/l-s.

Non-Domestic Ventilation Strategy

5.36 The ventilation strategy in the non-residential areas has been designed to meet with occupant and client requirements across the varied activity zones in the development, whilst maintaining the energy efficiency needed to lower carbon emissions. The following strategy is proposed:

Table 5.5 – Summary of Non-Residential Ventilation Strategy

Ventilation Zone	System	Specific Fan Power	Heat Recovery (Efficiency)
Residential Amenity, Leisure Use, Medical Centre & Office	Air-Handling Unit	1.6	Yes (85%)
WCs	Extract Fan (Remote from Zone)	0.4	No
Commercial Units	n/a (tenants may install supplementary which will need consideration in modelling)	n/a	n/a

Step 2 – Target Sitewide CO_2 Reductions

5.37 The following tables and graphs represent the Step 2 improvements for the development of the development over the Step 1 baseline:

Table 5.6 – Step 2 CO_2 Reductions

	Target Regulated Emissions ($tn.CO_2.annum$)	Target Unregulated Emissions ($tn.CO_2.annum$)	Total Target Emissions ($tn.CO_2.annum$)
Domestic Element	364.31	134.96	**499.27**
Non-Domestic Element	155.75	106.67	**262.42**
		Total =	**761.69**
		Difference =	35.87
		% Improvement over Step 1	**4.50%**

5.38 As detailed above, the measures as taken at the Step 2 stage would result in a targeted **4.50%** reduction in site-wide regulated and unregulated CO_2 emissions over the Part L 2013 Target Emission Rate (calculated using SAP 10 figures).

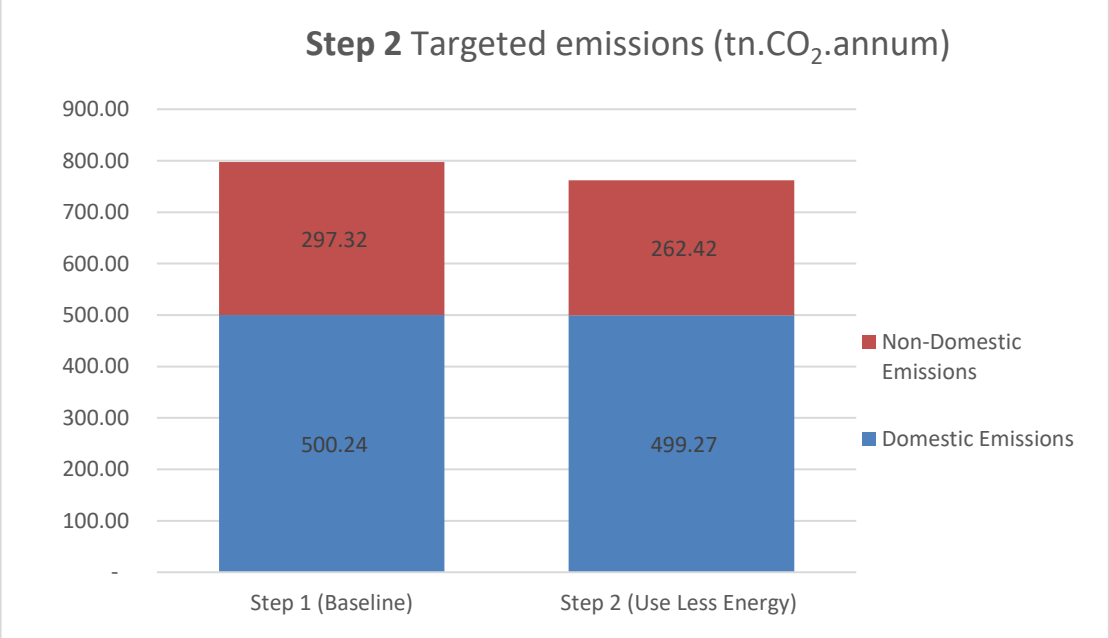


Fig 5.2 – Step 2 Targeted CO_2 emissions for Development

Step 3: Apply Renewable Technology

5.39 An analysis of low carbon/renewable technologies was undertaken to determine which would be suitable for application in a development of this size and nature. This analysis has been appended to this document in Appendix I.

5.40 During the design-development period for this scheme, multiple low carbon/renewable systems were examined for both their feasibility and ability to lower carbon emissions insofar as possible. As per the analysis contained in Appendix 1, the renewable system(s) deemed to be the most viable for the development is a:

1. **Communal Ground Source Heat Pump** providing distributing efficient and renewable heating and cooling throughout the development site;
2. **Photovoltaic (PV)** array serving the office portion of the development.

5.41 In order to ensure the safety and security of the electricity networks, depending on the size, type and location of the installation, the developer will be required to submit an 'application form for the installation of low carbon technologies' to the local distribution network operator (DNO) at completion of the development and installation of the heat pumps.

Low-Carbon/Renewable Technology System 1 – Communal Ground Source Heat Pumps

The preferred renewable technology proposal is for the installation of a Ground-Source Heat Pump (GSHP) distributing efficient and renewable heating and cooling throughout the development site. Various ground source options exist which could serve the site.

Ground Source Heat Pumps

5.42 The peak heating and cooling requirements for the development at the Kennet Centre have been estimated at 2500 kW and 1000 kW respectively.

5.43 The feasibility of Ground Source Heating has been explored at the concept stage. There are various technical solutions available to the site, which will be confirmed at further design development. The system will be a centralised GSHP providing heat and coolth to buffer tanks. Heat and coolth will be distributed to all blocks by pumped circuits within the main plantroom (located in Block A).

5.44 The seasonal co-efficient of performance (SCOP) of the system will be a minimum of 4, i.e. 400% efficient for heating. For cooling a Seasonal Energy Efficiency Ratio (SEER) of 5.5, i.e. 550% is provided.

Domestic Provision

5.45 Heating and cooling will be distributed within each block to the apartments where a Hydraulic Interface Unit (HIU) will be installed allowing space heating and domestic hot water (serving individual apartment cylinders) to be drawn.[8]

[8] The cylinders are subject to review at detail design and may be replaced with instantaneous domestic hot water fed from communal storage.

Non-Domestic Provision

5.46 For all non-domestic uses (including office, residential amenity and retail uses), a plate heat exchanger will be provided allowing heating and hot water to be delivered. Cooling will be provided to offices, residential amenity and retail uses only.

Low-Carbon/Renewable Technology System 2 – PV (Photovoltaic) Array serving the office

5.47 The second low-carbon/renewable energy proposed for the development is a Photovoltaic (PV) array. The proposed PV will be mounted at the uppermost roof level(s) of the office block and will serve the office uses. The building design will provide service riser accommodation to allow the roof mounted inverter to be wired back to a distribution board and G59 intake meter arrangement.

5.48 Included in the table below is a break-down of the proposed PV array:

Table 5.7 – PV Array Details

Served Area	PV Area	Estimated PV Peak Power (kWp)[9]	PV Energy Generation (kWh.annum)[10]
Office Roof	671 m²	140.6 kWp	102,188 kWh

5.49 This energy assessment has identified a roof mounted PV array of 140.6 kWp will generate 102,188 kWh of renewable electricity per annum and will result in a reduction of 23.8 tonnes of CO_2 per annum (calculated using SAP 10 emission factors).

5.50 The energy assessment assumed 380 no. 370 Watt PV panels, each measuring 1765mm (l) x 1000mm (w).

Step 3 – Carbon emissions reductions following step 3

5.51 The following tables and graphs represent the Step 3 improvements for the development over the Step 1 baseline emissions:

[9] This is an estimated capacity by DesignBuilder and subject to final detail design.
[10] This is the generation requirement of the PV to be provided to PV manufacturers.

Table 5.8 – Step 3 CO_2 Reductions

	Target Regulated Emissions (tn.CO2.annum)	Target Unregulated Emissions (tn.CO2.annum)	Total Target Emissions (tn.CO2.annum)
Domestic Element	121.85	134.96	**256.81**
Non-Domestic Element	94.63	106.67	**201.30**
		Total =	**458.12**
		Difference =	303.57
		% Improvement over Step 2[11]	38.06%
		Difference =	339.44
		% Improvement over Step 1	**42.56%**

5.52 As detailed above, the measures as taken at the Step 3 stage target a **38.06%** reduction in site-wide regulated and unregulated CO_2 emissions through the use of renewable technology, with a targeted overall reduction beyond the baseline of **42.56%** – calculated using SAP 10 emission factors and therefore exceeds the minimum CO_2 reduction requirements listed under Policy CS 15 of the West Berkshire Core Strategy.

5.53 The development has a target saving of **339.44** tonnes of CO_2 per annum compared to a Part L baseline, before the rooftop PV. This will increase further with future grid decarbonisation.

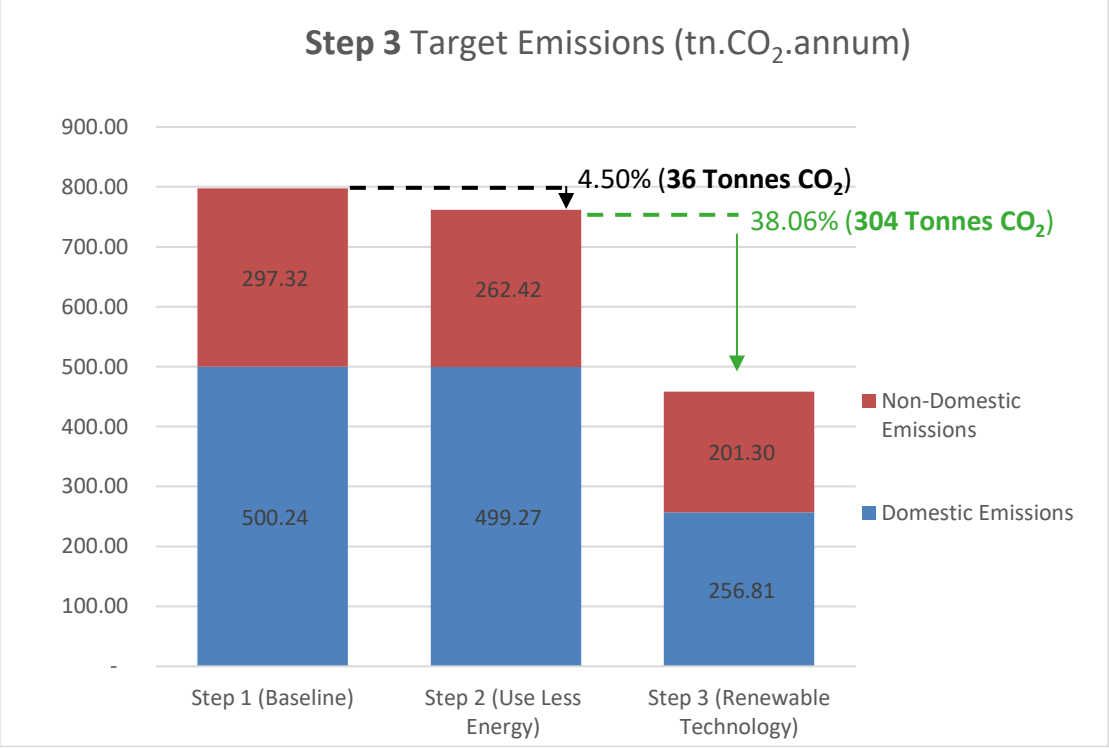


Fig 5.3 – Step 3 CO_2 target emissions for Development (Policy CS 15 compliant)

[11] Savings expressed against baseline emissions

Carbon Savings Beyond Policy CS 15

5.54 In order to maximise on-site renewable energy generation, and in addition to meeting and exceeding the building-level carbon reduction requirements of Policy CS 15 as detailed above, the applicant proposes installing a further 254.93 kWp PV array on the roof of the Multi-Storey Car Park (MSCP).

5.55 This PV array will generate an additional 207,768 kWh of renewable electricity per annum and will offset an additional 48.4 tonnes carbon per annum.

5.56 Therefore, at a sitewide level including building-reductions and the emission reductions from the MSCP PV, the development has a target saving of **388 tonnes** CO_2 beyond a Part L baseline as follows:

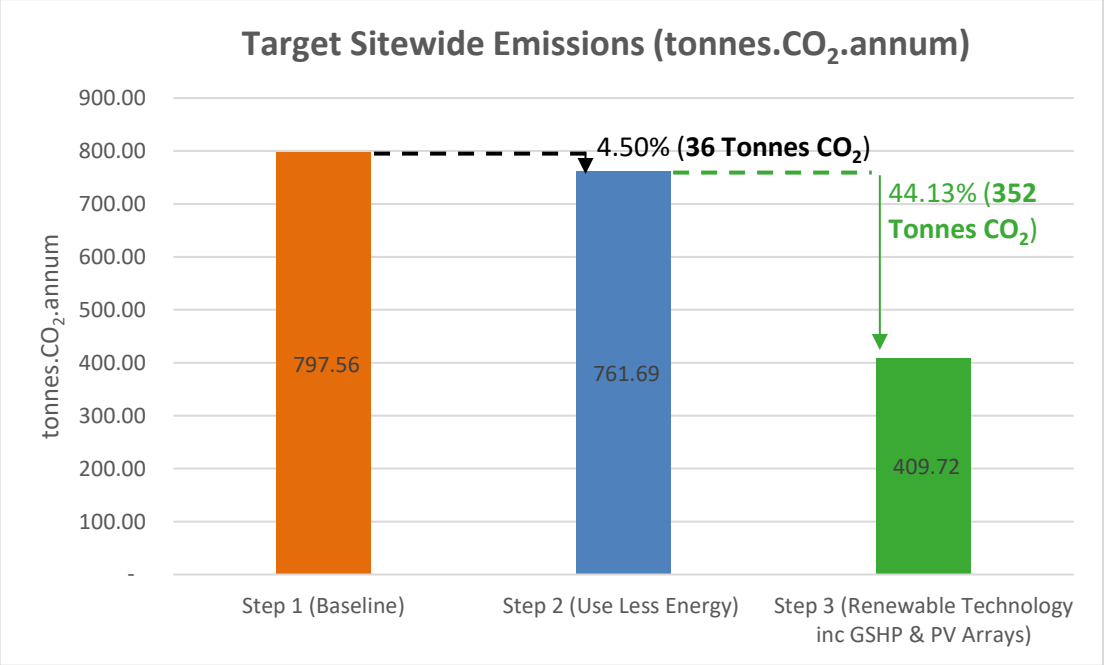


Fig 5.4 – Target Sitewide Carbon Emission Reductions (including MSCP PV)

6 CONCLUSION

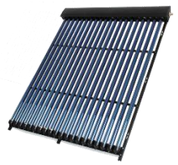
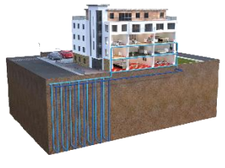
6.1 Envision has been appointed by Lochailort Newbury Limited (the applicant) to produce a Sustainability & Energy Efficiency Statement in in support of an application for full planning permission for a proposed development at the Kennet Centre in Newbury.

6.2 Planning permission is sought for the development of the site for the phased redevelopment of the Kennet Centre comprising (i) partial demolition of existing building (ii) flexible-use commercial space (iii) headquarters office building (iv) 402 dwellings plus residents' ancillary facilities (v) access, car parking and cycle parking (vi) landscaping & open space (vii) sustainable energy installations (viii) associated works.

6.3 The applicant is proposing to deliver a low-carbon, highly sustainable development in the centre of Newbury. As detailed in this report, the targeted carbon footprint of the Eagle Quarter will be **87%** less than that of the existing Kennet Centre – a significant betterment. In addition, on-site carbon savings have been maximised through the installation of low-carbon heating and large renewable electricity PV arrays across a number of roofs.

6.4 The measures as contained within this report are considered to demonstrate a significant betterment against the sustainability policies held within the West Berkshire Council Core Strategy, specifically policies CS 13, CS 15, CS 16, C 17 & CS 18.

APPENDIX I – LOW/ZERO CARBON/RENEWABLE ANALYSIS

		Typical Lifetime	Maintenance	Land & Space Requirements	Operational Impacts	Adopted in Development?
Solar Photovoltaic (PV) Panels		25	Low	PV is typically installed on available roof-space so little to no impact on land use.	Proportionately large arrays may need electrical infrastructure upgrade (0.5 MW+) PV arrays are typically maintenance free and panels are self-cleaning at angles in excess of 10 degrees. Provision for access to solar panels installed on flat roofs needs to be incorporated into the design of PV arrays layout as well as inclusion of spaces for inverters within the development. Quality of PV panels varies dramatically.	**Adopted** The office roof is free from shading and generally flat which is well suited for PV installation. Some of the lower roofs are in shade cast by the higher adjacent blocks, these areas are not appropriate for effective PV application. PV arrays have a long lifespan and have limited maintenance requirements and therefore have been deemed appropriate for installation on the office. Additional PV is proposed for the MSCP which may not feed into the buildings but will contribute to overall carbon emission reductions at a site level.
Solar Thermal		25	Low	Solar thermal panels are typically installed on available roof-space so little to no impact on land use. Requires hot water cylinders that link to system and requires additional energy. Due to amount of roof space required and distance from tank to panels, less suitable for dense developments or high-rise buildings.	Note above with regards to maintenance of solar thermal panels. Biggest reductions achieved by people who operate their hot water system with consideration of the panels.	**Not Adopted** The proposed DHW system (GSHP) will already generate hot water – given the significant hot water demand on site the use of a solar thermal system although technically feasible would not offer significant carbon emission savings relative to the cost and complexity of installation.
Air-Source Heat Pumps		20	Medium	No need for external ground works, only a heat pump unit for the air to pass through, typically installed on the roof. Minimal external visual evidence if located in plant enclosure.	Vital that ASHP model selected has been proven to maintain performance at the low temperature and high humidity conditions of the British winter. May need immersion backup for hot water. Highly reliable and require virtually no maintenance.	**Not Adopted** ASHPs are potentially viable for the development and are capable of providing a significant portion of the building's energy from effectively a renewable source, as for each kW of electricity in excess of 3kW of heating will be extracted. Two ASHP solutions were examined for inclusion in the design but were rejected for the following reasons; **Individual ASHP** – these offer high COPs but each ASHP would need to be located on the roof (no space) as a condenser farm at ground level would not be suitable or practical. **Communal ASHP** – these offer lower COPs than individual ASHPs. Also, space considerations are an issue.
Ground Source Heat Pumps		20	Low	Require extensive ground works to bury the boreholes that extract the low-grade heat from the earth. They therefore require a large area for horizontal burial (40-100m long trench) or a vertical bore (50-240m) which is considerably more expensive but can be used where space is limited.	May need immersion backup for hot water. Maintenance issues if components of ground bore hole fail.	**Adopted** A ground source heat pump has been identified as a feasible renewable technology for providing space & water heating to the development as; • The ground conditions for the site have been identified as suitable for the installation of GSHP to meet the sites demands, subject to rationalising the schemes loads. • High groundwater may prevent the use of open loop systems, which require permitting, however deeper standing column solutions are considered possible. • The system offers high COPs.

