

Sustainability and Energy Statement

Barton Buildings, Uxbridge

Prepared for Cyril Leonard
May 2021



envision

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Author	Signature
Sam Wallis BSc (Hons) M Arch Sc OCDEA	
Checked	Signature
Simon Rainsford BSc MSc	

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EXECUTIVE SUMMARY

1. This Sustainability and Energy Statement has been prepared by Envision on behalf of Cyril Leonard (The Applicant) and is submitted in support of a full planning application for the erection a single industrial unit, along with associated car parking and landscaped areas at Barton Buildings, Uxbridge Industrial Estate.
2. The primary purpose of this document to explain how the scheme can meet with London Borough of Hillingdon energy and sustainability policies, along with those found within the New London Plan.
3. Envision has 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 BREEAM Strategy

4. Whilst not a policy requirement, the applicant is voluntarily applying the BREEAM standard to the development to help enhance the sustainability of the proposals and to help attract future tenants. A BREEAM Very Good standard is sought. The scheme will deliver a series of specific sustainability measures which are aligned with BREEAM, and which are compatible with the GLA and Hillingdon's requirements for sustainable design and construction:
 - An ecologically beneficial landscaping scheme, to deliver site-wide ecological enhancement;
 - Sustainable material selections with the proposed design to undergo a Whole-Life Cycle Carbon Assessment to identify and reduce embodied carbon;
 - Incorporation of climate adaptation measures, including permeable paving and landscaping;
 - Water conservation measures within the development will be encouraged through the specification of a water leak detection system;
 - The scheme will incorporate a range of SuDs measures including permeable paving
 - The incorporation of adequate waste storage facilities, for use by the operators.

Summary of Energy Strategy

5. This statement additionally illustrates how the scheme complies with the nationally recognised *Energy Hierarchy* and follows passive and efficiency improvements before the application of any Low or Zero Carbon (LZC) sources.
6. Envision has produced Part L2A compliant SBEM calculations in order to determine the energy and CO₂ emissions for the proposed development. These have been calculated using SAP 10 figures, with detailed calculations provided in Appendix II.
7. To reduce the energy consumption of the development and to assist in achieving a Building Regulation Part L 2013 compliant development, the following design measures are recommended and will need to be incorporated into the detailed design:

- Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;
- Reduced Air Permeability, lower than standard Buildings Regulations, and in accordance with prospective development building occupiers;
- HVAC system controls ensure installed equipment will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values;
- High efficiency LED lighting utilising occupancy sensing in back-of-house areas;
- High-efficient Air-Source Heat Pumps providing efficient space heating and cooling to office and reception areas;
- A circa 13.6 kWp PV array on the south-east facing roof.

8. The figures used as the basis for this assessment are discussed further in Section 4 of this report.
9. In line with the requirements of the October 2018 update to the 'GLA Guidance on Preparing Energy Assessments', the predicted CO₂ emissions and energy demand presented in this report have been calculated using SAP 10 figures. The GLA 'Carbon Emission Reporting Spreadsheet', to be provided with referable planning applications is set up for development proposing communal heating systems. As this development proposes individual heating systems (not compatible with the GLA Carbon Emission Reporting Spreadsheet) the consumption figures have been manually converted with SAP 10 emission factors and provided in Appendix II.

Carbon Savings Predicted

10. The regulated site-wide baseline for the development (Part L2A 2013 compliant using SAP 10 carbon factors) has been calculated as being **12.05 tn.CO₂.year**.
11. The site-wide CO₂ emissions following reductions at the 'Be-Lean' Stage, i.e. energy-efficient stage, have been calculated at **10.40 tn.CO₂.year**. This represents a **13.64%** reduction in carbon emissions beyond the Part L 2013 compliant baseline.
12. At the 'Be-Clean' stage, district heating and communal heating solutions were assessed for their viability on site. Analysis showed that owing to the development's location, size and servicing strategy, neither were viable for inclusion. Therefore, there are no CO₂ or Energy Demand savings to be shown at this stage.
13. The 'Be-Green' stage, i.e. on-site renewables/low carbon technology accounted for the proposed installation of:
 - Air-Source Heat Pumps providing efficient space heating and cooling to ancillary areas in the industrial units;
 - A 9,322 kWh/annum PV array (circa 13.6 kWp) on the uppermost south-east facing roof.
14. The site-wide CO₂ emissions following reductions at the 'Be-Green' Stage, i.e. on-site renewables/low carbon technology, have been calculated at **7.26 tn.CO₂.year**.