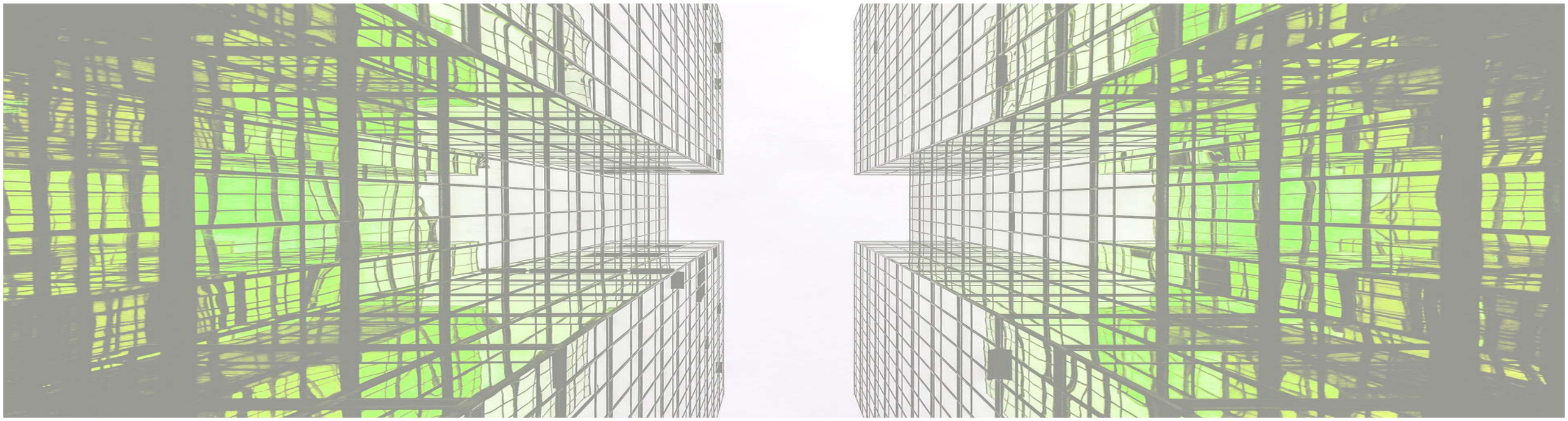
Wind Turbines		25	Medium	Smaller models (<6kW) can be roof mounted. Must be higher than surrounding structures/trees. Planning permission required.	Annual services required. Turbines rated in excess of 5kW may require the network to be strengthened and arrangements to be made with the local Distribution Network Operator and electricity supplier.	**Not Adopted** The restricted nature of the site, coupled with the noise, aesthetic (planning) and issues with arriving aircraft make this system impractical and unviable.
Combined Heat & Power (CHP)		25	High	CHP systems require a plant room and possibly separate energy centre for large developments. Require a flue to effectively disperse pollutants. This is best to rise to a minimum of 2m above the roofline of the tallest building.	Require operational support and maintenance. Can produce proportion of electricity which can help in lowering energy demand. Emissions of oxides of nitrogen – ~80-100mg/kWh.	**Not Adopted** As the grid continues to decarbonise, the carbon offset offered by CHP will reduce, resulting in the system actually emitting far more carbon than other systems as the heat efficiency is typically around 50%, i.e., an inefficient gas-fired boiler.
Biomass		20	High	Biomass boilers require a plant room and possibly separate energy centre for large developments. Require a flue to effectively disperse pollutants. This is best to rise to a minimum of 2m above the roofline of the tallest building. Fuel store/delivery vehicle space will be required. This should be maximised to reduce fuel delivery frequency.	Normally run-on biomass but can also work with biogas. Require some operational support and maintenance. Fuel deliveries required. Boiler and fuel store must be sited in proximity to space for delivery vehicle to park. Issues with rights to dig up roads, etc (for heat networks). Emissions of oxides of nitrogen – ~80-100mg/kWh.	**Not Adopted** Burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within a development if this nature.

APPENDIX II – BREEAM PREDICTIVE ASSESSMENT

BREEAM Pre-Assessment

Eagle Quarter - Office

Prepared for Lochailort Newbury Ltd
16th February 2021



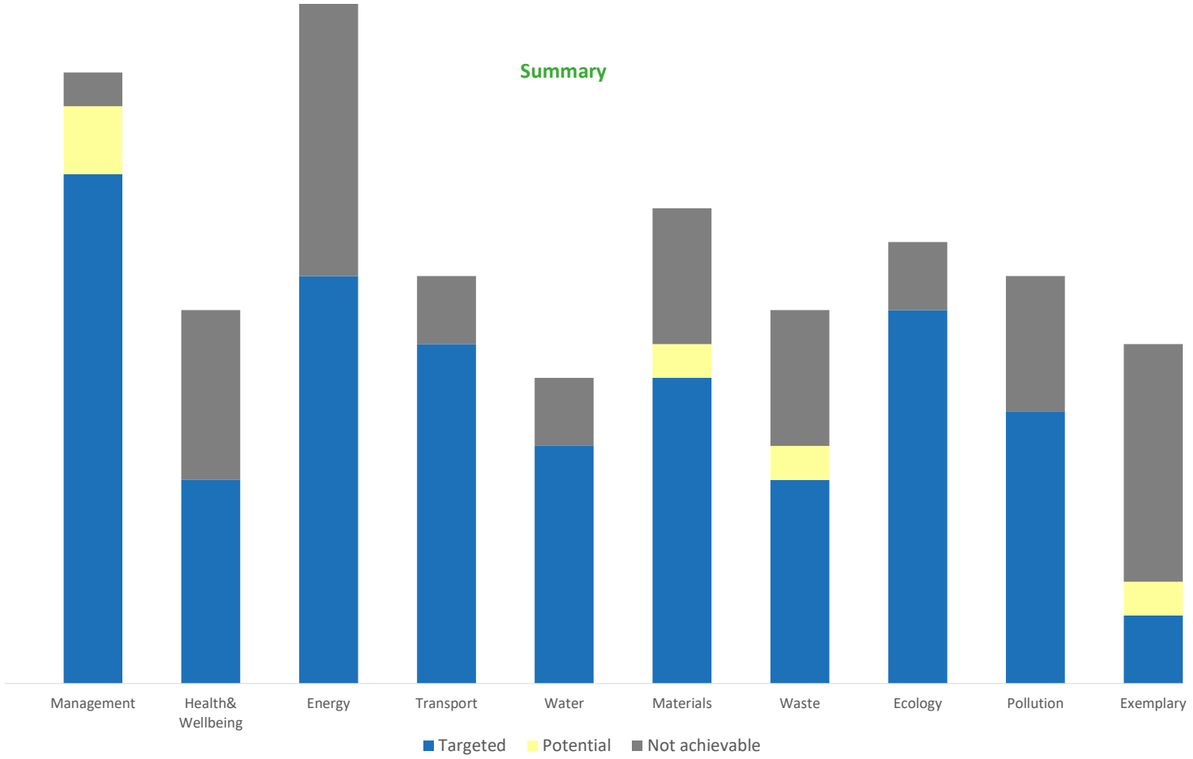
envision

Issue	Date	Reason for Issue	Author	Approved
Issue	08-Feb-21	Pre-assessment	Simon Rainsford	SR
A	16th February 2021	Pre Assessment	Simon Rainsford	SR

Project Name: Eagle Quarter - Office
Prepared for: Lochailort Newbury Ltd
Building Type: Office
Project Stage: Pre-Assessment
Project Stage: BREEAM NC 2018
Scheme: SD5078 Issue 3.0
Manual Version: Shell and Core
Project type: Excellent

The results, as illustrated in the summary graph below, indicates available, targeted, potential and achieved credits. The current targeted score as detailed overleaf confirm that the development could achieve a score of 71%, with potential additional credits to 76%.

Summary



Key Statistics

Will the building be heated and/or cooled?	Yes
Commercial/industrial refrigeration and storage systems	No
Building user transportation systems (Lifts)	Yes
Building user transportation systems (Escalators / moving walks)	No
Is demolition occurring under the developer's ownership?	Yes
Laboratory function/area and size category	No Laboratory
Laboratory containment level	No
Fume cupboards and/or containment devices	No
Are WC failities only provided within the residential areas of long term stay?	No
Unregulated water uses present? (e.g. vehicle wash system, irrigation)	Yes
Does the building have external areas within the boundary of the assessed development?	Yes
Are there statutory requirements, or other issues outside of the control of the project, that impact the ability to provide outdoor space?	No
Industrial unit with operational areas & office space	Yes

Lower Ground Floor, 24 Charlotte Street, Fitzrovia, W1T 2ND
Unit 2 Lodge Farm Business Centre, Castlethorpe, Milton Keynes, MK19 7ES
Howbery Business Park, Benson Ln, Wallingford, OX10 8BA

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1 INTRODUCTION

Envision has been appointed by Lochailort Newbury Limited to prepare a BREEAM predictive assessment for the proposed office building at the Kennet Centre, Newbury.

Project Description

Phased redevelopment of the Kennet Centre comprising (i) partial demolition of existing building (ii) flexible-use commercial space (iii) headquarters office building (iv) 400 dwellings plus residents' ancillary facilities (v) access, car parking and cycle parking (vi) landscaping & open space (vii) sustainable energy installations (viii) associated works

Planning Policy Requirements

The West Berks adopted Core Strategy (2006-2026) contains policies relating to a development's sustainable design. Of note is Policy CS15 relating to the use of sustainable construction & energy efficiency techniques. This requires that major development should reach BREEAM Excellent from 2013 . Further policy analysis is provdied within the Sustainability and Energy Efficiency Statement, section 3.

BREEAM Assessment Methodology

The development type has been defined, under BREEAM standards, as office Shell & Core and will be assessed under the most recent version of BREEAM UK New Construction 2018.

Targeted Rating and Minimum Requirements

BREEAM ratings are awarded based on achievement of relevant minimum standards and % score. Table 1 shows the required scores for each rating benchmark, with the targeted rating for this assessment highlighted in green. The descriptor of level of good/best practice is also provided, in line with the terms used by BRE, as an indicator of level of sustainability performance.

Figure 1 Site Layout Plan

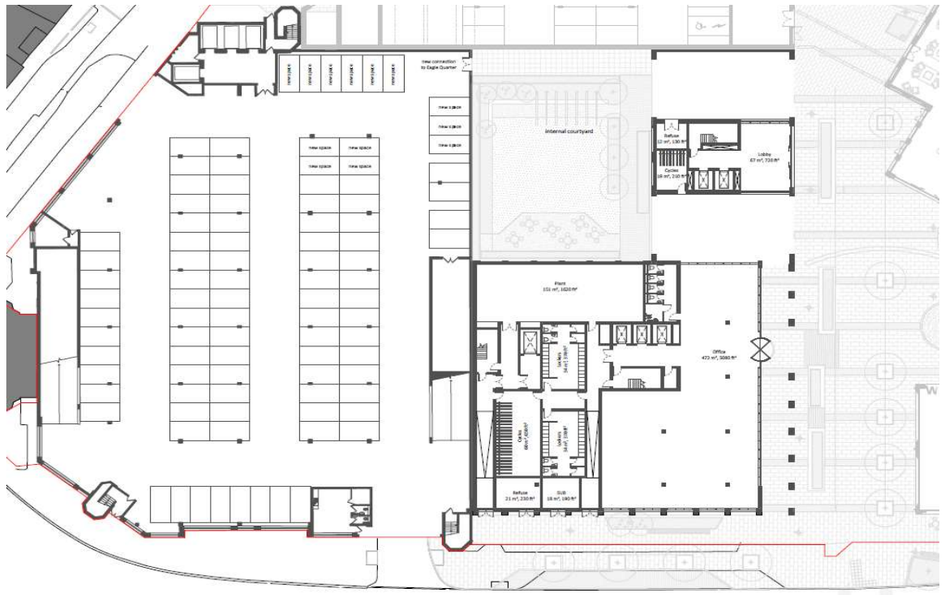


Table 1 BREEAM scoring

PASS	GOOD	VERY GOOD	EXCELLENT	OUTSTANDING
30%+	45%+	55%+	70%+	85%+
Standard Good Practice	Intermediate Good Practice	Advanced Good Practice	Best Practice	Innovator

Project Name: **Eagle Quarter - Office**
Building Type: **Office**
Project Type: **Shell and Core**

Targeted BREEAM rating % **72.32** **Excellent**
Potential BREEAM rating % **76.43** **Excellent**
Achieved scoring % **0.00** **Unclassified**

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
MANAGEMENT										
Man 01	**Project Brief and Design**	Project Delivery Planning	1	0		0		Client/PM/Architect	2	A clear sustainability brief developed prior to concept design. Identify and define roles, responsibilities and contribution of project team for key phases of the project delivery.
		Stakeholder Consultation (Interested Parties)	1	1		0		Client/PM/Architect	2	Consult all relevant parties on minimum consultation content at RIBA Stage 2. Prior to completion of RIBA Stage 4 feedback to all relevant parties must be given and received.
		Pre-requisite for BREEAM Advisory Professional credits: Have the client & the contractor formally agreed performance targets?					Yes	Client/Contractor/BREEAM AP	2	**BREEAM target must be formally agreed with the design team.**
		BREEAM Advisory Professionals (AP) (Concept Design)	1	1		0		BREEAM AP	2	Appointment of BREEAM AP prior to RIBA Stage 2. BREEAM target must be formally agreed with the design team.
		BREEAM AP (Developed Design)	1	1		0		BREEAM AP	4	BREEAM AP monitor and report progress against agreed BREEAM performance targets throughout the project up to PC Stage.
Man 02	**Life Cycle Cost and Service Life Planning**	Elemental Life Cycle Cost (LCC)	2	0	2	0		LCC Specialist	2	An outline, entire asset elemental life cycle cost plan has to be carried out at RIBA stage 2 in line with Standardised method of life cycle costing for construction procurement PD 156865:2008.
		Component Level Life Cycle Cost Options Appraisal	1	1		0		LCC Specialist	4	A component level LCC plan has been developed by the end of RIBA Stage 4 in line with 'Standardised method of life cycle costing for construction procurement' PD 156865:2008.
		Capital Cost Reporting	1	1		0		Client/QS	4	Report the capital cost for the fit-out works in pounds per meter square (£/m2) via the BREEAM Assessment Scoring and Reporting tool.
Man 03	**Responsible Construction Practices**	**Pre-requisite: Legal and sustainable timber**					Yes	Contractor	4	**All timber and timber-based products used during construction process of the project are legal and sustainable i.e. FSC or PEFC certified.**
		Environmental Management	1	1		0		Contractor	4	Contractor operates EMS: certificate of ISO 14001, EMAS or have a structure that is in compliance with BS 8555:2003 and has reached stage four of the impleentation stage. And implement best practice pollution prevention procedures: PPG6, Pollution Prevention Guidelines.
		Pre-requisite for BREEAM AP on site: Have the client & the contractor formally agreed performance targets?					Yes	Client/Contractor/BREEAM AP	4	**BREEAM target must be formally agreed with the main contractor.**
		BREEAM AP (Site)	1	1		0		Contractor	4	A BREEAM AP is appointed to monitor the project to ensure ongoing compliance with the relevant sustainability performance/process criteria, and therefore BREEAM target, during the Construction, Handover and Close Out stages.
		Responsible Construction Management **Minimum Standard: 1 credit Excellent, 2 credits Outstanding**	2	2		0	Yes	Contractor	4	Principal contractor achieves score register the site under the Considerate Contractors Scheme (CCS) or Fleet Operator Recognition Scheme (FORS) and achieves score required for targeted credits.
		Monitoring of Construction Site Impacts - Utility and Water Consumption	1	1		0		Contractor	4	Principal contractor monitor energy and water consumption on site.
		Monitoring of Construction Site Impacts - Transport of Construction Materials and Waste	1	1		0		Contractor	4	Principal contractor to monitor fuel consumption of transport of materials and waste to/from site.
Man 04	**Commissioning and Handover**	Commissioning - Testing Schedule and Responsibilities **Minimum Standard: 1 credit Very Good, Excellent and Outstanding**	1	1		0	Yes	Contractor/Specialist	4	Third party commissioning manager to be appointed. Testing schedule and responsibilities to be provided.
		Commissioning - Design and Preparation	1	1		0		Contractor/Specialist	4	Appointment of an appropriate project team member, provided they are not involved in the general installation works provide commissioning management.
		Testing and Inspecting Building Fabric	1	1		0		Contractor	4	Thermographic survey to be undertaken by professional holding a UKTA certificate and an airtightness test undertaken by professional holding with membership of ATTMA or IATS.
		Building User Guide **Minimum Standard: 1 credit Very Good, Excellent and Outstanding**					Yes	Client/Contractor	4	2 sets of building user guides to be developed: a technical and non-technical
		Handover	1	1		0		Contractor	4	A training schedule is prepared for building occupiers at handover including proposed occupation plans (introduction to Building User Guides, installed systems an key features, O&M manual, commissioning records, aftercare information).

MANAGEMENT	**TOTAL**	**18**	**15**	**2**	**0**
	% of total score	**11.00%**	**9.17%**	**1.22%**	**0.00%**
	% of each credit	**0.61%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
HEALTH & WELLBEING										
Hea 01	**Visual Comfort**	Daylighting	2	0		0		Daylighting Specialist	3	Daylighting study to be carried out and achieve average daylight factor of 2% over 80% (100% room dependant) of the floor plate and a uniformity ratio of at least 0.3.
		View Out	1	1		0		Architect	3	95% of the floor area in 95% of spaces for each relevant building area is within 8 m of an external wall. The window or opening must be ≥ 20% of the surrounding wall area or compliance is seeked via BS 8206.
		Internal and External Lighting Levels, Zoning and Controls	1	1		0		M&E Engineer	4	Internal lighting designed to provide lux levels in accordance with SLL Code for Lighting, CIBSE LG 7 and other relevant industry standards; and zoned to allow occupant control. External lighting designed in accordance with BS5489-1:2013 and BS EN 12464-2:2-14.
Hea 02	**Indoor Air Quality**	**Pre-requisite: Indoor Air Quality (IAQ) Plan**					Yes	Specialist	2	**IAQ Plan to be developed no later than RIBA Stage 2.**
		Ventilation	1	0		0		M&E Engineer	4	Provide fresh air into the building in accordance with the criteria of the relevant standard for ventilation. Consideration of carbon dioxide (CO_2) or air quality sensors. Design intakes and exhaust 10m apart and from sources of external pollution or in accordance with BS EN13779:2007 Annex 2.
Hea 04	**Thermal Comfort**	Thermal Modelling	1	1		0		Energy Consultant	3	Thermal modelling to be carried out in accordance with CIBSE AM 11.Air conditioned building to be designed in accordance with CIBE Guide A and the PMV & PPD to be reported; for naturally ventilated builidng consider overheating in line with CIBSE TM52/TM59.
		Design for Future Thermal Comfort	1	1		0		Energy Consultant	3	The thermal modeling demonstrates the building is designed for a projected climate change environment and for conditioned building report PMV & PPD.
Hea 05	**Acoustic Performance**	Acoustic Performance	1	1		0		Acoustician	3	Meet relevant acoustic performance standards for sound insulation, indoor ambient noise levels and reverberation. Suitably qualified acoustician to undertake calculation and testing requirements.
Hea 06	**Security**	Security of Site and Building	1	0	0	0		Security Specialist	2	Security Needs Assessment (SNA) undertaken by Suitably Qualified Security Specialist (SQSS) during RIBA Stage 2 and design embodies recommendations. Any deviation from recommendations to be justified and agreed with SQSS.
Hea 07	**Safe and Healthy Surroundings**	Safe Access	1	0		0		Architect/Specialist	4	Dedicated and safe cycle paths are provided from the site entrance to any cycle storage, and connect to off-site cycle paths. Pedestrian drop-off areas, delivery areas, dedicated parking or waiting areas are designed for vehicles.
		Outside Space	1	1		0		Architect	4	There is an outside space providing building users with an external amenity area.

HEALTH & WELLBEING	**TOTAL**	**11**	**6**	**0**	**0**
	% of total score	**8.00%**	**4.36%**	**0.00%**	**0.00%**
	% of each credit	**0.73%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
ENERGY										
Ene 01	**Reduction of Energy Use and Carbon Emissions**	Energy Performance **Minimum Standard: 4 credits Excellent, 6 credits Outstanding**	9	2		0	Yes	Energy Consultant	4	Credits are achieved through energy modelling (BRUKL report) and reduction in regulated CO_2 emissions.
		Prediction of Operational Energy Consumption **Minimum Standard: 4 credits for Outstanding**	4	4		0	Yes	Energy Consultant	4	Undertake energy workshop to focus on operation energy performance with design team and additional energy modelling during the design and post-construction stage to generate predicted operational energy consumption figures.
Ene 02	**Energy Monitoring**	Sub-Metering of End-Use Categories **Minimum Standard: 1 credit Very Good, Excellent and Outstanding**	1	1		0	Yes	M&E Engineer	4	Separate energy metering installed for each fuel type / use for 90% of estimated annual energy consumption, with pulsed output for future connection to energy management system.
		Sub-Metering of High Energy Load and Tenancy Areas	1	1		0		M&E Engineer	4	This requires sub metering of different functional areas. Meter to be connected to BMS or equipped with pulsed output for future connection to energy management system.
Ene 03	**External Lighting**	External Lighting	1	1		0		M&E Engineer	4	Average initial luminous efficacy of not less than 70 luminaire lumens per circuit Watt. Automatic control to prevent operation during daylight hours and presence detection in areas of intermittent pedestrian traffic.
Ene 04	**Low Carbon Design**	Passive Design Analysis	1	0		0		Energy Consultant	2	**Hea 04 to be achieved.** Analysis is carried out at RIBA Stage 2 and identifies passive design measures to reduce the total heating, cooling, mechanical ventilation, lighting loads and energy consumption.
		Free Cooling	1	0		0		M&E Engineer	4	Passive design is achieved and any of the free cooling strategies are implemented: night time cooling; ground coupled air cooling; displacement ventilation; ground water cooling; surface water cooling; evaporative cooling; disiccant dehumidification and evaporative cooling, using waste heat; absorption cooling, using waste heat; building does not require any significant form of active cooling or mech. ventilation i.e. naturally ventilated.
		Low Zero Carbon Feasibility Study	1	1		0		Energy Consultant	2	LZC Study carried out at RIBA Stage 2 by an energy specialist to establish most appropriate low or zero carbon energy source(s). Technology(ies) to be specified and resulted in a meaningful reduction in regulated CO2 emissions.
Ene 06	**Energy Efficient Transportation Systems**	Energy Consumption	1	1		0		Lift Specialist	4	An analysi of the transportation demand and usage patterns is carried out and energy consumption has been estimated in accordance with BS EN ISO 25745 Part 2 and 3.
		Energy Efficient Features - Lifts	1	1		0		Lift Specialist	4	Energy efficient features offering the greatest potential energy savingsare to be specified: standby condition during off-peak periods; lift care lighting and display across is >70lamp lumens/circuit Watt; drive controller capble of variable speed, variable-voltage and variable-frequency. Where use of regenrative drive saves energy it needs to by specified.
		Energy Efficient Features - Escalators or Moving Walks	0	0		0		Lift Specialist	4	Specify a load-sensing device or a passenger-sensing device for each escalator or moving walk.

ENERGY	**TOTAL**	**21**	**12**	**0**	**0**
	% of total score	**14.00%**	**8.00%**	**0.00%**	**0.00%**
	% of each credit	**0.67%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
TRANSPORT										
Tra 01	**Transport Assessment and Travel Plan**	Travel plan	2	2		0	**AI < 25**	Transport Consultant	2-4	Travel Plan and Transport Assessment to be carried out at early design stages cearly considering the impact onto the surrounding infrastructure and to calculate the public transport Accessibility Index (AI) for the assessed building. Preliminary calculations confirmed AI of 2.59
Tra 02	**Sustainable Transport Measures**	1. The existing AI calculated in Tra 01	10	8		0	**No**	Transport Consultant	2-4	Credits are awarded based on identify the sustainable transport measures as per BREEAM manual Table 7.4 and on the AI of the site. Credit can be awarded when a minimum AI is 8. Preliminary calculations confirmed AI of 2.59
		2. Demonstrate an increase over the existing Accessibility Index.					**No**	Transport Consultant	2-4	Achieved through negotiation with local bus, train companies to increase the frequency of the local service or dedicated bus service, diverted bus route or new bus stop etc.
		3. Provide a public transport information system in a publicly accessible area, to allow building users access to up-to-date information on the available public transport and transport infrastructure.					**Yes**	Transport Consultant/Client	2-4	This may include signposting to public transport, cycling, walking infrastructure or local amenities.
		4. Provide electric recharging stations of a minimum of 3kw for at least 10% of the total car parking capacity for the development.					**No**	Transport Consultant/Client	2-4	Electric recharging stations of a minimum of 3kW for at least 10% of the total car park.
		5. Set up a car sharing group or facility to facilitate and encourage building users to car share. Raise awareness of the sharing scheme.					**Yes**	Transport Consultant/Client	2-4	Car sharing group or facility, priority spaces for car sharers for at least 5% of the total car parking capacity, locate priority parking nearest the development.
		6. During preparation of the brief, the design team consults with the local authority (LA) on the state of the local cycling network and public accessible pedestrian routes, to focus on whichever the LA deems most relevant to the project, and how to improve it.					**No**	Transport Consultant/Client	1	Agree and implement one proposition chosen with the local authority.
		7. Install compliant cycle storage spaces to meet the minimum levels set out in a BREEAM manual Table 7.5					**Yes**	Transport Consultant/Client/Architect	2-4	Industrial: provide 1 cycling space for 10 staff.
		8. Provide at least two compliant cyclists' facilities for the building users, (including pupils where appropriate to the building type) – Showers; – Changing facilities; – Lockers; – Drying spaces.					**Yes**	Transport Consultant/Client/Architect	2-4	Option 7 must be achieved in addition to at least 2 compliant cyclist facilities: showers, changing rooms, lockers or drying space.
		9. At least three existing accessible amenities are present within 500m of the main entrance.					**Yes**	Transport Consultant	2-4	Food outlet, ATM, access to an outdoor space, access to recreation/leisure facility, post office, community facility, GP surgery and child care. All depending on type of the buillding.
		10. Enhanced amenities					**Yes**	Transport Consultant	2-4	One or more of the new accessible amenity (as per point 9 above) is provided.
		11. Implement one site-specific improvement measure, not covered by the options already listed in this issue, in line with the recommendations of the travel plan.					**Yes**	Transport Consultant/Client	2-4	Additional amenities as part of internal layout design to be agreed between LBA, C-TAS and appointed architects / internal design consultants.

TRANSPORT	**TOTAL**	**12**	**10**	**0**	**0**
	% of total score	**11.50%**	**9.58%**	**0.00%**	**0.00%**
	% of each credit	**0.96%**			

WATER										
Wat 01	**Water Consumption**	Water Consumption **Minimum Standard: 1 credit Good, Very Good, Excellent and 2 credis Outstanding**	5	3		0	Yes	Architect	4	Specification of water efficient domestic water-consuming components, grey/rain water collection to reduce the water consumption. Use the BREEAM Wat 01 calculator to assess the efficiency of sanitary wear.
Wat 02	**Water Monitoring**	Water Monitoring **Minimum Standard: Criterion 1 - water meter on mains Good, Very Good, Excellent and Outstanding**	1	1		0	Yes	M&E Engineer	4	Specification of water meter with pulsed output and BMS connected on mains water supply to each building. Install water sub-meters for all water consuming systems over 10% of the building demand.
Wat 03	**Water Leak Detection**	Leak Detection System	1	1		0		M&E Engineer	4	Water leak detection system with audible alarm capable of detecting a major leak on the mains water supply within the building and between the building and the utilities water meter.
		Flow Control Devices	1	1		0		M&E Engineer	4	Flow control devices that regulate the supply of water to each WC area/facility must be provided.
Wat 04	**Water Efficient Equipment**	Water Efficient Equipment	1	1		0		M&E Engineer	4	Mitigate or reduce unregulated water usage i.e. vehicle wash, swimming pools, irrigation system etc.

WATER	**TOTAL**	**9**	**7**	**0**	**0**
	% of total score	**7.00%**	**5.44%**	**0.00%**	**0.00%**
	% of each credit	**0.78%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
MATERIALS										
Mat 01	**Environmental Impacts from Construction Products - Building Life Cycle Assessment (LCA)**	Superstructure - Concept Design	6	3	0	0	Yes	LCA Specialist	2	Using BREEAM simplified Building LCA tool or an IMPACT approved tool, carry out building Life Cycle Assessment (LCA) at RIBA Stage 2 **before planning submission.** Integrate the LCA options appraisal within the wider design decision-making process.
		Superstructure - Technical Design						LCA Specialist	4	Using BREEAM simplified Building LCA tool or an IMPACT approved tool, carry out building LCA for superstructure design options at RIBA Stage 4.
		Substructure and Hard Landscaping Options Appraisal during Concept Design	1	1		0		LCA Specialist	2	Using BREEAM simplified Building LCA tool or an IMPACT approved tool, carry out the LCA options appraisal for s substructure and hard landscaping at RIBA Stage 2.
Mat 02	**Environmental Impacts from Construction Products - Environmental Product Declarations (EPD)**	Specification of Products with a Recognised Environmental Product Declaration (EPD)	1	1	0	0		Architect	4	To specify products with recognised EPD and use BREEAM Mat 01/02 results submission tool.
Mat 03	**Responsible Sourcing of Construction Products**	**Pre-requisite: Legal and sustainable timber**					Yes/No?	Contractor	4	**100% of timber and timber-based products used n the project are 'Legal' and 'Sustainable' as per UK Government's Timber Procurement Policy (TPP).**
		Enabling Sustainable Procurement	1	1		0		Client/Design Team	2	Sustainable Procurement Plan includes sustainability aims, objectives and strategic targets to guide procurement process must be in place before RIBA Stage 2.
		Measuring Responsible Sourcing	3	1	1	0		Architect/Contractor	4	To specify materials from manufacturers who can provide EMS Certification, FSC, PEFC, SFI, CARES, Eco-reinforcement, BES 6001, Supply chain.
Mat 05	**Designing for Durability and Resilience**	Protecting Vulnerable Parts of the Building from Damage and Protecting Exposed Parts of the Building from Material Degradation	1	1		0		Design Team	4	The building incorporates suitable durability and protection measures and specification to limit materials degradation between environmental factors.
Mat 06	**Material Efficiency**	Preparation and Brief	1	1	0	0	Yes	Design Team	1	Set targets and report opportunities and methods for optimise the use of materials for each of the RIBA Stage. Consideration should be given to pre-fabrication and WRAP compliance.
		Concept Design					Yes		2	
		Developed Design					No		3	
		Technical Design					No		4	
		Construction					No		5	

MATERIALS	**TOTAL**	**14**	**9**	**1**	**0**
	% of total score	**17.50%**	**11.25%**	**1.25%**	**0.00%**
	% of each credit	**1.25%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
WASTE										
Wst 01	**Construction Waste Management**	Pre-demolition Audit **Minimum Standard: 1 credit Outstanding**	1	0		0		Demolition Contractor	2	Pre-demolition audit must be carried out at RIBA Stage 2 and include any existing building, structures and hard surfaces. Audit needs to be referenced in RMP below.
		Construction Resource Efficiency	3	2		0	Yes	Contractor	4	Prepare a compliant Resource Management Plan (RMP) covering the targets of non-hazardous waste arising from site construction and main contractor to achieve a construction waste resource efficiency benchmark of 6.5 tonnes of construction waste generated per 100m2 GIA.
		Diversion of Resources from Landfill	1	1		0		Contractor	4	Prepare a compliant RMP and divert at least 90% (tonnes) of demolition and 80% (tonnes) non-demolition waste from landfill.
Wst 02	**Recycled Aggregates**	**Pre-requisite: If demolition occurs on site, to encourage the reuse of the site-won material on site complaint Pre-demolition Audit**					Yes	Structural Engineer	4	**As per Wst 01 above.**
		Project Sustainable Aggregate Points	1	0		0		Structural Engineer	4	Identify all aggregate types, quantities and calculate the distance travelled by transport type. Points are awarded using BREEAM Wst 02 calculator.
Wst 03	**Operational Waste**	Operational Waste **Minimum Standard: 1 credit Excellent and Outstanding**	1	1		0	Yes	Architect	4	A dedicated central space for storage of recyclable waste, clearly labelled and accessible to building occupants/facilities operators. A minimum of $2m^2$ for each unit is required.
Wst 04	**Speculative Finishes (Offices only)**	Speculative Floor and Ceiling Finishes	1	1		0		Architect	4	To install floor and ceiling finishes selected by the known occupant or if occupant not known in show area only.
Wst 05	**Adaptation to Climate Change**	Resilience of structure, fabric, building services and renewables installation	1	0		0		Design Team	2	Conduct a climate change adaptation strategy appraisal for structural and fabric resilience by the end of RIBA Stage 2. Carry out risk assessment to identify and evaluate the impact on the building from extreme weather conditions. Provide an update at RIBA Stage 4.
Wst 06	**Design for Disassembly and Adaptability**	Design for Disassembly and Functional Adaptability - Recommendations	1	1	0	0		Design Team	2	Carry out and implement a functional adaptation appraisal at RIBA Stage 2 and developed recommendations and solutions (i.e. alternative building uses, functions, etc.)
		Disassembly and Functional Adaptability – Implementation	1	0	1	0		Design Team	4	Provide an update during RIBA Stage 4, how the recommendations have been implemented i.e. plant replacement, horizontal / vertical expantion, refurbishment potential etc.

WASTE	**TOTAL**	**11**	**6**	**1**	**0**
	% of total score	**7.00%**	**3.82%**	**0.64%**	**0.00%**
	% of each credit	**0.64%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
LAND USE & ECOLOGY										
LE 01	**Site Selection**	Previously Occupied Land	1	1		0		Architect	4	At lest 75% of new development footprint is built on the previously occupied land.
		Contaminated Land	1	0		0		Specialist	4	Specialist's land contamination report and summary details of the implementation plan of the remediation strategy to be developed.
Ecology Route Selection							**Route 2**	Client/Design Team	1	Route 1: Project team member Route 2: Suitably Qualified Ecologist (SQE)
LE 02	**Ecological Risks and Opportunities**	**Pre-requisite: Statutory Obligations**					No	Client/Contractor	4	**The client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.**
		Survey and Evaluation	0	0		0		Desing Team	1	Route 1: Project team member to evaluate site and risk via BREEAM Checklist
		Survey and Evaluation	1	1		0		Ecologist	1	Route 2: SQE appointed to carry out survey and evaluation of the site.
		Determining Ecological Outcomes	1	1		0		Design Team - Route 1 Ecologist - Route 2	2	The first credit achieved. Route 1 and 2 determining ecological outcomes, recommendations and data collection from survey. Evaluation is shared with design team to influence decision-making process.
LE 03	**Managing Impacts on Ecology**	**Prerequisite: Ecological Risks and Opportunities**					No	Client/Contractor	2	**LE 02 has been achieved. The client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.**
		Planning and Measures On-Site	1	1		0		Design Team - Route 1 Ecologist - Route 2	2	Route 1 and 2: Roles and responsibilities to be assigned. Plan and implement site preparation and construction work early; collaborate and implement solutions and measures with stakeholders.
		Managing Negative Impacts	2	2		0		Design Team - Route 1 Ecologist - Route 2	4	Route 1: Negative impacts from site preparation and construction works have been managed according to the hierarchy and no net impact has resulted (1 credit) Route 2: SQE to provide recommendation on avoidance of negative impact of the site preparation and construction works according to the hierarchy and no net impact has resulted (1 or 2 credits).
LE 04	**Ecological Change and Enhancement**	**Prerequisite: Managing Negative Impacts on Ecology**					No	Client/Contractor	2	**LE 03 has been achieved. Roles and responsibilities to be assigned. Site preparation and construction works have been planned. The client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.**
		Change and Enhancement of Ecology	0	0		0		Design Team	4	Route 1: Ecological measure that enhance the site ecological value (1 credit)
		Ecological Enhancement	1	1		0		Ecologist/Design Team	4	Route 2: Project team liaise with stakeholders and implement solutions on site or off site within the zone of influence. (N/A for Route 1)
		Change and Enhancement of Ecology	3	2		0		Ecologist	4	Route 2: SQE to provide calculations of the change in ecological value (up to 3 credits)
LE 05	**Long Term Ecology Management and Maintenance**	**Prerequisite: Statutory Obligations, Planning and Site Implementation**					No	Client/Contractor	2	**LE 03 and LE 04 have been achieved. The client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.**
		Management and Maintenance throughout the Project	1	1		0		Design Team - Route 1 Ecologist - Route 2	4	Route 1 and 2: The optimal ecological outcomes agreed in LE02 are are met in-practice and enhancement measures in LE03 & LE04 are implemented and monitored. A section on Ecology and Biodiversity has been included as part of the tenant or building owner information supplied.
		Landscape and Ecology Management Plan	1	1		0		Landscape Architect/Ecologist	4	Route 2: Landscape and ecology management plan, or similar, is developed in accordance with BS 42020:2013 covering as a minimum the first five years after project completion.

LAND USE & ECOLOGY	**TOTAL**	**13**	**11**	**0**	**0**
	% of total score	**15.00%**	**12.69%**	**0.00%**	**0.00%**
	% of each credit	**1.15%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
POLLUTION										
Pol 01	**Impact of Refrigerants**	**Pre-Requisite: Systems with Electric Compressors**					Yes	M&E Engineer	4	**All systems with electric compressors comply with the requirements of BS EN 378:2016 (parts 2 and 3). Refrigeration systems containing ammonia comply with the Institute of Refrigeration Ammonia Refrigeration Systems code of practice.**
		Impact of Refrigerants	2	1		0		M&E Engineer	4	1 credit where Refrigerant's Direct Effect Life Cycle CO_2 equivalent emissions (DELC CO_2e) of ≤ 1000 $kgCO_2e/kW$ cooling/heating capacity; 2 credits where DELC is ≤ 100 $kgCO_2e/kW$
		Leak Detection	1	0		0		M&E Engineer	4	All systems are hermetically sealed or only use environmentally benign refrigerants or a permanent automated refrigerant leak detection system is required.
Pol 02	**Local Air Quality**	**Is the project required to connect to a District Heating system, and it supplies all heating and hot water demands to the building?**					No	M&E Engineer	4	**When it is required to connect to DH the Local Air Quality credit is N/A.**
		Local Air Quality	2	2		0		M&E Engineer	4	Emissions from all installed combustion plant that provide space heating and domestic hot water do not exceed the gas boilers NOx = 24mg/kWh (2 credits) or 27mg/kWh (1 credit)
Pol 03	**Flood and Surface Water Management**	Flood Resilience	2	1		0		Flood Risk Consultant	4	Site specific Flood Risk Assessment prepared by specialist to confirm that if the site is a low, medium or high probability of flooding from all sources of flooding.
		Surface Water Run Off	2	2		0		Flood Risk Consultant	4	**Surface water run-off design solutions must be bespoke.** Specialist to provide calculation and confirm the proposed attenuation measures, i.e. SUDs. Calculation for rate and volume of surface watr run-off.
		Minimising Watercourse Pollution	1	0		0		Flood Risk Consultant	4	Specialist to confirm there is no discharge from the developed site for rainfall up to 5 mm and the pollution prevention systems are in line with the SUDs requirements.
Pol 04	**Reduction of Night Time Light Pollution**	Reduction of Night Time Light Pollution	1	1		0		M&E Engineer	4	External lighting design is in line with ILP guidance of obtrusive light and can be automatically switched off. Illuminated advertisements are designed in compliance with ILP PLG05 The Brightness of Illuminated Advertisements.
Pol 05	**Reduction of Noise Pollution**	Reduction of Noise Pollution	1	1		0		Acoustician	4	A BS 4142:2014 compliant noise impact assessment to be carried out by Acoustician.

POLLUTION	**TOTAL**	**12**	**8**	**0**	**0**
	% of total score	**9.00%**	**6.00%**	**0.00%**	**0.00%**
	% of each credit	**0.75%**			

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	Achieved	Mandatory	Responsibilities	RIBA Stage	Comments / Actions
EXEMPLARY										
Man 03	**Responsible Construction Practices**	Responsible Construction Practices	1	0	1	0		Contractor	4	Principal contractor achieves score register the site under the Considerate Contractors Scheme (CCS) or Fleet Operator Recognition Scheme (FORS) and achieves score required for targeted credits.
Hea 01	**Visual Comfort**	Daylighting	1	0		0		Daylighting Specialist	4	When relevant building areas exceed good practice daylight factor OR the relevant building areas exceed good practice average and minimum point daylight illuminance criteria.
		Internal and External Lighting Levels, Zoning and Controls	1	0		0		M&E Engineer	4	Lighting in each zone can be manually dimmed down to 20%.
Hea 02	**Indoor Air Quality**	Emissions by Construction Products	0	0		0		Architect	4	All decorative paints and varnishes specified must meet performance standard EU Directive 2004/42/CE and testing standard BS EN ISO 1189-2:2013, Pat2. In addition, all 7 remaining product categories meet testing requirements and emissions levels criteria for Volatile Organic Compound (VOC) Emissions.
Hea 06	**Security**	Security of Site and Building	1	0		0		Security Specialist	4	The performance against the scheme has been confirmed by independent assessment and verification.
Ene 01	**Reduction of Emissions**	Beyond Zero Net Rgulated Carbon and Carbon Negative	5	0		0		Energy Consultant	4	Carbon neutral or carbon negative building is achieved. A calculation of the energy score using the BREEAM Refurbishment and Fit-out energy model must be carried out. This must be assessed against a baseline BRUKL.
		Post Occupancy Stage	2	0		0		Energy Consultant	4	Achieve maximum available credits in Ene 02 and a client or building occupier commits funds to pay for the post occupancy stage. Assessor to be appointed and to report on the actual energy consumption for first 12 months. Remediation action might be required.
Wat 01	**Water Consumption**	Water Consumption	1	0		0		Architect/M&E Engineer	4	Specification of water efficient domestic water-consuming components to reduce the water consumption 65% beyond the baseline. Use the BREEAM Wat 01 calculator to assess the efficiency of sanitary wear including rainwater and greywater harvesting.
Mat 01	**Life Cycle Impacts**	Core Building Services Options Appraisal	1	1		0		LCA Specialist	4	Carry out LCA options of at least 3 signigicatly different core building services.
		LCA and LCC Alignment	1	0		0		LCA Specialist	4	Align LCA and LCC options appraisal activity. Both credits LCA and LCC must be achieved.
		Third Party Verification	1	1		0		LCA Specialist	4	A suitably qualified third party work or verifies the building LCA work and produces a report.
Mat 03	**Responsible Sourcing of Materials**	Responsible Sourcing of Construction Products	1	0		0		Architect/Contractor	4	Achieve 50% of the points available in the Mat 03 calculation through sourcing of main building materials from responsible suppliers.
Wst 01	**Construction Waste Management**	Construction Resource Efficiency and Diversion of Resources from Landfill	1	0		0		Contractor	4	To achieve a construction waste resource efficiency benchmark of 1.6m3 (or 1.9 tonnes) of construction waste generated per 100m2 GIA and divert at least 85% by volume or 90% tonnage of non-demolition waste from landfill and 85%y volume or 95% in tonnage of demolition waste from landfill.
Wst 02	**Recycled Aggregates**	Project Sustainable Aggregate Points	1	0		0		Structural Engineer	4	Identify all aggregate types, quantities and calculate the distance travelled by transport type. Points are awarded using BREEAM Wst 02 calculator.
Wst 05	**Adaptation to Climate Change**	Responding to Climate Change	1	0		0		Design Team	4	Achieved when credits Hea 04 Thermal comfort, 8 credits in Ene 01, Ene 04 Passive analysis, 3 credits in Wat 01, Mat 05 Material degradatin and Pol 03 Flood risk and 2 credits for Surface water run-off credits are achieved.
LE 02	**Ecological Risks and Opportunities**	Wider Site Sustainability	1	0		0		Ecologist	4	Wider sustainability related activities and potential ecosystem service bnefits are considered as part of determining the optimal ecological outcomes for the site.