15. Therefore, in total the development reduces CO₂ emissions by **4.79 tn.CO₂.year**, equal to a **39.77%** saving beyond the Part L 2013 baseline (using SAP 10 emission factors), thereby complying with adopted and emerging London Borough of Hillingdon and London Plan energy policies with regards to minimum CO₂ emission reductions for major non-residential developments.

Table A.1 – Final Site-Wide CO₂ reductions Chart

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	12.05	28.60
After energy demand reduction	10.40	28.60
After heat network / CHP	n/a	n/a
After renewable energy	7.26	28.60
	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	1.64	13.64%
Savings from heat network / CHP	n/a	n/a
Savings from renewable energy	3.15	26.14%
Cumulative on-site savings	4.79	39.77%

1 INTRODUCTION

- 1.1 This Sustainability and Energy Statement has been prepared by Envision on behalf of Cyril Leonard (The Applicant) and is submitted in support of a full planning application for the erection a single industrial building, comprising two units, along with associated car parking and landscaped areas at Barton Buildings, Uxbridge Industrial Estate.
- 1.2 The primary purpose of this statement is to explain how sustainable development principles have been considered within the scheme proposals, and how these factors would continue to be considered during the further stages of the project, in accordance with relevant national and local planning policies and guidance.
- 1.3 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 policies relevant to the application;
 - Section 4 Provides the energy statement and LZC Feasibility Study;
 - Section 5 provides a conclusion.
 - A BREEAM Pre Assessment, demonstrating the applicant's intent to reach BREEAM 'Very Good' is provided in Appendix 1.

2 CONTEXT AND PROPOSALS

Location and Existing Situation

- 2.1 The proposed development site is located within Uxbridge Industrial Estate, in the London Borough of Hillingdon. The site and surrounding area is illustrated on the site location plan below. The insert satellite image provides an illustration of the current land uses.