EXEMPLARY	**TOTAL**	**10**	**2**	**1**	**0**
	% of total score	**10.00%**	**2.00%**	**1.00%**	**0.00%**
	% of each credit	**1.00%**			

APPENDIX III – SAP 10 CONVERSION SHEET

The applicant should complete all the light blue cells including information on the modelled units, the area per unit, the number of units, the baseline energy consumption figures, the TER and the TFEE.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

DEMAND

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - TER WORKSHEET							REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)						REGULATED CO2 EMISSIONS PER UNIT							Fabric Energy Efficiency (FEE)
				Calculated TER 2012 (kgCO2 / m2)	TER Worksheet TER 2012 (kgCO2 / m2)	Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated TER SAP10 (kgCO2 / m2)	Target Fabric Energy Efficiency (TFEE) (kWh/m^2)
	TER Worksheet (Row 4)				TER Worksheet (Row 273)	TER Worksheet (Row 211)		TER Worksheet (Row 219)		TER Worksheet (Row 232)	TER Worksheet (Row 231)	N / A														
1B1B-MF (N)	*39.11*	*21*	*924*	**20.3**	**20.3**	*1103.16*	*Natural Gas*	*1936.14*	*Natural Gas*	*189.26*	*75*		**238**	**418**	**98**	**39**		**794**	**232**	**407**	**44**	**17**		**700**	**17.9**	
1B1B-MF (S)	*39.11*	*7*	*336*	**18.8**	**18.8**	*815.54*	*Natural Gas*	*1949.18*	*Natural Gas*	*189.26*	*75*		**176**	**421**	**98**	**39**		**734**	**171**	**409**	**44**	**17**		**642**	**16.4**	
1B1B-MF (E-W)	*39.11*	*18*	*798*	**19.6**	**19.6**	*974.46*	*Natural Gas*	*1942.19*	*Natural Gas*	*189.26*	*75*		**210**	**420**	**98**	**39**		**767**	**205**	**408**	**44**	**17**		**674**	**17.2**	
1B2B-MF (N)	*49.8*	*36*	*1887*	**18.1**	**18.1**	*1362.85*	*Natural Gas*	*2066.1*	*Natural Gas*	*235.45*	*75*		**294**	**446**	**122**	**39**		**902**	**286**	**434**	**55**	**17**		**792**	**15.9**	
1B2B-MF (S)	*49.8*	*30*	*1581*	**16.7**	**16.7**	*1016.24*	*Natural Gas*	*2080.25*	*Natural Gas*	*235.45*	*75*		**220**	**449**	**122**	**39**		**830**	**213**	**437**	**55**	**17**		**723**	**14.5**	
1B2B-MF (E-W)	*49.8*	*48*	*2499*	**17.5**	**17.5**	*1207.59*	*Natural Gas*	*2072.7*	*Natural Gas*	*235.45*	*75*		**261**	**448**	**122**	**39**		**870**	**254**	**435**	**55**	**17**		**761**	**15.3**	
2B4P-MF (N)	*69.58*	*45*	*3151*	**16.3**	**16.3**	*1880.24*	*Natural Gas*	*2424.25*	*Natural Gas*	*320.98*	*75*		**406**	**524**	**167**	**39**		**1,135**	**395**	**509**	**75**	**17**		**996**	**14.3**	
2B4P-MF (S)	*69.58*	*43*	*2945.5*	**14.9**	**14.9**	*1421.05*	*Natural Gas*	*2440.75*	*Natural Gas*	*320.98*	*75*		**307**	**527**	**167**	**39**		**1,040**	**298**	**513**	**75**	**17**		**903**	**13.0**	
2B4P-MF (E-W)	*69.58*	*47*	*3219.5*	**15.7**	**15.7**	*1674.21*	*Natural Gas*	*2432.02*	*Natural Gas*	*320.98*	*75*		**362**	**525**	**167**	**39**		**1,092**	**352**	**511**	**75**	**17**		**955**	**13.7**	
3B5P-MF (N)	*89.53*	*6*	*630*	**15.3**	**15.3**	*2670.44*	*Natural Gas*	*2583.77*	*Natural Gas*	*375.05*	*75*		**577**	**558**	**195**	**39**		**1,368**	**561**	**543**	**87**	**17**		**1,208**	**13.5**	
3B5P-MF (S)	*89.53*	*8*	*840*	**14.3**	**14.3**	*2254.47*	*Natural Gas*	*2595.3*	*Natural Gas*	*375.05*	*75*		**487**	**561**	**195**	**39**		**1,281**	**473**	**545**	**87**	**17**		**1,123**	**12.5**	
1B1B-TF (N)	*39.11*	*3*	*126*	**22.8**	**22.8**	*1569.93*	*Natural Gas*	*1920.58*	*Natural Gas*	*189.26*	*75*		**339**	**415**	**98**	**39**		**891**	**330**	**403**	**44**	**17**		**795**	**20.3**	
1B1B-TF (E-W)	*39.11*	*4*	*168*	**22.0**	**22.0**	*1424.81*	*Natural Gas*	*1925.68*	*Natural Gas*	*189.26*	*75*		**308**	**416**	**98**	**39**		**861**	**299**	**404**	**44**	**17**		**765**	**19.6**	
1B2B-TF (N)	*49.8*	*9*	*459*	**20.5**	**20.5**	*1927.38*	*Natural Gas*	*2049.49*	*Natural Gas*	*235.45*	*75*		**416**	**443**	**122**	**39**		**1,020**	**405**	**430**	**55**	**17**		**907**	**18.2**	
1B2B-TF (S)	*49.8*	*7*	*357*	**18.9**	**18.9**	*1546.59*	*Natural Gas*	*2060.64*	*Natural Gas*	*235.45*	*75*		**334**	**445**	**122**	**39**		**940**	**325**	**433**	**55**	**17**		**830**	**16.7**	
1B2B-TF (E-W)	*49.8*	*12*	*612*	**19.8**	**19.8**	*1754.8*	*Natural Gas*	*2054.88*	*Natural Gas*	*235.45*	*75*		**379**	**444**	**122**	**39**		**984**	**369**	**432**	**55**	**17**		**872**	**17.5**	
2B4P-TF (N)	*69.58*	*12*	*822*	**18.7**	**18.7**	*2658.02*	*Natural Gas*	*2404.63*	*Natural Gas*	*320.98*	*75*		**574**	**519**	**167**	**39**		**1,299**	**558**	**505**	**75**	**17**		**1,155**	**16.6**	
2B4P-TF (S)	*69.58*	*12*	*822*	**17.2**	**17.2**	*2159.75*	*Natural Gas*	*2417.06*	*Natural Gas*	*320.98*	*75*		**467**	**522**	**167**	**39**		**1,194**	**454**	**508**	**75**	**17**		**1,053**	**15.1**	
2B4P-TF (E-W)	*69.58*	*15*	*1027.5*	**18.0**	**18.0**	*2431.62*	*Natural Gas*	*2410.71*	*Natural Gas*	*320.98*	*75*		**525**	**521**	**167**	**39**		**1,251**	**511**	**506**	**75**	**17**		**1,109**	**15.9**	
3B5P-TF (N)	*89.53*	*2*	*210*	**17.5**	**17.5**	*3616.55*	*Natural Gas*	*2565.22*	*Natural Gas*	*375.05*	*75*		**781**	**554**	**195**	**39**		**1,569**	**759**	**539**	**87**	**17**		**1,403**	**15.7**	
3B5P-TF (S)	*89.53*	*4*	*420*	**16.5**	**16.5**	*3170.06*	*Natural Gas*	*2574.03*	*Natural Gas*	*375.05*	*75*		**685**	**556**	**195**	**39**		**1,474**	**666**	**541**	**87**	**17**		**1,311**	**14.6**	
3B5P-TF (E-W)	*89.53*	*6*	*630*	**16.0**	**16.0**	*2986.04*	*Natural Gas*	*2577.09*	*Natural Gas*	*375.05*	*75*		**645**	**557**	**195**	**39**		**1,435**	**627**	**541**	**87**	**17**		**1,273**	**14.2**	
Sum	**23,579**	**395**	**24,465**	**17.6**	**-**	**634,148**	**N/A**	**886,056**	**N/A**	**109,067**	**29,625**	**0**	**136,976**	**191,388**	**56,606**	**15,375**	**0**	***415,927***	**133,171**	**186,072**	**25,412**	**6,903**	**0**	***365,283***	**15.5**	**0.00**

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) TER - SOURCE: BRUKL OUTPUT							REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) TER - SOURCE: BRUKL.INP or *SIM.CSV FILE			REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) - TER BRUKL			REGULATED CO2 EMISSIONS	
				Calculated TER 2012 (kgCO2 / m2)	BRUKL TER 2012 (kgCO2 / m2)	Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling	Natural Gas	Grid Electricity	2012 CO2 emissions (kgCO2 p.a.)	Natural Gas	Grid Electricity	SAP10 CO2 emissions (kgCO2 p.a.)	BRUKL TER SAP10 (kgCO2 / m2)
													###############	###############		###############	###############		
Amenity Use	*956.76*	*1*	*2343.1*	**27.0**	**27.0**	*24.8*	*Natural Gas*	*0.49*	*Natural Gas*	*15.64*	*19.26*	*7.71*	**25**	**42**	**25,856**	**25**	**42**	**14,343**	**15.0**
Commercial Use	*672.39*	*1*	*3643.1*	**42.4**	**42.4**	*13.88*	*Natural Gas*	*9.33*	*Natural Gas*	*41.69*	*18.69*	*13.53*	**23**	**72**	**28,522**	**23**	**72**	**14,569**	**21.7**
Leisure Use	*322.58*	*1*	*388*	**54.5**	**54.5**	*27.13*	*Natural Gas*	*0*	*Natural Gas*	*15.84*	*62.18*	*18.06*	**27**	**94**	**17,574**	**27**	**94**	**8,879**	**27.5**
Office Building	*7806.55*	*1*	*7806.55*	**25.4**	**25.4**	*12.73*	*Natural Gas*	*15.09*	*Natural Gas*	*19.57*	*11.86*	*6.86*	**28**	**37**	**198,185**	**28**	**37**	**113,529**	**14.5**

Sum	9,758	4	14,181	44.8	-	141,189	141,189	0	0	0	0	0	103	245	N/A	N/A	N/A	*437,179*	103	245	N/A	N/A	N/A	*238,268*	24.4

SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Total Area (m^2)	Calculated TER 2012 ($kgCO_2$ / m2)	-	REGULATED ENERGY CONSUMPTION									REGULATED CO2 EMISSIONS				REGULATED CO2 EMISSIONS PER UNIT	
				Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)			2012 CO_2 emissions ($kgCO_2$ p.a.)				SAP10 CO_2 emissions ($kgCO_2$ p.a.)	Calculated TER SAP10 ($kgCO_2$ / m2)
Sum	38,645	22.1	-	775,337		886,056		109,067	29,625	0			*853,106*				*603,551*	15.6

The applicant should complete all the light blue cells including information on the 'be lean' energy consumption figures, the 'be lean' DER, the DFEE and the regulated energy demand of the 'be lean' scenario.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

DOMESTIC ENERGY DEMAND DATA

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m²)	Number of units	Total area represented by model (m²)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE LEAN' SAP DER WORKSHEET							REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)						REGULATED CO2 EMISSIONS PER UNIT							Fabric Energy Efficiency (FEE)	REGULATED ENERGY DEMAND PER UNIT PER ANNUM (kWh p.a.)				
				Calculated DER 2012 (kgCO2 / m2)	DER Worksheet DER 2012 (kgCO2 / m2)	Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	Space Heating CO2 emissions (kgCO2 p.a.)	Domestic Hot Water CO2 emissions (kgCO2 p.a.)	Lighting CO2 emissions (kgCO2 p.a.)	Auxiliary CO2 emissions (kgCO2 p.a.)	Cooling CO2 emissions (kgCO2 p.a.)	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated DER SAP10 (kgCO2 / m2)	Dwelling Fabric Energy Efficiency (DFEE) (kWh/m²)	Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
					DER Sheet (Row 384)	DER Sheet [(Row 307a) + (Row 367a x 0.01)]	Select fuel type	DER Sheet [(Row 310a) + (Row 367a x 0.01)]	Select fuel type	DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315																			
1B1B-MF (N)	39.11	21	924	19.7	19.7	1053.882353	Natural Gas	1869.839572	Natural Gas	187.83	83.23		228	404	97	43		772	221	393	44	19		677	17.3						
1B1B-MF (S)	39.11	7	336	17.6	17.6	681.7112299	Natural Gas	1869.839572	Natural Gas	187.83	79.75		147	404	97	41		690	143	393	44	19		598	15.3						
1B1B-MF (E-W)	39.11	18	798	18.7	18.7	869.1016043	Natural Gas	1869.839572	Natural Gas	187.83	81.5		188	404	97	42		731	183	393	44	19		638	16.3						
1B2B-MF (N)	49.8	36	1887	17.8	17.8	1306.652406	Natural Gas	2002.31016	Natural Gas	231.03	102.1		282	432	120	53		888	274	420	54	24		773	15.5						
1B2B-MF (S)	49.8	30	1581	16.1	16.1	924.4705882	Natural Gas	2002.31016	Natural Gas	231.03	98.53		200	432	120	51		803	194	420	54	23		691	13.9						
1B2B-MF (E-W)	49.8	48	2499	17.1	17.1	1135.807487	Natural Gas	2002.31016	Natural Gas	231.03	100.5		245	432	120	52		850	239	420	54	23		736	14.8						
2B4P-MF (N)	69.58	45	3151	16.4	16.4	1851.262032	Natural Gas	2368.502674	Natural Gas	311.44	130.11		400	512	162	68		1,141	389	497	73	30		989	14.2						
2B4P-MF (S)	69.58	43	2945.5	14.8	14.8	1339.101604	Natural Gas	2368.502674	Natural Gas	311.44	125.33		289	512	162	65		1,028	281	497	73	29		880	12.7						
2B4P-MF (E-W)	69.58	47	3219.5	15.7	15.7	1622.042781	Natural Gas	2368.502674	Natural Gas	311.44	127.97		350	512	162	66		1,090	341	497	73	30		940	13.5						
3B5P-MF (N)	89.53	6	630	15.1	15.1	2410.716578	Natural Gas	2537.037433	Natural Gas	375.05	170.43		521	548	195	88		1,352	506	533	87	40		1,166	13.0						
3B5P-MF (S)	89.53	8	840	14.0	14.0	1955.764706	Natural Gas	2537.037433	Natural Gas	375.05	166.18		422	548	195	86		1,251	411	533	87	39		1,070	11.9						
1B1B-TF (N)	39.11	3	126	23.9	23.9	1782.663102	Natural Gas	1869.839572	Natural Gas	187.83	90.04		385	404	97	47		933	374	393	44	21		832	21.3						
1B1B-TF (E-W)	39.11	4	168	22.6	22.6	1563.614973	Natural Gas	1869.839572	Natural Gas	187.83	87.99		338	404	97	46		885	328	393	44	21		785	20.1						
1B2B-TF (N)	49.8	9	459	21.9	21.9	2235.219251	Natural Gas	2002.31016	Natural Gas	231.03	110.78		483	432	120	57		1,093	469	420	54	26		970	19.5						
1B2B-TF (S)	49.8	7	357	20.0	20.0	1789.283422	Natural Gas	2002.31016	Natural Gas	231.03	106.61		386	432	120	55		994	376	420	54	25		875	17.6						
1B2B-TF (E-W)	49.8	12	612	21.0	21.0	2032.727273	Natural Gas	2002.31016	Natural Gas	231.03	108.89		439	432	120	57		1,048	427	420	54	25		927	18.6						
2B4P-TF (N)	69.58	12	822	20.5	20.5	3129.957219	Natural Gas	2368.502674	Natural Gas	311.44	142.07		676	512	162	74		1,423	657	497	73	33		1,260	18.1						
2B4P-TF (S)	69.58	12	822	18.6	18.6	2546.941176	Natural Gas	2368.502674	Natural Gas	311.44	136.62		550	512	162	71		1,294	535	497	73	32		1,137	16.3						
2B4P-TF (E-W)	69.58	15	1027.5	19.6	19.6	2864.513369	Natural Gas	2368.502674	Natural Gas	311.44	139.59		619	512	162	72		1,364	602	497	73	33		1,204	17.3						
3B5P-TF (N)	89.53	2	210	18.9	18.9	3964.352941	Natural Gas	2537.037433	Natural Gas	375.05	184.96		856	548	195	96		1,695	833	533	87	43		1,496	16.7						
3B5P-TF (S)	89.53	4	420	17.6	17.6	3443.786096	Natural Gas	2537.037433	Natural Gas	375.05	180.09		744	548	195	93		1,580	723	533	87	42		1,385	15.5						
3B5P-TF (E-W)	89.53	6	630	17.1	17.1	3228.652406	Natural Gas	2537.037433	Natural Gas	375.05	178.08		697	548	195	92		1,532	678	533	87	41		1,340	15.0						
Sum	23,579	395	24,465	17.8	-	639,878	N/A	861,512	N/A	106,703	46,108	0	138,214	186,087	55,379	23,930	0	419,024	134,374	180,918	24,862	10,743	0	364,310	15.5	0.00	0	0	0	0	0

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

NON-DOMESTIC ENERGY DEMAND

Building Use	Area per unit (m²)	Number of units	Total area represented by model (m²)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION BY END USE (kWh/m² p.a.) 'BE LEAN' BER - SOURCE: BRUKL OUTPUT							ATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m² p.a.) 'BE LEAN' BER - SOURCE: BRUKL.INP or *SIM.CS					REGULATED CO2 EMISSIONS PER UNIT							N/A	REGULATED ENERGY DEMAND PER UNIT PER ANNUM (kWh p.a.)				
				Calculated BER 2012 (kgCO2 / m2)	BRUKL BER 2012 (kgCO2 / m2)	Space Heating (kWh/m² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m² p.a.)	Fuel type Domestic Hot Water	Lighting (kWh/m² p.a.)	Auxiliary (kWh/m² p.a.)	Cooling (kWh/m² p.a.)	Natural Gas	Grid Electricity				2012 CO2 emissions (kgCO2 p.a.)	Natural Gas	Grid Electricity				SAP10 CO2 emissions (kgCO2 p.a.)	BRUKL BER SAP10 (kgCO2 / m2)		Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
													############	############					############	############										
Amenity Use	956.76	1	2343.1	21.5	21.5	10.9	Natural Gas	0.48	Natural Gas	9.66	23.14	4.85	11	37				20,580	11	37				10,470	10.9						
Commercial Use	672.39	1	3643.1	35.6	35.6	7.25	Natural Gas	9.08	Natural Gas	24.8	27.21	11.35	16	62				23,930	16	62				11,984	17.8						
Leisure Use	322.58	1	388	45.8	45.8	5.5	Natural Gas	0	Natural Gas	9.79	67.9	10.53	6	86				14,784	6	86				6,838	21.2						
Office Building	7806.55	1	7806.55	21.2	21.2	8.46	Natural Gas	14.69	Natural Gas	11.17	14.93	6	23	31				165,683	23	31				94,747	12.1						
Sum	9,758	4	14,181	37.3	-	83,121	N/A	121,243	N/A	116,275	178,890	62,508	56	216	N/A	N/A	N/A	363,519	56	216				193,543	19.8		0	0	0	0	0

SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Total Area (m²)	Calculated BER 2012 (kgCO2 / m2)	-	REGULATED ENERGY CONSUMPTION							REGULATED CO2 EMISSIONS			REGULATED CO2 EMISSIONS		N/A	REGULATED ENERGY DEMAND PER UNIT PER ANNUM (kWh p.a.)				
				Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)			2012 CO2 emissions (kgCO2 p.a.)				Space Heating (kWh p.a.)	Domestic Hot Water (kWh p.a.)	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
Sum	38,645	20.2	-	722,999	N/A	982,755	N/A	222,978	224,998	62,508			782,543			557,853	14.4	N/A	0	0	0	0	0

The applicant should complete all the light blue cells including information on the 'be clean' energy consumption figures and the 'be clean' DER.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE CLEAN' SAP DER WORKSHEET									REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)								REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.)								
				Calculated DER 2012 (kgCO2 / m2)	DER Worksheet DER 2012 (kgCO2 / m2)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP if applicable	Fuel type CHP if applicable	Total Electricity generated by CHP (-) if applicable	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Lighting	Auxiliary	Cooling	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated DER SAP10 (kgCO2 / m2)
					DER Sheet (Row 384)	DER Sheet [Row 307b ÷ (Row 367b x 0.01)]	Select fuel type	DER Sheet [(Row 310b ÷ (Row 367b x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) ÷ (Row 362 x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) × (Row 361 ÷ 362)]	DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315																	
1B1B-MF (N)	*39.11*	*21*	*924*	**19.7**	**19.7**	*1053.882353*	*Natural Gas*	*1869.839572*	*Natural Gas*				*187.83*	*83.23*		**228**	**404**			**97**	**43**		**772**	**221**	**393**			**44**	**19**		**677**	**17.3**
1B1B-MF (S)	*39.11*	*7*	*336*	**17.6**	**17.6**	*681.7112299*	*Natural Gas*	*1869.839572*	*Natural Gas*				*187.83*	*79.75*		**147**	**404**			**97**	**41**		**690**	**143**	**393**			**44**	**19**		**598**	**15.3**
1B1B-MF (E-W)	*39.11*	*18*	*798*	**18.7**	**18.7**	*869.1016043*	*Natural Gas*	*1869.839572*	*Natural Gas*				*187.83*	*81.5*		**188**	**404**			**97**	**42**		**731**	**183**	**393**			**44**	**19**		**638**	**16.3**
1B2B-MF (N)	*49.8*	*36*	*1887*	**17.8**	**17.8**	*1306.652406*	*Natural Gas*	*2002.31016*	*Natural Gas*				*231.03*	*102.1*		**282**	**432**			**120**	**53**		**888**	**274**	**420**			**54**	**24**		**773**	**15.5**
1B2B-MF (S)	*49.8*	*30*	*1581*	**16.1**	**16.1**	*924.4705882*	*Natural Gas*	*2002.31016*	*Natural Gas*				*231.03*	*98.53*		**200**	**432**			**120**	**51**		**803**	**194**	**420**			**54**	**23**		**691**	**13.9**
1B2B-MF (E-W)	*49.8*	*48*	*2499*	**17.1**	**17.1**	*1135.807487*	*Natural Gas*	*2002.31016*	*Natural Gas*				*231.03*	*100.5*		**245**	**432**			**120**	**52**		**850**	**239**	**420**			**54**	**23**		**736**	**14.8**
2B4P-MF (N)	*69.58*	*45*	*3151*	**16.4**	**16.4**	*1851.262032*	*Natural Gas*	*2368.502674*	*Natural Gas*				*311.44*	*130.11*		**400**	**512**			**162**	**68**		**1,141**	**389**	**497**			**73**	**30**		**989**	**14.2**
2B4P-MF (S)	*69.58*	*43*	*2945.5*	**14.8**	**14.8**	*1339.101604*	*Natural Gas*	*2368.502674*	*Natural Gas*				*311.44*	*125.33*		**289**	**512**			**162**	**65**		**1,028**	**281**	**497**			**73**	**29**		**880**	**12.7**
2B4P-MF (E-W)	*69.58*	*47*	*3219.5*	**15.7**	**15.7**	*1622.042781*	*Natural Gas*	*2368.502674*	*Natural Gas*				*311.44*	*127.97*		**350**	**512**			**162**	**66**		**1,090**	**341**	**497**			**73**	**30**		**940**	**13.5**
3B5P-MF (N)	*89.53*	*6*	*630*	**15.1**	**15.1**	*2410.716578*	*Natural Gas*	*2537.037433*	*Natural Gas*				*375.05*	*170.43*		**521**	**548**			**195**	**88**		**1,352**	**506**	**533**			**87**	**40**		**1,166**	**13.0**
3B5P-MF (S)	*89.53*	*8*	*840*	**14.0**	**14.0**	*1955.764706*	*Natural Gas*	*2537.037433*	*Natural Gas*				*375.05*	*166.18*		**422**	**548**			**195**	**86**		**1,251**	**411**	**533**			**87**	**39**		**1,070**	**11.9**
1B1B-TF (N)	*39.11*	*3*	*126*	**23.9**	**23.9**	*1782.663102*	*Natural Gas*	*1869.839572*	*Natural Gas*				*187.83*	*90.04*		**385**	**404**			**97**	**47**		**933**	**374**	**393**			**44**	**21**		**832**	**21.3**
1B1B-TF (E-W)	*39.11*	*4*	*168*	**22.6**	**22.6**	*1563.614973*	*Natural Gas*	*1869.839572*	*Natural Gas*				*187.83*	*87.99*		**338**	**404**			**97**	**46**		**885**	**328**	**393**			**44**	**21**		**785**	**20.1**
1B2B-TF (N)	*49.8*	*9*	*459*	**21.9**	**21.9**	*2235.219251*	*Natural Gas*	*2002.31016*	*Natural Gas*				*231.03*	*110.78*		**483**	**432**			**120**	**57**		**1,093**	**469**	**420**			**54**	**26**		**970**	**19.5**
1B2B-TF (S)	*49.8*	*7*	*357*	**20.0**	**20.0**	*1789.283422*	*Natural Gas*	*2002.31016*	*Natural Gas*				*231.03*	*106.61*		**386**	**432**			**120**	**55**		**994**	**376**	**420**			**54**	**25**		**875**	**17.6**
1B2B-TF (E-W)	*49.8*	*12*	*612*	**21.0**	**21.0**	*2032.727273*	*Natural Gas*	*2002.31016*	*Natural Gas*				*231.03*	*108.89*		**439**	**432**			**120**	**57**		**1,048**	**427**	**420**			**54**	**25**		**927**	**18.6**
2B4P-TF (N)	*69.58*	*12*	*822*	**20.5**	**20.5**	*3129.957219*	*Natural Gas*	*2368.502674*	*Natural Gas*				*311.44*	*142.07*		**676**	**512**			**162**	**74**		**1,423**	**657**	**497**			**73**	**33**		**1,260**	**18.1**
2B4P-TF (S)	*69.58*	*12*	*822*	**18.6**	**18.6**	*2546.941176*	*Natural Gas*	*2368.502674*	*Natural Gas*				*311.44*	*136.62*		**550**	**512**			**162**	**71**		**1,294**	**535**	**497**			**73**	**32**		**1,137**	**16.3**
2B4P-TF (E-W)	*69.58*	*15*	*1027.5*	**19.6**	**19.6**	*2864.513369*	*Natural Gas*	*2368.502674*	*Natural Gas*				*311.44*	*139.59*		**619**	**512**			**162**	**72**		**1,364**	**602**	**497**			**73**	**33**		**1,204**	**17.3**
3B5P-TF (N)	*89.53*	*2*	*210*	**18.9**	**18.9**	*3964.352941*	*Natural Gas*	*2537.037433*	*Natural Gas*				*375.05*	*184.96*		**856**	**548**			**195**	**96**		**1,695**	**833**	**533**			**87**	**43**		**1,496**	**16.7**
3B5P-TF (S)	*89.53*	*4*	*420*	**17.6**	**17.6**	*3443.786096*	*Natural Gas*	*2537.037433*	*Natural Gas*				*375.05*	*180.09*		**744**	**548**			**195**	**93**		**1,580**	**723**	**533**			**87**	**42**		**1,385**	**15.5**
3B5P-TF (E-W)	*89.53*	*6*	*630*	**17.1**	**17.1**	*3228.652406*	*Natural Gas*	*2537.037433*	*Natural Gas*				*375.05*	*178.08*		**697**	**548**			**195**	**92**		**1,532**	**678**	**533**			**87**	**41**		**1,340**	**15.0**
Sum	**23,579**	**395**	**24,465**	**17.8**	**-**	**639,878**	**N/A**	**861,512**	**N/A**	**0**	**N/A**	**0**	**106,703**	**46,108**	**0**	**138,214**	**186,087**	**0**	**0**	**55,379**	**23,930**	**0**	***419,024***	**134,374**	**180,918**	**0**	**0**	**24,862**	**10,743**	**0**	***364,310***	**15.5**

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK		REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) 'BE CLEAN' BER - SOURCE: BRUKL OUTPUT									REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) 'BE CLEAN' BER - SOURCE: BRUKL.INP or *SIM.CSV FILE								REGULATED CO2 EMISSIONS PER UNIT								
				Calculated BER 2012 (kgCO2 / m2)	BRUKL BER 2012 (kgCO2 / m2)	Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water			Total Electricity generated by CHP (-) if applicable	Lighting	Auxiliary	Cooling	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable			2012 CO2 emissions (kgCO2 p.a.)	Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable			SAP 10 CO2 emissions (kgCO2 p.a.)	BRUKL BER SAP10 (kgCO2 / m2)
Amenity Use	*956.76*	*1*	*2343.1*	**21.5**	**21.5**	*10.9*	*Natural Gas*	*0.48*	*Natural Gas*				*9.66*	*23.14*	*4.85*	**11**	**37**					**20,580**	**11**	**37**					**10,470**	**10.9**
Commercial Use	*672.39*	*1*	*3643.1*	**35.6**	**35.6**	*7.25*	*Natural Gas*	*9.08*	*Natural Gas*				*24.8*	*27.21*	*11.35*	**16**	**62**					**23,930**	**16**	**62**					**11,984**	**17.8**
Leisure Use	*322.58*	*1*	*388*	**45.8**	**45.8**	*5.5*	*Natural Gas*	*0*	*Natural Gas*				*9.79*	*67.9*	*10.53*	**6**	**86**					**14,784**	**6**	**86**					**6,838**	**21.2**
Office Building	*7806.55*	*1*	*7806.55*	**21.2**	**21.2**	*8.46*	*Natural Gas*	*14.69*	*Natural Gas*				*11.17*	*14.93*	*6*	**23**	**31**					**165,683**	**23**	**31**					**94,747**	**12.1**
Sum	**9,758**	**4**	**14,181**	**37.3**	**-**	**83,121**	**N/A**	**121,243**	**N/A**	**N/A**	**N/A**	**0**	**116,275**	**178,890**	**62,508**	**56**	**216**	**0**	**0**			***363,519***	**56**	**216**	**0**	**0**			***193,543***	**19.8**

SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Total Area (m^2)	Calculated BER 2012 (kgCO2 / m2)	-	REGULATED ENERGY CONSUMPTION									REGULATED CO2 EMISSIONS	REGULATED CO2 EMISSIONS PER UNIT	
				Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Space and Domestic Hot Water from CHP (kWh p.a.)	N/A	Electricity generated by CHP (kWh p.a.) if applicable	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	2012 CO2 emissions (kgCO2 p.a.)	SAP 10 CO2 emissions (kgCO2 p.a.)	Calculated BER SAP10 (kgCO2 / m2)
Sum	**38,645**	**20.2**	**-**	**722,999**	**N/A**	**982,755**	**N/A**	**0**	**N/A**	**0**	**222,978**	**224,998**	**62,508**	***782,543***	***557,853***	**14.4**

The applicant should complete all the light blue cells including information on the 'be green' energy consumption figures and the 'be green' DER.

SAP 2012 CO2 PERFORMANCE

SAP10 CO2 PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated DER 2012 (kgCO2 / m2)	VALIDATION CHECK: DER Worksheet DER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE GREEN' SAP DER WORKSHEET: Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space Heating (Heat source 2) if applicable	Fuel type Space Heating	Domestic Hot Water (Heat source 2) if applicable	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP if applicable	Fuel type CHP if applicable	Total Electricity generated by CHP (-) if applicable	Electricity generated by renewable (-) if applicable	Lighting	Auxiliary	Cooling
				DER Sheet (Row 384)		DER Sheet [Row 307b + (Row 367b x 0.01)]	Select fuel type	DER Sheet [Row 310b + (Row 367b x 0.01)]	Select fuel type	DER Sheet [Row 307c + (Row 367c x 0.01)]	Select fuel type	DER Sheet [Row 310c + (Row 367c x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) × (Row 362 x 0.01)]	Select fuel type	DER Sheet [(Row 307a + 310a) × (Row 361 + 362)]	DER Sheet Row 380	DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315
1B1B-MF (N)	39.11	21	924	12.7	12.7	246.345	Grid Electricity	437.075	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			187.83	83.23	
1B1B-MF (S)	39.11	7	336	11.5	11.5	159.35	Grid Electricity	437.075	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			187.83	79.75	
1B1B-MF (E-W)	39.11	18	798	12.1	12.1	203.1525	Grid Electricity	437.075	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			187.83	81.5	
1B2B-MF (N)	49.8	36	1887	11.5	17.8	305.43	Grid Electricity	468.04	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			231.03	102.1	
1B2B-MF (S)	49.8	30	1581	10.6	10.6	216.095	Grid Electricity	468.04	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			231.03	98.53	
1B2B-MF (E-W)	49.8	48	2499	11.1	11.1	265.495	Grid Electricity	468.04	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			231.03	100.5	
2B4P-MF (N)	69.58	45	3151	10.7	10.7	432.7325	Grid Electricity	553.6375	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			311.44	130.11	
2B4P-MF (S)	69.58	43	2945.5	9.7	9.7	313.015	Grid Electricity	553.6375	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			311.44	125.33	
2B4P-MF (E-W)	69.58	47	3219.5	10.2	10.2	379.1525	Grid Electricity	553.6375	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			311.44	127.97	
3B5P-MF (N)	89.53	6	630	9.9	9.9	563.505	Grid Electricity	593.0325	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			375.05	170.43	
3B5P-MF (S)	89.53	8	840	9.2	9.2	457.16	Grid Electricity	593.0325	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			375.05	166.18	
1B1B-TF (N)	39.11	3	126	15.0	15.0	416.6975	Grid Electricity	437.075	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			187.83	90.04	
1B1B-TF (E-W)	39.11	4	168	14.3	14.3	365.495	Grid Electricity	437.075	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			187.83	87.99	
1B2B-TF (N)	49.8	9	459	13.9	13.9	522.4825	Grid Electricity	468.04	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			231.03	110.78	
1B2B-TF (S)	49.8	7	357	12.8	12.8	418.245	Grid Electricity	468.04	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			231.03	106.61	
1B2B-TF (E-W)	49.8	12	612	13.4	13.4	475.15	Grid Electricity	468.04	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			231.03	108.89	
2B4P-TF (N)	69.58	12	822	13.0	13.0	731.6275	Grid Electricity	553.6375	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			311.44	142.07	
2B4P-TF (S)	69.58	12	822	11.9	11.9	595.3475	Grid Electricity	553.6375	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			311.44	136.62	
2B4P-TF (E-W)	69.58	15	1027.5	12.5	12.5	669.58	Grid Electricity	553.6375	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			311.44	139.59	
3B5P-TF (N)	89.53	2	210	12.1	12.1	926.6675	Grid Electricity	593.0325	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			375.05	184.96	
3B5P-TF (S)	89.53	4	420	11.3	11.3	804.985	Grid Electricity	593.0325	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			375.05	180.09	
3B5P-TF (E-W)	89.53	6	630	11.0	17.1	754.6975	Grid Electricity	593.0325	Grid Electricity	0	Grid Electricity	0	Grid Electricity	0	Grid Electricity			375.05	178.08	
Sum	23,579	395	24,465	11.5	-	149,571	N/A	201,378	N/A	0	N/A	0	N/A	0	N/A	0	0	106,703	46,108	0

REGULATED CO2 EMISSIONS PER UNIT (kgCO2 p.a.): Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Electricity generated by renewable if applicable	Lighting	Auxiliary	Cooling	2012 CO2 emissions (kgCO2 p.a.)
128	227	0			97	43		495
83	227	0			97	41		448
105	227	0			97	42		472
159	243	0			120	53		574
112	243	0			120	51		526
138	243	0			120	52		553
225	287	0			162	68		741
162	287	0			162	65		676
197	287	0			162	66		712
292	308	0			195	88		883
237	308	0			195	86		826
216	227	0			97	47		587
190	227	0			97	46		560
271	243	0			120	57		691
217	243	0			120	55		635
247	243	0			120	57		666
380	287	0			162	74		902
309	287	0			162	71		829
348	287	0			162	72		869
481	308	0			195	96		1,079
418	308	0			195	93		1,014
392	308	0			195	92		987
77,628	104,515	0	0	0	55,379	23,930	0	271,427

REGULATED CO2 EMISSIONS PER UNIT: Space Heating	Domestic Hot Water	Space Heating and DHW from CHP if applicable	Electricity generated by CHP if applicable	Electricity generated by renewable if applicable	Lighting	Auxiliary	Cooling	SAP10 CO2 emissions (kgCO2 p.a.)	Calculated DER SAP10 (kgCO2 / m2)
57	102	0			44	19		222	5.7
83	227	0			44	19		448	5.1
47	102	0			44	19		212	5.4
71	109	0			54	24		258	5.2
50	109	0			54	23		236	4.7
62	109	0			54	23		248	5.0
101	129	0			73	30		333	4.8
73	129	0			73	29		304	4.4
88	129	0			73	30		320	4.6
131	138	0			87	40		397	4.4
107	138	0			87	39		371	4.1
97	102	0			44	21		264	6.7
85	102	0			44	21		251	6.4
122	109	0			54	26		310	6.2
97	109	0			54	25		285	5.7
111	109	0			54	25		299	6.0
170	129	0			73	33		405	5.8
139	129	0			73	32		372	5.3
156	129	0			73	33		390	5.6
216	138	0			87	43		485	5.4
188	138	0			87	42		455	5.1
176	138	0			87	41		443	4.9
34,850	46,921	0	0	0	24,862	10,743	0	121,855	5.2

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated BER 2012 (kgCO2 / m2)	VALIDATION CHECK: BRUKL BER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) 'BE GREEN' BER - SOURCE: BRUKL OUTPUT: Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water							Electricity generated by CHP (-) if applicable	Electricity generated by renewable technology (-) if applicable	Lighting	Auxiliary	Cooling
Amenity Use	956.76	1	2343.1	21.0	21.0	3.79	Grid Electricity	0.11	Grid Electricity									9.66	23.14	4.85
Commercial Use	672.39	1	3643.1	29.5	29.5	2.76	Grid Electricity	2.12	Grid Electricity									24.8	27.21	11.35
Leisure Use	322.58	1	388	34.5	34.5	1.29	Grid Electricity	0	Grid Electricity									9.79	67.9	10.53
Office Building	7806.55	1	7806.55	13.6	13.6	4.78	Grid Electricity	3.43	Grid Electricity									11.17	14.93	6
Sum	9,758	4	14,181	28.3	-	43,213	N/A	28,307	N/A							0	0	116,275	178,890	62,508

REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) 'BE GREEN' BER - SOURCE: BRUKL.INP or *SIM.CSV FILE: Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable	Electricity generated by renewable technology (-) if applicable	Enter Carbon Factor 1	Enter Carbon Factor 2	Enter Carbon Factor 3	2012 CO2 emissions (kgCO2 p.a.)
0	41							20,116
0	57							19,847
0	67							11,139
0	39			-13				106,004
0	203	0	0	-13	0	0	0	276,198

REGULATED CO2 EMISSIONS PER UNIT: Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) if applicable	Electricity generated by renewable technology (-) if applicable	Enter Carbon Factor 1	Enter Carbon Factor 2	Enter Carbon Factor 3	SAP10 CO2 emissions	BRUKL BER SAP10 (kgCO2 / m2)
	41							9,031	9.4
	57							8,910	13.3
	67							5,001	15.5
	39			-13				47,589	6.1
0	203	0	0	-13	0	0	0	122,996	12.7

SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Total Area (m^2)	Calculated BER 2012 (kgCO2 / m2)	-	REGULATED CO2 EMISSIONS: Space Heating (kWh p.a.)		Domestic Hot Water (kWh p.a.)		Space Heating (kWh p.a.)		Domestic Hot Water (kWh p.a.)		Space and Domestic Hot Water from CHP (kWh p.a.)		Electricity generated by CHP (kWh p.a.) if applicable	Electricity generated by renewable (kWh p.a.) if applicable	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
Sum	38,645	0.0	-	192,785	N/A	229,686	N/A	0	N/A	0	N/A	0	N/A	0	0	222,978	224,998	62,508