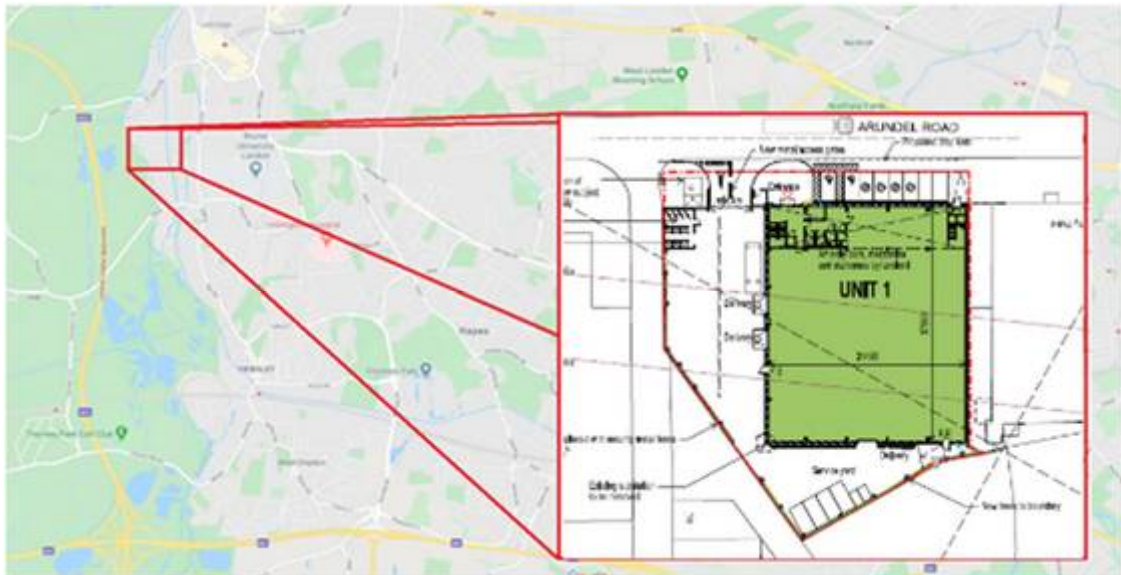


Figure 2.1 – Site Location

The Proposed Development

- 2.2 The planning application seeks consent for a single industrial building, with ancillary office space and associated infrastructure and landscaping.

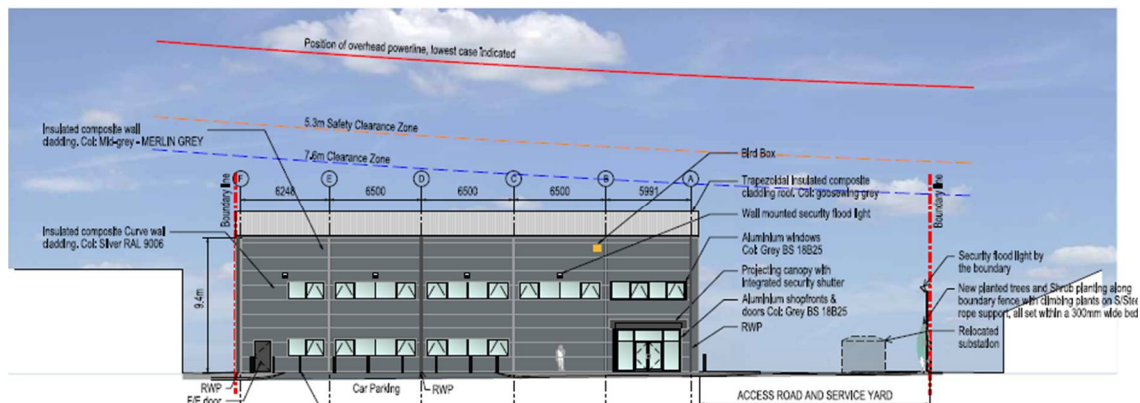


Figure 2.2 – Proposed Development

3 SUSTAINABILITY POLICY CONTEXT

- 3.1 A key mechanism for delivering the principles of sustainable 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, CO₂ reductions and sustainable design.

National Policy

- 3.2 The revised National Planning Policy Framework (NPPF) was published on 24th July 2018 and updated 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.

London Plan Policy

London Plan 2021

3.5 The London Plan 2021 contains a number of policies directly related to standards for energy and sustainability, including:

- Policy G1 Green Infrastructure;
- Policy G5 Urban Greening;
- Policy G 6 Biodiversity and Access to Nature;
- Policy SI 1 Improving Air Quality;
- Policy SI 2 Minimising greenhouse gas emissions;
- Policy SI 3 Energy Infrastructure;
- Policy SI 4 Managing heat risk;
- Policy SI 7 Reducing Waste and supporting the circular economy;
- Policy SI 12 Flood Risk Management;
- Policy SI 13 Sustainable Drainage; and
- Policy T 5 Cycling.

London Borough of Hillingdon Planning Policies

3.6 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. The planning documents within the London Borough of Hillingdon's local development framework relevant to sustainability are; The Hillingdon Local Plan: Part 1- Strategic Policies (adopted November 2012) and The Hillingdon Local Plan: Part 2 - Development Management Policies (adopted January 2020).