REGULATED CO2 EMISSIONS: Space Heating CO2 emissions	Domestic Hot Water CO2 emissions	Space Heating and DHW from CHP CO2 emissions if applicable	Electricity generated by CHP CO2 savings if applicable	Electricity generated by renewable CO2 savings if applicable	Lighting CO2 emissions	Auxiliary CO2 emissions	Cooling CO2 emissions	2012 CO2 emissions
77,628	104,719	0	0	-13	55,379	23,930	0	547,625

REGULATED CO2 EMISSIONS PER UNIT: Space Heating CO2 emissions	Domestic Hot Water CO2 emissions	Space Heating and DHW from CHP CO2 emissions if applicable	Electricity generated by CHP CO2 savings if applicable	Electricity generated by renewable CO2 savings if applicable	Lighting CO2 emissions	Auxiliary CO2 emissions	Cooling CO2 emissions	SAP10 CO2 emissions	Calculated BER SAP10 (kgCO2 / m2)
34,850	47,124	0	0	-13	24,862	10,743	0	245,851	6.4

SAP 2012 PERFORMANCE

DOMESTIC

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	416	
After energy demand reduction	419	
After heat network / CHP	419	
After renewable energy	271	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	-3	-1%
Savings from heat network / CHP	0	0%
Savings from renewable energy	148	35%
Cumulative on site savings	**144**	**35%**
Annual savings from off-set payment	271	-
	(Tonnes CO2)	
Cumulative savings for off-set payment	**8,143**	-
Cash in-lieu contribution (£)	**488,569**	

NON-DOMESTIC

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	437	
After energy demand reduction	364	
After heat network / CHP	364	
After renewable energy	276	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

SAP10 PERFORMANCE

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	365	
After energy demand reduction	364	
After heat network / CHP	364	
After renewable energy	122	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	1	0%
Savings from heat network / CHP	0	0%
Savings from renewable energy	242	66%
Cumulative on site savings	**243**	**67%**
Annual savings from off-set payment	122	-
	(Tonnes CO2)	
Cumulative savings for off-set payment	**3,656**	-
Cash in-lieu contribution (£)	**219,338**	

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	238	
After energy demand reduction	194	
After heat network / CHP	194	
After renewable energy	124	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	74	17%
Savings from heat network / CHP	0	0%
Savings from renewable energy	87	20%
Total Cumulative Savings	**161**	**37%**

Table 5: Shortfall in regulated carbon dioxide savings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Total Target Savings	**153**	-
Shortfall	-8	-239
Cash in-lieu contribution (£)	**-14,343**	-

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	45	19%
Savings from heat network / CHP	0	0%
Savings from renewable energy	70	29%
Total Cumulative Savings	**114**	**48%**

Table 5: Shortfall in regulated carbon dioxide savings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Total Target Savings	83	-
Shortfall	-31	-926
Cash in-lieu contribution (£)	**-55,581**	-

SITE-WIDE

	Total regulated emissions (Tonnes CO2 / year)	CO2 savings (Tonnes CO2 / year)	Percentage savings (%)
Part L 2013 baseline	853		
Be lean	783	71	8%
Be clean	783	0	0%
Be green	548	235	28%
	-	**CO2 savings off-set (Tonnes CO2)**	-
Off-set	-	**7,904**	-

	Total regulated emissions (Tonnes CO2 / year)	CO2 savings (Tonnes CO2 / year)	Percentage savings (%)
Part L 2013 baseline	604		
Be lean	558	46	8%
Be clean	558	0	0%
Be green	246	312	52%
	-	**CO2 savings off-set (Tonnes CO2)**	-
Off-set	-	**2,729**	-

Building use	Energy demand following energy efficiency measures (MWh/year)						
	Space Heating	Hot Water	Lighting	Auxilary	Cooling	Unregulated electricity	Unregulated gas
Domestic	0	0	0	0	0		
Non-domestic	0	0	0	0	0		

	Target Fabric Energy Efficiency (kWh/m^2)	Dwelling Fabric Energy Efficiency (kWh/m^2)	Improvement (%)
Development total	0.00	0.00	

	Area weighted average non-domestic cooling demand (MJ/m^2)	Total area weighted non-domestic cooling demand (MJ/year)
Actual		
Notional		

APPENDIX IV – PART L SAP SUMMARY FOR EACH STAGE

Block Compliance WorkSheet: Step 1 & Step 2 (Part L)

User Details

Assessor Name: **Stroma Number:**

Software Name: Stroma FSAP **Software Version:** Version: 1.0.5.25

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
1B1B-MF (N) - Step 2	19.74	20.29	35.6	41.2	39.11
1B1B-MF (S) - Step 2	17.64	18.78	26.8	32.9	39.11
1B1B-MF (E-W) - Step 2	18.7	19.62	31.7	37.8	39.11
1B2B-MF (N) - STEP 2	17.82	18.11	32.8	39.6	49.8
1B2B-MF (S) - STEP 2	16.13	16.67	25.8	31.8	49.8
1B2B-MF (E-W) - STEP 2	17.07	17.46	30	36.4	49.8
2B4P-MF (N) - STEP 2	16.39	16.32	31.7	38	69.58
2B4P-MF (S) - STEP 2	14.77	14.94	25.1	30.7	69.58
2B4P-MF (E-W) - STEP 2	15.67	15.7	29	35	69.58
3B6P-MF (N) - STEP 2	15.1	15.29	32.4	40.8	89.53
3B6P-MF (S) - STEP 2	13.98	14.31	28.1	36	89.53
1B1B-TF (N) - STEP 2	23.86	22.78	51.4	53.5	39.11
1B1B-TF (E-W) - Step 2	22.62	22.01	46.8	49.8	39.11
1B2B-TF (N) - STEP 2	21.94	20.48	48.7	51.8	49.8
1B2B-TF (S) - STEP 2	19.96	18.88	40.9	43.4	49.8
1B2B-TF (E-W) - STEP 2	21.04	19.76	45.4	48.2	49.8
2B4P-TF (N) - STEP 2	20.45	18.67	47.5	50.2	69.58
2B4P-TF (S) - STEP 2	18.6	17.16	40.2	42.3	69.58
2B4P-TF (E-W) - STEP 2	19.61	17.99	44.3	46.8	69.58
3B6P-TF (N) - STEP 2	18.93	17.52	47.2	52.3	89.53
3B6P-TF (S) - STEP 2	17.65	16.47	42.4	47.1	89.53

Calculation Summary

Block Compliance WorkSheet: Step 1 & Step 2 (Part L)Cont...

Total Floor Area	1269.95
Average TER	17.56
Average DER	18.04
Average DFEE	37.21
Average TFEE	42.21
Compliance	Fail
% Improvement DER|TER	N/A
% Improvement DFEE|TFEE	N/A

Block Compliance WorkSheet: Step 3

User Details

Assessor Name: **Stroma Number:**

Software Name: Stroma FSAP **Software Version:** Version: 1.0.5.25

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
1B1B-MF (N) - Step 2	12.67	29.52	35.6	41.2	39.11
1B1B-MF (S) - Step 2	11.47	27.17	26.8	32.9	39.11
1B1B-MF (E-W) - Step 2	12.07	28.47	31.7	37.8	39.11
1B2B-MF (N) - STEP 2	17.82	18.11	32.8	39.6	49.8
1B2B-MF (S) - STEP 2	10.56	24.05	25.8	31.8	49.8
1B2B-MF (E-W) - STEP 2	11.1	25.29	30	36.4	49.8
2B4P-MF (N) - STEP 2	10.65	23.67	31.7	38	69.58
2B4P-MF (S) - STEP 2	9.72	21.54	25.1	30.7	69.58
2B4P-MF (E-W) - STEP 2	10.24	22.71	29	35	69.58
3B6P-MF (N) - STEP 2	9.87	22.26	32.4	40.8	89.53
3B6P-MF (S) - STEP 2	9.23	20.74	28.1	36	89.53
1B1B-TF (N) - STEP 2	15.02	33.39	51.4	53.5	39.11
1B1B-TF (E-W) - Step 2	14.31	32.19	46.8	49.8	39.11
1B2B-TF (N) - STEP 2	13.89	29.97	48.7	51.8	49.8
1B2B-TF (S) - STEP 2	12.76	27.49	40.9	43.4	49.8
1B2B-TF (E-W) - STEP 2	13.37	28.85	45.4	48.2	49.8
2B4P-TF (N) - STEP 2	12.97	27.31	47.5	50.2	69.58
2B4P-TF (S) - STEP 2	11.91	24.98	40.2	42.3	69.58
2B4P-TF (E-W) - STEP 2	12.49	26.25	44.3	46.8	69.58
3B6P-TF (N) - STEP 2	12.06	25.73	47.2	52.3	89.53
3B6P-TF (S) - STEP 2	11.32	24.09	42.4	47.1	89.53

Calculation Summary

Block Compliance WorkSheet: Step 3Cont...

Total Floor Area	1269.95
Average TER	25.24
Average DER	11.86
Average DFEE	37.21
Average TFEE	42.21
Compliance	Pass
% Improvement DER|TER	53.01
% Improvement DFEE|TFEE	11.85

APPENDIX V – BRUKLS FOR EACH STAGE

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Resi Leisure- Blocks A C D (Step 2)

As designed

Date: Tue Feb 09 13:00:27 2021

Administrative information

Building Details

Address: Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number: 02074860680

Address: 24 Charlotte Street, London, W1T 2ND

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	54.5
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	54.5
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	45.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"Block 1 - Gym_W_9"
Floor	0.25	0.12	0.12	"Block 1 - Gym_S_3"
Roof	0.25	0.12	0.12	"Block 1 - Gym_R_5"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"Block 1 - Gym_G_10"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Be Lean HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	4.5	-	1.6	0.85
Standard value	0.91*	N/A	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Lean DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Block 1 - Gym	-	-	-	-	-	-	-	0.4	-	-	N/A
Block 1 - Studio 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Block 1 - Studio 2	-	-	-	-	-	-	-	0.4	-	-	N/A

General lighting and display lighting

	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Block 1 - Gym	-	120	-	469
Block 1 - Studio 1	-	120	-	88
Block 1 - Studio 2	-	120	-	62

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Block 1 - Gym	NO (-34.8%)	NO
Block 1 - Studio 1	N/A	N/A
Block 1 - Studio 2	NO (-57.4%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	322.6	322.6
External area [m^2]	591.9	591.9
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	157.53	256.69
Average U-value [W/m^2K]	0.27	0.43
Alpha value* [%]	23.76	16.17

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
100	**C2 Residential Institutions: Universities and colleges**
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	5.5	27.13
Cooling	10.53	18.06
Auxiliary	67.9	62.18
Lighting	9.79	15.84
Hot water	0	0
Equipment*	84.77	84.77
TOTAL**	**93.72**	**123.21**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	183.76	314.07
Primary energy* [kWh/m^2]	270.76	320.68
Total emissions [kg/m^2]	45.8	54.5

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	17.1	166.7	5.5	10.5	67.9	0.86	4.4	0.94	5.5
	Notional	80	234.1	27.1	18.1	62.2	0.82	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"Block 1 - Gym_W_9"
Floor	0.2	0.12	"Block 1 - Gym_S_3"
Roof	0.15	0.12	"Block 1 - Gym_R_5"
Windows, roof windows, and rooflights	1.5	1.2	"Block 1 - Gym_G_10"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Resi Leisure- Blocks A C D (Step 3)

As designed

Date: Tue Feb 09 13:04:34 2021

Administrative information

Building Details

Address: Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number: 02074860680

Address: 24 Charlotte Street, London, W1T 2ND

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	53.2
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	53.2
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	45.3
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"Block 1 - Gym_W_9"
Floor	0.25	0.12	0.12	"Block 1 - Gym_S_3"
Roof	0.25	0.12	0.12	"Block 1 - Gym_R_5"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"Block 1 - Gym_G_10"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Be Green HVAC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4.5	-	1.6	0.85
Standard value	2.5*	N/A	N/A	1.6^	0.5
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Green DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Block 1 - Gym	-	-	-	-	-	-	-	0.4	-	-	N/A
Block 1 - Studio 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Block 1 - Studio 2	-	-	-	-	-	-	-	0.4	-	-	N/A

General lighting and display lighting

	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Block 1 - Gym	-	120	-	469
Block 1 - Studio 1	-	120	-	88
Block 1 - Studio 2	-	120	-	62

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Block 1 - Gym	NO (-34.8%)	NO
Block 1 - Studio 1	N/A	N/A
Block 1 - Studio 2	NO (-57.4%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	322.6	322.6
External area [m^2]	591.9	591.9
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	157.53	256.69
Average U-value [W/m^2K]	0.27	0.43
Alpha value* [%]	23.76	16.17

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
100	**C2 Residential Institutions: Universities and colleges**
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	1.29	9.14
Cooling	10.53	18.06
Auxiliary	67.9	62.18
Lighting	9.79	15.84
Hot water	0	0
Equipment*	84.77	84.77
TOTAL**	**89.5**	**105.22**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	183.76	314.07
Primary energy* [kWh/m^2]	267.9	314.95
Total emissions [kg/m^2]	45.3	53.2

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] Heat pump (electric): ground or water source, [HFT] Electricity, [CFT] Electricity										
	Actual	17.1	166.7	1.3	10.5	67.9	3.7	4.4	4	5.5
	Notional	80	234.1	9.1	18.1	62.2	2.43	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"Block 1 - Gym_W_9"
Floor	0.2	0.12	"Block 1 - Gym_S_3"
Roof	0.15	0.12	"Block 1 - Gym_R_5"
Windows, roof windows, and rooflights	1.5	1.2	"Block 1 - Gym_G_10"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Commercial Units (Step 2)

As designed

Date: Tue Feb 09 12:55:55 2021

Administrative information

Building Details

Address: Kennet Centre, Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	42.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	42.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	35.6
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"G1 TO G4 - Unit G1- Toilet 2_W_6"
Floor	0.25	0.12	0.12	"G1 TO G4 - Unit G1- Toilet 2_S_3"
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"B1 TO B3 - Unit B1_ Shop 1_G_9"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Be Lean BOH

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	-	-	-	-
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					YES

2- Be Lean HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	4.5	-	1.6	0.85
Standard value	0.91*	N/A	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Lean DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
G1 TO G4 - Unit G1- Toilet 2	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G1- Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G2- Toilet 3	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G3- Toilet 4	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G4- Toilet 5	-	-	0.4	-	-	-	-	-	-	-	N/A
B1 TO B3 - Unit B1_ Shop 1	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B1_ Toilet 1	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B1_ Store 1	-	-	-	-	-	-	-	0.5	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
B1 TO B3 - Unit B2_ Food Preparation	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B2_ Restaurant	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B3_ Store 2	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B3_ Shop 2	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B3_ Toilet 3	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B2_ Toilet 2	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G1- Shop 1	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G2- Shop 2	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G3- Restaurant	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G4- Shop 3	-	-	-	-	-	-	-	0.5	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
G1 TO G4 - Unit G1- Store Room	120	-	-	16
G1 TO G4 - Unit G1- Toilet 2	-	120	-	20
G1 TO G4 - Unit G1- Toilet 1	-	120	-	20
G1 TO G4 - Unit G2- Toilet 3	-	120	-	19
G1 TO G4 - Unit G3- Toilet 4	-	120	-	20
G1 TO G4 - Unit G4- Toilet 5	-	120	-	19
B1 TO B3 - Unit B1_ Shop 1	120	-	-	353
B1 TO B3 - Unit B1_ Toilet 1	120	-	-	39
B1 TO B3 - Unit B1_ Store 1	120	-	-	66
B1 TO B3 - Unit B2_ Food Preparation	120	-	-	75
B1 TO B3 - Unit B2_ Restaurant	120	-	-	326
B1 TO B3 - Unit B3_ Store 2	120	-	-	59
B1 TO B3 - Unit B3_ Shop 2	120	-	-	394
B1 TO B3 - Unit B3_ Toilet 3	120	-	-	46
B1 TO B3 - Unit B2_ Toilet 2	120	-	-	46
G1 TO G4 - Unit G1- Shop 1	-	120	120	2355
G1 TO G4 - Unit G2- Shop 2	-	120	120	300
G1 TO G4 - Unit G3- Restaurant	-	120	120	75
G1 TO G4 - Unit G4- Shop 3	-	120	120	293

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B1 TO B3 - Unit B1_ Shop 1	YES (+15.9%)	NO
B1 TO B3 - Unit B1_ Toilet 1	N/A	N/A
B1 TO B3 - Unit B1_ Store 1	N/A	N/A
B1 TO B3 - Unit B2_ Food Preparation	N/A	N/A
B1 TO B3 - Unit B2_ Restaurant	YES (+23.5%)	NO
B1 TO B3 - Unit B3_ Store 2	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B1 TO B3 - Unit B3_ Shop 2	YES (+21.3%)	NO
B1 TO B3 - Unit B3_ Toilet 3	N/A	N/A
B1 TO B3 - Unit B2_ Toilet 2	N/A	N/A
G1 TO G4 - Unit G1- Shop 1	YES (+15.9%)	NO
G1 TO G4 - Unit G2- Shop 2	NO (-26.4%)	NO
G1 TO G4 - Unit G3- Restaurant	NO (-26.4%)	NO
G1 TO G4 - Unit G4- Shop 3	NO (-24.2%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	671.8	671.8
External area [m^2]	1377	1377
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	427.23	572.12
Average U-value [W/m^2K]	0.31	0.42
Alpha value* [%]	15.84	12.68

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

Building Use

% Area	Building Type
60	**A1/A2 Retail/Financial and Professional services**
5	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
34	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	7.25	13.88
Cooling	11.35	13.53
Auxiliary	27.21	18.69
Lighting	24.8	41.69
Hot water	9.08	9.33
Equipment*	32.02	32.02
TOTAL**	**79.69**	**97.13**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	204.73	225.41
Primary energy* [kWh/m^2]	209.57	249.58
Total emissions [kg/m^2]	35.6	42.4

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	89.9	8.6	0	0	0	0	0	0	0
	Notional	99.7	11.8	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Natural Gas, [CFT] Natural Gas										
	Actual	223.5	7.4	78.9	0	9.8	0.79	0	0.94	0
	Notional	372.9	312.6	126.5	0	14.7	0.82	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	18.7	188.6	6	11.9	28.3	0.86	4.4	0.94	5.5
	Notional	35.4	184	12	14.2	19.3	0.82	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"G1 TO G4 - Unit G1- Toilet 2_W_6"
Floor	0.2	0.12	"G1 TO G4 - Unit G1- Toilet 2_S_3"
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	1.2	"B1 TO B3 - Unit B1_ Shop 1_G_9"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Commercial Units (Step 3)

As designed

Date: Tue Feb 09 13:06:53 2021

Administrative information

Building Details

Address: Kennet Centre, Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	41.7
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	41.7
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	34.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"G1 TO G4 - Unit G1- Toilet 2_W_6"
Floor	0.25	0.12	0.12	"G1 TO G4 - Unit G1- Toilet 2_S_3"
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"B1 TO B3 - Unit B1_ Shop 1_G_9"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values $[W/(m^2K)]$
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values $[W/(m^2K)]$
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values $[W/(m^2K)]$

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Be Green BOH

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	-	-	-
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					YES

2- Be Green HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4	4.5	-	1.6	0.85
Standard value	2.5*	N/A	N/A	1.6^	0.5
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Green DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
G1 TO G4 - Unit G1- Toilet 2	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G1- Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G2- Toilet 3	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G3- Toilet 4	-	-	0.4	-	-	-	-	-	-	-	N/A
G1 TO G4 - Unit G4- Toilet 5	-	-	0.4	-	-	-	-	-	-	-	N/A
B1 TO B3 - Unit B1_ Shop 1	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B1_ Toilet 1	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B1_ Store 1	-	-	-	-	-	-	-	0.5	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
B1 TO B3 - Unit B2_ Food Preparation	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B2_ Restaurant	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B3_ Store 2	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B3_ Shop 2	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B3_ Toilet 3	-	-	-	-	-	-	-	0.5	-	-	N/A
B1 TO B3 - Unit B2_ Toilet 2	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G1- Shop 1	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G2- Shop 2	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G3- Restaurant	-	-	-	-	-	-	-	0.5	-	-	N/A
G1 TO G4 - Unit G4- Shop 3	-	-	-	-	-	-	-	0.5	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
G1 TO G4 - Unit G1- Store Room	120	-	-	16
G1 TO G4 - Unit G1- Toilet 2	-	120	-	20
G1 TO G4 - Unit G1- Toilet 1	-	120	-	20
G1 TO G4 - Unit G2- Toilet 3	-	120	-	19
G1 TO G4 - Unit G3- Toilet 4	-	120	-	20
G1 TO G4 - Unit G4- Toilet 5	-	120	-	19
B1 TO B3 - Unit B1_ Shop 1	120	-	-	353
B1 TO B3 - Unit B1_ Toilet 1	120	-	-	39
B1 TO B3 - Unit B1_ Store 1	120	-	-	66
B1 TO B3 - Unit B2_ Food Preparation	120	-	-	75
B1 TO B3 - Unit B2_ Restaurant	120	-	-	326
B1 TO B3 - Unit B3_ Store 2	120	-	-	59
B1 TO B3 - Unit B3_ Shop 2	120	-	-	394
B1 TO B3 - Unit B3_ Toilet 3	120	-	-	46
B1 TO B3 - Unit B2_ Toilet 2	120	-	-	46
G1 TO G4 - Unit G1- Shop 1	-	120	120	2355
G1 TO G4 - Unit G2- Shop 2	-	120	120	300
G1 TO G4 - Unit G3- Restaurant	-	120	120	75
G1 TO G4 - Unit G4- Shop 3	-	120	120	293

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B1 TO B3 - Unit B1_ Shop 1	YES (+15.9%)	NO
B1 TO B3 - Unit B1_ Toilet 1	N/A	N/A
B1 TO B3 - Unit B1_ Store 1	N/A	N/A
B1 TO B3 - Unit B2_ Food Preparation	N/A	N/A
B1 TO B3 - Unit B2_ Restaurant	YES (+23.5%)	NO
B1 TO B3 - Unit B3_ Store 2	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B1 TO B3 - Unit B3_ Shop 2	YES (+21.3%)	NO
B1 TO B3 - Unit B3_ Toilet 3	N/A	N/A
B1 TO B3 - Unit B2_ Toilet 2	N/A	N/A
G1 TO G4 - Unit G1- Shop 1	YES (+15.9%)	NO
G1 TO G4 - Unit G2- Shop 2	NO (-26.4%)	NO
G1 TO G4 - Unit G3- Restaurant	NO (-26.4%)	NO
G1 TO G4 - Unit G4- Shop 3	NO (-24.2%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	671.8	671.8
External area [m^2]	1377	1377
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	427.23	572.12
Average U-value [W/m^2K]	0.31	0.42
Alpha value* [%]	15.84	12.68

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

Building Use

% Area	Building Type
60	**A1/A2 Retail/Financial and Professional services**
5	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
34	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	2.76	6.3
Cooling	11.35	13.53
Auxiliary	27.21	18.69
Lighting	24.8	41.69
Hot water	2.12	3.15
Equipment*	32.02	32.02
TOTAL**	**68.24**	**83.36**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	204.73	225.41
Primary energy* [kWh/m^2]	204.27	244.9
Total emissions [kg/m^2]	34.5	41.7

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	89.9	8.6	0	0	0	0	0	0	0
	Notional	99.7	11.8	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Electricity, [CFT] Natural Gas										
	Actual	223.5	7.4	73.7	0	9.8	0.84	0	1	0
	Notional	372.9	312.6	126.5	0	14.7	0.82	0	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): ground or water source, [HFT] Electricity, [CFT] Electricity										
	Actual	18.7	188.6	1.4	11.9	28.3	3.7	4.4	4	5.5
	Notional	35.4	184	4	14.2	19.3	2.43	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"G1 TO G4 - Unit G1- Toilet 2_W_6"
Floor	0.2	0.12	"G1 TO G4 - Unit G1- Toilet 2_S_3"
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	1.2	"B1 TO B3 - Unit B1_ Shop 1_G_9"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Office Building (Step 2)

As designed

Date: Tue Feb 09 12:59:05 2021

Administrative information

Building Details

Address: Kennet Centre, Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number: 02074860680

Address: 24 Charlotte Street, London, W1T 2ND

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	25.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	25.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"Ground floor - Toilet Block 4_P_8"
Floor	0.25	0.12	0.12	"Ground floor - Toilet Block 4_S_3"
Roof	0.25	0.12	0.12	"Fifth Floor - Corridor 2_R_4"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"Ground floor - Reception lobby_G_5"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

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- Be Lean BOH

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	-	-	-	-
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					YES

2- Be Lean HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	4.5	-	1.6	0.85
Standard value	0.91*	N/A	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Lean DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ground floor - Toilet Block 4	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Locerks 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 5	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Lockers 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 4	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 3	-	-	0.4	-	-	-	-	-	-	-	N/A
First floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
First floor - Toilet Block 1	-	-	0.4	-	-	-	-	-	-	-	N/A
First floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Toilet Block 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Dis. Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Fourth floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Fourth floor - Dis. Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
First Core floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
First Core floor - Toilet Block 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Core floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Core floor - toilet block	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Reception lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground floor - Office Space 2	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground floor - Lift lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground floor - Office Space	-	-	-	-	-	-	-	0.4	-	-	N/A
First floor - Mezzanine office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
First floor - Lifts Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
First floor - Mezzanine office floor 2	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Lifts Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Fourth floor - Office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Fourth floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
Fourth floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Third Floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
Second floor - Office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Second floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
First Core floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
First Core floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Core floor - Reception	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Core floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Ground floor - Stairs 2	-	120	-	29
Ground floor - Service Lift	120	-	-	39
Ground floor - Lift Block	120	-	-	66
Ground floor - Stairs 1	-	120	-	31
Ground floor - Elec. room	120	-	-	31

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Ground floor - Cycle store	120	-	-	44
First floor - Elec. room	120	-	-	35
First floor - Stairs 1	-	120	-	33
First floor - Lift 1	120	-	-	72
First floor - Service Lift	120	-	-	44
First floor - Stairs 2	-	120	-	32
First floor - store	120	-	-	9
Fifth Floor - Lift block	120	-	-	72
Fifth Floor - Elec. room	120	-	-	35
Fifth Floor - Stairs 1	-	120	-	33
Fifth Floor - Stairs 2	-	120	-	32
Fifth Floor - Service Lift	120	-	-	44
Fifth Floor - Services store	120	-	-	9
Fifth Floor - lift block 1	120	-	-	54
Fifth Floor - Stairs	-	120	-	35
Fifth Floor - Store	120	-	-	10
Fourth floor - Elec. room	120	-	-	35
Fourth floor - Stairs 1	-	120	-	33
Fourth floor - Stairs 2	-	120	-	32
Fourth floor - Services store	120	-	-	9
Fourth floor - Store	120	-	-	10
Fourth floor - Stairs	-	120	-	35
Fourth floor - lift block 1	120	-	-	54
Second floor - Services store	120	-	-	9
First Core floor - lift block	120	-	-	54
First Core floor - Stairs	-	120	-	35
First Core floor - Store	120	-	-	10
Ground Core floor - Lift block	120	-	-	51
Ground Core floor - Stairs	-	120	-	32
Ground Core floor - Store	120	-	-	9
Ground floor - Toilet Block 4	-	120	-	27
Ground floor - Locerks 1	-	120	-	55
Ground floor - Toilet Block 2	-	120	-	27
Ground floor - Corridor 1	-	120	-	91
Ground floor - Toilet Block 5	-	120	-	93
Ground floor - Service Lift Lobby	-	120	-	21
Ground floor - Corridor 2	-	120	-	66
Ground floor - Lockers lobby	-	120	-	27
Ground floor - Lockers 2	-	120	-	56
Ground floor - Toilet Block 4	-	120	-	28
Ground floor - Toilet Block 3	-	120	-	28
First floor - Corridor 1	-	120	-	39
First floor - Corridor 2	-	120	-	41

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
First floor - Service Lift lobby	-	120	-	23
First floor - Toilet Block 2	-	120	-	63
First floor - Toilet Block 1	-	120	-	63
First floor - Toilets lobby	-	120	-	17
First floor - Dis. Toilet	-	120	-	29
Fifth Floor - Corridor 2	-	120	-	41
Fifth Floor - Toilet Block 1	-	120	-	63
Fifth Floor - Corridor	-	120	-	39
Fifth Floor - Service Lift lobby	-	120	-	23
Fifth Floor - Dis. Toilet	-	120	-	29
Fifth Floor - Toilets lobby	-	120	-	17
Fifth Floor - Toilet Block 2	-	120	-	63
Fifth Floor - Dis. Toilet 1	-	120	-	25
Fifth Floor - Toilet Block 2	-	120	-	40
Fourth floor - Corridor	-	120	-	39
Fourth floor - Corridor 2	-	120	-	41
Fourth floor - Toilet Block 2	-	120	-	40
Fourth floor - Dis. Toilet 1	-	120	-	25
First Core floor - Dis. Toilet	-	120	-	25
First Core floor - Toilet Block 1	-	120	-	40
Ground Core floor - Dis. Toilet	-	120	-	24
Ground Core floor - toilet block	-	120	-	36
Ground floor - Reception lobby	-	120	120	430
Ground floor - Office Space 2	120	-	-	810
Ground floor - Lift lobby	-	120	-	38
Ground floor - Office Space	120	-	-	1564
First floor - Mezzanine office floor 1	120	-	-	1156
First floor - Lifts Lobby	-	120	-	47
First floor - Mezzanine office floor 2	120	-	-	969
Fifth Floor - Office floor 1	120	-	-	1781
Fifth Floor - Office floor	120	-	-	3063
Fifth Floor - Lifts Lobby	-	120	-	47
Fifth Floor - Lobby	-	120	-	61
Fourth floor - Office floor 1	120	-	-	1781
Fourth floor - Office floor	120	-	-	4337
Fourth floor - Lobby	-	120	-	61
Third Floor - Office floor	120	-	-	4337
Second floor - Office floor 1	120	-	-	1781
Second floor - Office floor	120	-	-	4337
First Core floor - Office floor	120	-	-	379
First Core floor - Lobby	-	120	-	61
Ground Core floor - Reception	-	120	120	141
Ground Core floor - Lobby	-	120	-	57

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground floor - Reception lobby	YES (+43.4%)	NO
Ground floor - Office Space 2	N/A	N/A
Ground floor - Lift lobby	N/A	N/A
Ground floor - Office Space	YES (+56.7%)	NO
First floor - Mezzanine office floor 1	NO (-15%)	NO
First floor - Lifts Lobby	N/A	N/A
First floor - Mezzanine office floor 2	NO (-49.7%)	NO
Fifth Floor - Office floor 1	YES (+8.4%)	NO
Fifth Floor - Office floor	YES (+1.5%)	NO
Fifth Floor - Lifts Lobby	N/A	N/A
Fifth Floor - Lobby	N/A	N/A
Fourth floor - Office floor 1	YES (+8.4%)	NO
Fourth floor - Office floor	NO (-5.8%)	NO
Fourth floor - Lobby	N/A	N/A
Third Floor - Office floor	NO (-5.8%)	NO
Second floor - Office floor 1	YES (+8.4%)	NO
Second floor - Office floor	YES (+16%)	NO
First Core floor - Office floor	NO (-3.7%)	NO
First Core floor - Lobby	N/A	N/A
Ground Core floor - Reception	YES (+69.2%)	NO
Ground Core floor - Lobby	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	7632.1	7632.1
External area [m^2]	12294.7	12294.7
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	3355.47	4706.52
Average U-value [W/m^2K]	0.27	0.38
Alpha value* [%]	11.48	8.89

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	8.46	12.77
Cooling	6	6.86
Auxiliary	14.93	11.86
Lighting	11.17	19.57
Hot water	14.69	15.09
Equipment*	40.73	40.73
TOTAL**	**55.25**	**66.16**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	130.58	142.05
Primary energy* [kWh/m^2]	124.31	148.62
Total emissions [kg/m^2]	21.2	25.4

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	99.1	1.1	0	0	0	0	0	0	0
	Notional	136.7	8	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Natural Gas, [CFT] Natural Gas										
	Actual	113.9	7.6	40.2	0	3.6	0.79	0	0.94	0
	Notional	132.4	15.9	44.9	0	5.4	0.82	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	17.2	118.1	5.5	7.5	18.1	0.86	4.4	0.94	5.5
	Notional	30.4	110.5	10.3	8.5	14.1	0.82	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"Ground floor - Toilet Block 4_P_8"
Floor	0.2	0.12	"Ground floor - Toilet Block 4_S_3"
Roof	0.15	0.12	"Fifth Floor - Corridor 2_R_4"
Windows, roof windows, and rooflights	1.5	1.2	"Ground floor - Reception lobby_G_5"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Office Building (Step 3)

As designed

Date: Mon Mar 01 16:19:47 2021

Administrative information

Building Details

Address: Kennet Centre, Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number: 02074860680

Address: 24 Charlotte Street, London, W1T 2ND

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	24.8
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	24.8
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	13.6
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"Ground floor - Toilet Block 4_P_8"
Floor	0.25	0.12	0.12	"Ground floor - Toilet Block 4_S_3"
Roof	0.25	0.12	0.12	"Fifth Floor - Corridor 2_R_4"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"Ground floor - Reception lobby_G_5"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

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- Be Green BOH

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	-	-	-
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					YES

2- Be Green HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4	4.5	-	1.6	0.85
Standard value	2.5*	N/A	N/A	1.6^	0.5
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Green DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ground floor - Toilet Block 4	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Locerks 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 5	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Lockers 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 4	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Toilet Block 3	-	-	0.4	-	-	-	-	-	-	-	N/A
First floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
First floor - Toilet Block 1	-	-	0.4	-	-	-	-	-	-	-	N/A
First floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Toilet Block 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Dis. Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Fifth Floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Fourth floor - Toilet Block 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Fourth floor - Dis. Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
First Core floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
First Core floor - Toilet Block 1	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Core floor - Dis. Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Core floor - toilet block	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground floor - Reception lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground floor - Office Space 2	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground floor - Lift lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground floor - Office Space	-	-	-	-	-	-	-	0.4	-	-	N/A
First floor - Mezzanine office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
First floor - Lifts Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
First floor - Mezzanine office floor 2	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Lifts Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Fifth Floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Fourth floor - Office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Fourth floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
Fourth floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Third Floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
Second floor - Office floor 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Second floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
First Core floor - Office floor	-	-	-	-	-	-	-	0.4	-	-	N/A
First Core floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Core floor - Reception	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Core floor - Lobby	-	-	-	-	-	-	-	0.4	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Ground floor - Stairs 2	-	120	-	29
Ground floor - Service Lift	120	-	-	39
Ground floor - Lift Block	120	-	-	66
Ground floor - Stairs 1	-	120	-	31
Ground floor - Elec. room	120	-	-	31

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Ground floor - Cycle store	120	-	-	44
First floor - Elec. room	120	-	-	35
First floor - Stairs 1	-	120	-	33
First floor - Lift 1	120	-	-	72
First floor - Service Lift	120	-	-	44
First floor - Stairs 2	-	120	-	32
First floor - store	120	-	-	9
Fifth Floor - Lift block	120	-	-	72
Fifth Floor - Elec. room	120	-	-	35
Fifth Floor - Stairs 1	-	120	-	33
Fifth Floor - Stairs 2	-	120	-	32
Fifth Floor - Service Lift	120	-	-	44
Fifth Floor - Services store	120	-	-	9
Fifth Floor - lift block 1	120	-	-	54
Fifth Floor - Stairs	-	120	-	35
Fifth Floor - Store	120	-	-	10
Fourth floor - Elec. room	120	-	-	35
Fourth floor - Stairs 1	-	120	-	33
Fourth floor - Stairs 2	-	120	-	32
Fourth floor - Services store	120	-	-	9
Fourth floor - Store	120	-	-	10
Fourth floor - Stairs	-	120	-	35
Fourth floor - lift block 1	120	-	-	54
Second floor - Services store	120	-	-	9
First Core floor - lift block	120	-	-	54
First Core floor - Stairs	-	120	-	35
First Core floor - Store	120	-	-	10
Ground Core floor - Lift block	120	-	-	51
Ground Core floor - Stairs	-	120	-	32
Ground Core floor - Store	120	-	-	9
Ground floor - Toilet Block 4	-	120	-	27
Ground floor - Locerks 1	-	120	-	55
Ground floor - Toilet Block 2	-	120	-	27
Ground floor - Corridor 1	-	120	-	91
Ground floor - Toilet Block 5	-	120	-	93
Ground floor - Service Lift Lobby	-	120	-	21
Ground floor - Corridor 2	-	120	-	66
Ground floor - Lockers lobby	-	120	-	27
Ground floor - Lockers 2	-	120	-	56
Ground floor - Toilet Block 4	-	120	-	28
Ground floor - Toilet Block 3	-	120	-	28
First floor - Corridor 1	-	120	-	39
First floor - Corridor 2	-	120	-	41

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
First floor - Service Lift lobby	-	120	-	23
First floor - Toilet Block 2	-	120	-	63
First floor - Toilet Block 1	-	120	-	63
First floor - Toilets lobby	-	120	-	17
First floor - Dis. Toilet	-	120	-	29
Fifth Floor - Corridor 2	-	120	-	41
Fifth Floor - Toilet Block 1	-	120	-	63
Fifth Floor - Corridor	-	120	-	39
Fifth Floor - Service Lift lobby	-	120	-	23
Fifth Floor - Dis. Toilet	-	120	-	29
Fifth Floor - Toilets lobby	-	120	-	17
Fifth Floor - Toilet Block 2	-	120	-	63
Fifth Floor - Dis. Toilet 1	-	120	-	25
Fifth Floor - Toilet Block 2	-	120	-	40
Fourth floor - Corridor	-	120	-	39
Fourth floor - Corridor 2	-	120	-	41
Fourth floor - Toilet Block 2	-	120	-	40
Fourth floor - Dis. Toilet 1	-	120	-	25
First Core floor - Dis. Toilet	-	120	-	25
First Core floor - Toilet Block 1	-	120	-	40
Ground Core floor - Dis. Toilet	-	120	-	24
Ground Core floor - toilet block	-	120	-	36
Ground floor - Reception lobby	-	120	120	430
Ground floor - Office Space 2	120	-	-	810
Ground floor - Lift lobby	-	120	-	38
Ground floor - Office Space	120	-	-	1564
First floor - Mezzanine office floor 1	120	-	-	1156
First floor - Lifts Lobby	-	120	-	47
First floor - Mezzanine office floor 2	120	-	-	969
Fifth Floor - Office floor 1	120	-	-	1781
Fifth Floor - Office floor	120	-	-	3063
Fifth Floor - Lifts Lobby	-	120	-	47
Fifth Floor - Lobby	-	120	-	61
Fourth floor - Office floor 1	120	-	-	1781
Fourth floor - Office floor	120	-	-	4337
Fourth floor - Lobby	-	120	-	61
Third Floor - Office floor	120	-	-	4337
Second floor - Office floor 1	120	-	-	1781
Second floor - Office floor	120	-	-	4337
First Core floor - Office floor	120	-	-	379
First Core floor - Lobby	-	120	-	61
Ground Core floor - Reception	-	120	120	141
Ground Core floor - Lobby	-	120	-	57

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground floor - Reception lobby	YES (+43.4%)	NO
Ground floor - Office Space 2	N/A	N/A
Ground floor - Lift lobby	N/A	N/A
Ground floor - Office Space	YES (+56.7%)	NO
First floor - Mezzanine office floor 1	NO (-15%)	NO
First floor - Lifts Lobby	N/A	N/A
First floor - Mezzanine office floor 2	NO (-49.7%)	NO
Fifth Floor - Office floor 1	YES (+8.4%)	NO
Fifth Floor - Office floor	YES (+1.5%)	NO
Fifth Floor - Lifts Lobby	N/A	N/A
Fifth Floor - Lobby	N/A	N/A
Fourth floor - Office floor 1	YES (+8.4%)	NO
Fourth floor - Office floor	NO (-5.8%)	NO
Fourth floor - Lobby	N/A	N/A
Third Floor - Office floor	NO (-5.8%)	NO
Second floor - Office floor 1	YES (+8.4%)	NO
Second floor - Office floor	YES (+16%)	NO
First Core floor - Office floor	NO (-3.7%)	NO
First Core floor - Lobby	N/A	N/A
Ground Core floor - Reception	YES (+69.2%)	NO
Ground Core floor - Lobby	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	7632.1	7632.1
External area [m^2]	12294.7	12294.7
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	3355.47	4706.52
Average U-value [W/m^2K]	0.27	0.38
Alpha value* [%]	11.48	8.89

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	4.78	7.27
Cooling	6	6.86
Auxiliary	14.93	11.86
Lighting	11.17	19.57
Hot water	3.43	5.09
Equipment*	40.73	40.73
TOTAL**	**40.31**	**50.65**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	13.09	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	130.58	142.05
Primary energy* [kWh/m^2]	120.66	143.14
Total emissions [kg/m^2]	13.6	24.8