3.7 Specific policies relevant to the energy and sustainability of new development include:

Policy DMEI 1: Living Walls and Roofs and on-site Vegetation¹

3.8 All development proposals are required to comply with the following:

- All major development should incorporate living roofs and/or walls into the development. Suitable justification should be provided where living walls and roofs cannot be provided; and
- Major development in Air Quality Management Areas must provide onsite provision of living roofs and/or walls.

¹ An Ecological Statement & Sustainable Drainage Statement are being submitted with this planning application demonstrating how this policy has been achieved.

Policy DMEI 2: Reducing Carbon Emissions

- All developments are required to make the fullest contribution to minimising carbon dioxide emissions in accordance with London Plan targets.
- All major development proposals must be accompanied by an energy assessment showing how these reductions will be achieved.
- Proposals that fail to take reasonable steps to achieve the required savings will be resisted. However, where it is clearly demonstrated that the targets for carbon emissions cannot be met onsite, the Council may approve the application and seek an off-site contribution to make up for the shortfall.

Policy DMEI 3: Decentralised Energy

- All major developments are required to be designed to be able to connect to a Decentralised Energy Network (DEN).
- Major developments located within 500 metres of an existing DEN, and minor new-build developments located within 100 metres, will be required to connect to that network, including provision of the means to connect to that network and a reasonable financial contribution to the connection charge, unless a feasibility assessment demonstrates that connection is not reasonably possible.
- Major developments located within 500 metres of a planned future DEN, which is considered by the Council likely to be operational within 3 years of a grant of planning permission, will be required to provide a means to connect to that network and developers shall provide a reasonable financial contribution for the future cost of connection and a commitment to connect via a legal agreement or contract, unless a feasibility assessment demonstrates that connection is not reasonably possible.

Policy DMEI 7: Biodiversity Protection and Enhancement

- The design and layout of new development should retain and enhance any existing features of biodiversity or geological value within the site. Where loss of a significant existing feature of biodiversity is unavoidable, replacement features of equivalent biodiversity value should be provided on-site. Where development is constrained and cannot provide high quality biodiversity enhancements on-site, then appropriate contributions will be sought to deliver off-site improvements through a legal agreement.

4 BREEAM STRATEGY

- 4.1 As identified in the policy review, BREEAM is not a policy requirement of the scheme. Notwithstanding this, the applicant considers that its application will help demonstrate a sustainable building through the planning process and will help to attract future interest from tenants.
- 4.2 Cyril Leonard requires that Barton Buildings achieves the Building Research Establishment's Environmental Assessment Method (BREEAM) standard of 'Very-Good' for this development at Barton Buildings. A BREEAM Pre-Assessment for the development detailing all credit requirements has been included in Appendix I, the pre-assessment confirms the buildings will achieve a BREEAM 'Very-Good' rating.
- 4.3 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.
- 4.4 The proposed commercial development consists of a single building comprising primarily of industrial warehouse space, with small ancillary office area.
- 4.5 The predictive assessment presented within this report is made against the BREEAM New Construction criteria (2018 v3), and tailored to suit the criteria. As the occupier is unknown, the assessments are being undertaken based on a shell only approach.

Target Levels

- 4.6 As required by Cyril Leonard, the target for the proposed works is 'Very-Good' which is equal to or greater than 55%. 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

- 4.7 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 Very Good. These credits are shown in the table below. The predictive assessment makes reference to these where appropriate.

Table 4.2 – Mandatory Credits

BREEAM issue	Very Good
Man 04 – Commissioning and Handover	One credit (Commissioning-test schedule and responsibilities)
Man 04 – Commissioning and Handover	Criterion 11 (Building User Guide)
Man 05 – Aftercare	One credit (Commissioning-implementation)
Ene 02 – Energy Monitoring	One credit (First sub-metering credit)
Wat 02 – Water Monitoring	Criterion 1 only
Mat 03 – Responsible Sourcing	Criterion 1 only

Assessment Scope

- 4.8 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 this purpose.

Table 4.3 – Assessment Parameters

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

- 4.9 An analysis of all available BREEAM credits, and credits deemed achievable for the development at Barton Buildings is contained in Appendix II.

Predicted Score

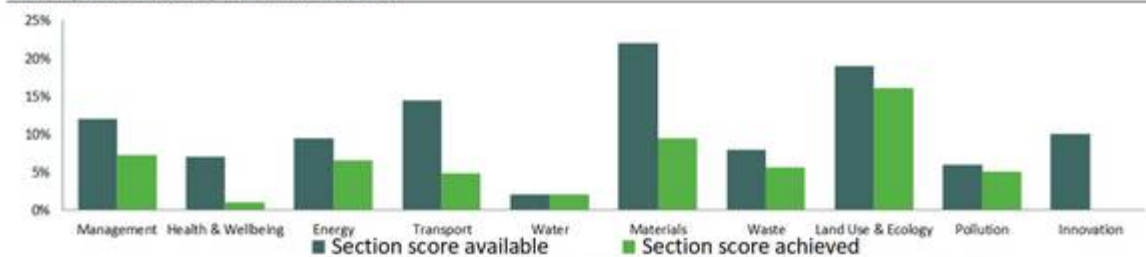
- 4.10 As detailed below, the predicted BREEAM score following the review in Appendix II is 57.70%, which is equivalent to a BREEAM rating of ‘Very-Good’, thereby in accordance with the sustainability requirements of Cyril Leonard, albeit that additional ‘potential credits’ have been identified to further increase the score:

Fig 4.2 – Predicted Score

Overall Building Performance

Building name	Barton Buildings
BREEAM rating	Very Good
Total Score	57.70%
Min. standards level achieved	Outstanding level

Building Performance by Environment Section



Environmental Section	No. credits available	No. credits Achieved	% credits achieved	Section Weighting	Section Score
Management	15	9	60.00%	12.00%	7.20%
Health & Wellbeing	7	1	14.29%	7.00%	1.00%
Energy	13	9	69.23%	9.50%	6.57%
Transport	12	4	33.33%	14.50%	4.83%
Water	2	2	100.00%	2.00%	2.00%
Materials	14	6	42.86%	22.00%	9.42%
Waste	10	7	70.00%	8.00%	5.60%
Land Use & Ecology	13	11	84.62%	19.00%	16.07%
Pollution	6	5	83.33%	6.00%	5.00%
Innovation	10	0	0.00%	10.00%	0.00%

5 ENERGY STATEMENT

- 5.1 In pursuing compliance with the Energy Policy in the London Borough of Hillingdon, Envision has followed guidance from the Borough's Local Plan, namely Policy DMEI 2: Reducing Carbon Emissions – which requires development to make the fullest contribution to minimising carbon dioxide emissions in accordance with London Plan targets.
- 5.2 The local policy applicable to this area, LB Hillingdon refers to the requirements of the current London Plan 2016 and in particular Policy 5.2 which has a requirement that all new buildings should make the fullest contribution to minimising carbon dioxide (CO₂) emissions in accordance with the following energy hierarchy:
- Step 1 – Reducing Energy Requirements;
 - Step 2 – Supplying the energy that is required more efficiently;
 - Step 3 – Meeting remaining energy requirements through renewable and low carbon energy.

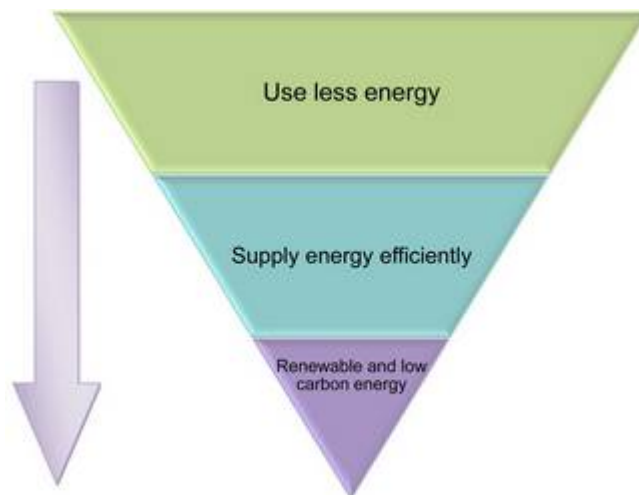


Fig 5.1 - 'Energy Hierarchy'

- 5.3 In line with the requirements of the October 2018 update to the 'GLA Guidance on preparing Energy Assessments', the predicted CO₂ emissions and energy demand presented in this report have been calculated using SAP 10 figures.