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	99.1	1.1	0	0	0	0	0	0	0
	Notional	136.7	8	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Electricity, [CFT] Natural Gas										
	Actual	113.9	7.6	37.6	0	3.6	0.84	0	1	0
	Notional	132.4	15.9	44.9	0	5.4	0.82	0	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): ground or water source, [HFT] Electricity, [CFT] Electricity										
	Actual	17.2	118.1	1.3	7.5	18.1	3.7	4.4	4	5.5
	Notional	30.4	110.5	3.5	8.5	14.1	2.43	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"Ground floor - Toilet Block 4_P_8"
Floor	0.2	0.12	"Ground floor - Toilet Block 4_S_3"
Roof	0.15	0.12	"Fifth Floor - Corridor 2_R_4"
Windows, roof windows, and rooflights	1.5	1.2	"Ground floor - Reception lobby_G_5"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Resi Amenity-Blocks A C D (Step 2)

As designed

Date: Tue Feb 09 12:40:09 2021

Administrative information

Building Details

Address: Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number: 02074860680

Address: 24 Charlotte Street, London, W1T 2ND

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	27
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	27
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"Ground Floor - Circulation_P_6"
Floor	0.25	0.12	0.12	"Ground Floor - Toilet 2_S_3"
Roof	0.25	0.12	0.12	"Ground Floor - Amenity 1_R_4"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"Ground Floor - Reception_G_8"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

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- Be Lean BOH

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	-	-	-	-
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					YES

2- Be Lean HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.94	4.5	-	1.6	0.85
Standard value	0.91*	N/A	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Lean DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ground Floor - Toilet 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 5	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 6	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 4	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 3	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
First Floor - Toilets	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
First Floor - Disabled Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Reception	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Amenity 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Parcel-Post Room	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Staff	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Amenity 2	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Control Room	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Office	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Amenity	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Meeting Room 2	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Meeting Room 3	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Meeting Room 1	-	-	-	-	-	-	-	0.4	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
First Floor - Store	120	-	-	4
Ground Floor - Toilet 2	-	120	-	52
Ground Floor - Circulation	-	120	-	37
Ground Floor - Toilet	-	120	-	33
Ground Floor - Toilet 5	-	120	-	22
Ground Floor - Toilet 6	-	120	-	26
Ground Floor - Toilet 4	-	120	-	22
Ground Floor - Toilet 3	-	120	-	21
Ground Floor - Toilet 1	-	120	-	51
First Floor - Toilets	-	120	-	50
First Floor - Disabled Toilet	-	120	-	17
Ground Floor - Reception	-	120	120	274
Ground Floor - Amenity 1	-	120	-	339
Ground Floor - Parcel-Post Room	120	-	-	62
Ground Floor - Staff	120	-	-	146
Ground Floor - Amenity 2	-	120	-	484
Ground Floor - Control Room	120	-	-	113
Ground Floor - Office	120	-	-	175
First Floor - Amenity	-	120	-	253
First Floor - Meeting Room 2	120	-	-	121
First Floor - Meeting Room 3	120	-	-	131
First Floor - Meeting Room 1	120	-	-	122

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Reception	YES (+28.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Amenity 1	NO (-16.1%)	NO
Ground Floor - Parcel-Post Room	N/A	N/A
Ground Floor - Staff	N/A	N/A
Ground Floor - Amenity 2	NO (-45.4%)	NO
Ground Floor - Control Room	N/A	N/A
Ground Floor - Office	N/A	N/A
First Floor - Amenity	N/A	N/A
First Floor - Meeting Room 2	N/A	N/A
First Floor - Meeting Room 3	N/A	N/A
First Floor - Meeting Room 1	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	956.8	956.8
External area [m^2]	1413.4	1413.4
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	405.08	643.43
Average U-value [W/m^2K]	0.29	0.46
Alpha value* [%]	15.89	14.53

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
100	**C2 Residential Institutions: Universities and colleges**
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	10.9	24.8
Cooling	4.85	7.71
Auxiliary	23.14	19.26
Lighting	9.66	15.64
Hot water	0.48	0.49
Equipment*	28.65	28.65
TOTAL**	**49.03**	**67.89**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	113.43	180.73
Primary energy* [kWh/m^2]	126.58	158.38
Total emissions [kg/m^2]	21.5	27

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	145.4	0.1	0	0	0	0	0	0	0
	Notional	138.2	1.3	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Natural Gas, [CFT] Natural Gas										
	Actual	61.2	33.9	21.6	0	6.6	0.79	0	0.94	0
	Notional	93.2	88.9	31.6	0	9.8	0.82	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	31	83.9	10	5.3	24.7	0.86	4.4	0.94	5.5
	Notional	71.5	109.2	24.3	8.4	20.2	0.82	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"Ground Floor - Circulation_P_6"
Floor	0.2	0.12	"Ground Floor - Toilet 2_S_3"
Roof	0.15	0.12	"Ground Floor - Amenity 1_R_4"
Windows, roof windows, and rooflights	1.5	1.2	"Ground Floor - Reception_G_8"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Resi Amenity-Blocks A C D (Step 3)

As designed

Date: Tue Feb 09 13:02:56 2021

Administrative information

Building Details

Address: Kennet Centre, Newbury,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Envision

Telephone number: 02074860680

Address: 24 Charlotte Street, London, W1T 2ND

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	26.3
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	26.3
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	"Ground Floor - Circulation_P_6"
Floor	0.25	0.12	0.12	"Ground Floor - Toilet 2_S_3"
Roof	0.25	0.12	0.12	"Ground Floor - Amenity 1_R_4"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"Ground Floor - Reception_G_8"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

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- Be Green BOH

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	-	-	-
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					YES

2- Be Green HVAC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4	4.5	-	1.6	0.85
Standard value	2.5*	N/A	N/A	1.6^	0.5
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- Be Green DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ground Floor - Toilet 2	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 5	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 6	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 4	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 3	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Toilet 1	-	-	0.4	-	-	-	-	-	-	-	N/A
First Floor - Toilets	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
First Floor - Disabled Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
Ground Floor - Reception	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Amenity 1	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Parcel-Post Room	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Staff	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Amenity 2	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Control Room	-	-	-	-	-	-	-	0.4	-	-	N/A
Ground Floor - Office	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Amenity	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Meeting Room 2	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Meeting Room 3	-	-	-	-	-	-	-	0.4	-	-	N/A
First Floor - Meeting Room 1	-	-	-	-	-	-	-	0.4	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
First Floor - Store	120	-	-	4
Ground Floor - Toilet 2	-	120	-	52
Ground Floor - Circulation	-	120	-	37
Ground Floor - Toilet	-	120	-	33
Ground Floor - Toilet 5	-	120	-	22
Ground Floor - Toilet 6	-	120	-	26
Ground Floor - Toilet 4	-	120	-	22
Ground Floor - Toilet 3	-	120	-	21
Ground Floor - Toilet 1	-	120	-	51
First Floor - Toilets	-	120	-	50
First Floor - Disabled Toilet	-	120	-	17
Ground Floor - Reception	-	120	120	274
Ground Floor - Amenity 1	-	120	-	339
Ground Floor - Parcel-Post Room	120	-	-	62
Ground Floor - Staff	120	-	-	146
Ground Floor - Amenity 2	-	120	-	484
Ground Floor - Control Room	120	-	-	113
Ground Floor - Office	120	-	-	175
First Floor - Amenity	-	120	-	253
First Floor - Meeting Room 2	120	-	-	121
First Floor - Meeting Room 3	120	-	-	131
First Floor - Meeting Room 1	120	-	-	122

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Reception	YES (+28.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Amenity 1	NO (-16.1%)	NO
Ground Floor - Parcel-Post Room	N/A	N/A
Ground Floor - Staff	N/A	N/A
Ground Floor - Amenity 2	NO (-45.4%)	NO
Ground Floor - Control Room	N/A	N/A
Ground Floor - Office	N/A	N/A
First Floor - Amenity	N/A	N/A
First Floor - Meeting Room 2	N/A	N/A
First Floor - Meeting Room 3	N/A	N/A
First Floor - Meeting Room 1	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	956.8	956.8
External area [m^2]	1413.4	1413.4
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	405.08	643.43
Average U-value [W/m^2K]	0.29	0.46
Alpha value* [%]	15.89	14.53

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
100	**C2 Residential Institutions: Universities and colleges**
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	3.79	10.08
Cooling	4.85	7.71
Auxiliary	23.14	19.26
Lighting	9.66	15.64
Hot water	0.11	0.17
Equipment*	28.65	28.65
TOTAL**	**41.55**	**52.85**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	113.43	180.73
Primary energy* [kWh/m^2]	124.38	153.28
Total emissions [kg/m^2]	21	26.3

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	145.4	0.1	0	0	0	0	0	0	0
	Notional	138.2	1.3	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Electricity, [CFT] Natural Gas										
	Actual	61.2	33.9	20.2	0	6.6	0.84	0	1	0
	Notional	93.2	88.9	31.6	0	9.8	0.82	0	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): ground or water source, [HFT] Electricity, [CFT] Electricity										
	Actual	31	83.9	2.3	5.3	24.7	3.7	4.4	4	5.5
	Notional	71.5	109.2	8.2	8.4	20.2	2.43	3.6	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

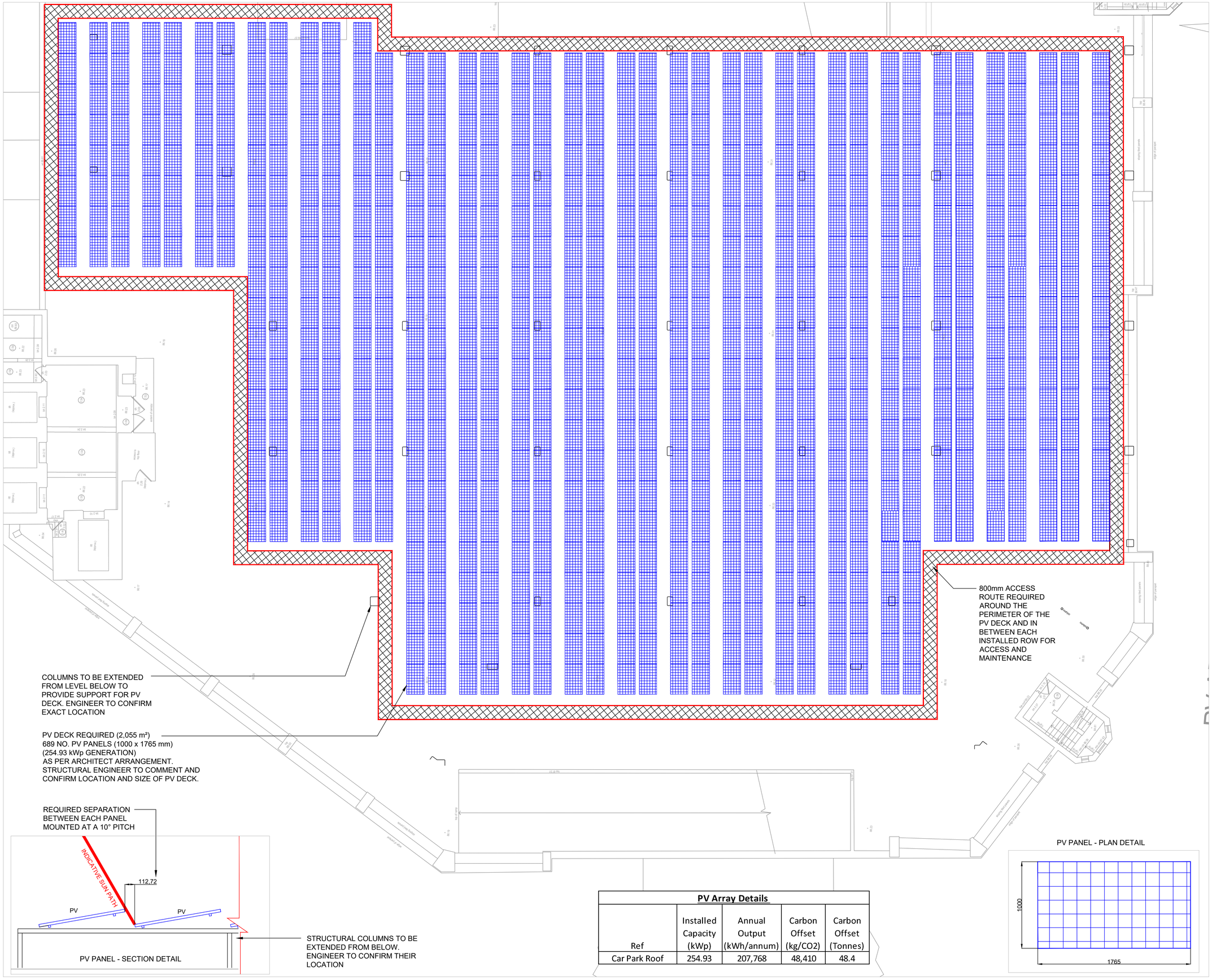
Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	"Ground Floor - Circulation_P_6"
Floor	0.2	0.12	"Ground Floor - Toilet 2_S_3"
Roof	0.15	0.12	"Ground Floor - Amenity 1_R_4"
Windows, roof windows, and rooflights	1.5	1.2	"Ground Floor - Reception_G_8"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

APPENDIX VI – PV LAYOUT DRAWING



PV Array Details

Ref	Installed Capacity (kWp)	Annual Output (kWh/annum)	Carbon Offset (kg/CO2)	Carbon Offset (Tonnes)
Car Park Roof	254.93	207,768	48,410	48.4

Notes

The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor is to comply in all respects with current Building Legislation, British Standard Specifications, Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated on this drawing. This drawing must be read with and checked against all relevant Engineers and Architects drawings and all other specialist documentation provided.

Sketch proposals are for illustrative purposes only & as such are subject to detailed site investigation including ground conditions / contaminants, drainage, design & planning / density negotiations. Sketch proposals may be based upon enlargements of OS sheets & visual estimations of existing site features, accuracy will therefore need to be verified by survey. Sketch proposals have not been considered in respect of CDM Regulations.

Do not scale. Work to given dimensions only.

This drawing is a single service drawing showing the concept design that has been co-ordinated with the structure and other building services installations. This drawing is not a co-ordinated working/installation drawing and should not be used as such. Any contractor using this drawing as a working/installation drawing does so at his own risk.

KEY

PV PANEL

AVAILABLE ROOF AREA

ACCESS AND MAINTENANCE WALKWAY

AOV / ROOF ACCESS

NORTH POINT

Status

- ☐ Preliminary
- ☐ For Information
- ☐ For Record Purposes
- ☒ For Comment
- ☐ For Tender
- ☐ For Approval
- ☐ For Contract

Revision	Ref	Details	Rev.by	Chk'd	Date
	A	Issued For Comment	HS	IP	23-02-21
	B	Updated In Line With Architects Comments	HS	IP	01-03-21

Client: LOCHAILORT BUILDING COMMUNITIES

Project: Eagle Quarter Newbury

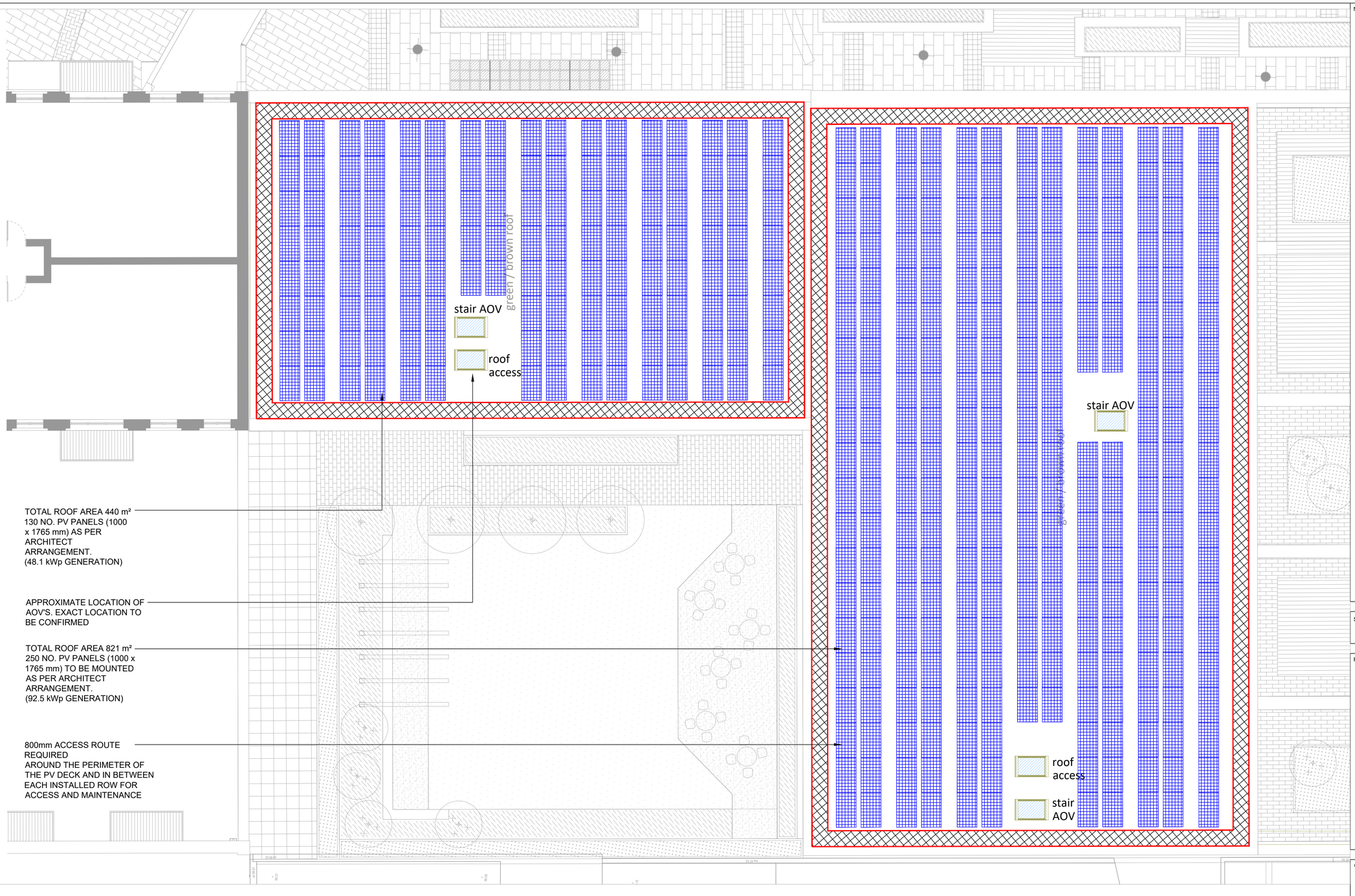
envision
Unit 2 Lodge Farm
Castlethorpe
Milton Keynes
MK9 7ES
T: 01908 062819

Title: Proposed PV Roof Plan

Drawn/CAD	Engineer	Scale	Date
HS	IP	1:100@A1	Feb 21

Drg No: P20621-E-PV-001

Revision: B



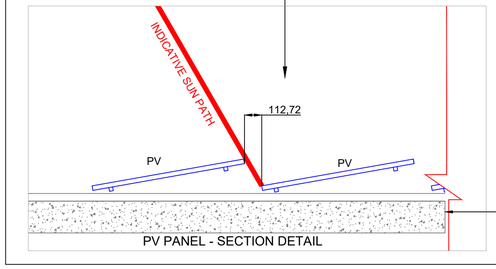
TOTAL ROOF AREA 440 m²
130 NO. PV PANELS (1000 x 1765 mm) AS PER ARCHITECT ARRANGEMENT.
(48.1 kWp GENERATION)

APPROXIMATE LOCATION OF AOV'S. EXACT LOCATION TO BE CONFIRMED

TOTAL ROOF AREA 821 m²
250 NO. PV PANELS (1000 x 1765 mm) TO BE MOUNTED AS PER ARCHITECT ARRANGEMENT.
(92.5 kWp GENERATION)

800mm ACCESS ROUTE REQUIRED
AROUND THE PERIMETER OF THE PV DECK AND IN BETWEEN EACH INSTALLED ROW FOR ACCESS AND MAINTENANCE

REQUIRED SEPARATION BETWEEN EACH PANEL MOUNTED AT A 10° PITCH

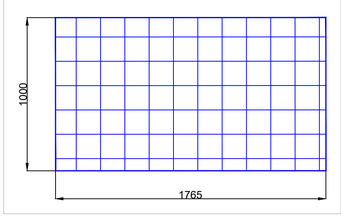


PV PANEL - SECTION DETAIL

PV ARRAY TO BE MOUNTED ON OFFICE FLAT ROOF

Ref	Installed Capacity (kWp)	Annual Output (kWh/annum)	Carbon Offset (kg/CO2)	Carbon Offset (Tonnes)
Office Roof PV	140.6	102,188	23,810	23.8

PV PANEL - PLAN DETAIL



Notes

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PV PANEL	
AVAILABLE ROOF AREA	
ACCESS AND MAINTENANCE WALKWAY	
AOV / ROOF ACCESS	

NORTH POINT

Status

☐ Preliminary ☒ For Comment ☐ For Approval
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Drg No: P20621-E-PV-002 Revision: B