Methodology

- 5.4 The appropriate methodology for calculating the development's energy performance and compliance with Part L of the Building Regulations 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.

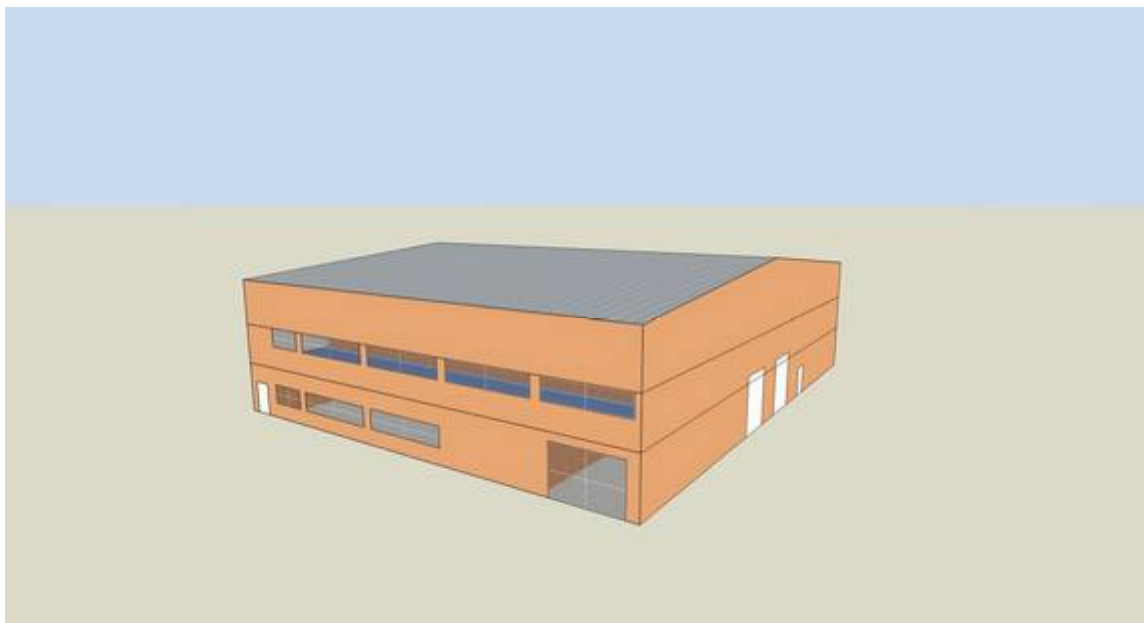


Fig 5.2 DesignBuilder Model of Development (not aesthetic representation)

Establishing the Target Emission Rate (TER)

- 5.5 The total emissions savings calculated in this report are expressed against a Building Regulation 2013 Target Emission Rate. This is the Baseline against which the measures implemented must show an improvement.
- 5.6 The Target Emission Rates for the development has been established using CLG approved methodology and software.
- 5.7 The calculated carbon emissions for the Target Emission Rates are illustrated below. The calculated figures demonstrate a Building Regulations 2013 (Part L2a) compliant model.

Table 5.1 – Target CO₂ emissions for Development

	Target Regulated Emissions (Tonnes.CO ₂ .yr)	Target Energy Demand (kWh.yr)
Proposed Unit	12.05	55,690.92

- 5.8 The figure of **12.05 tonnes.CO₂.year**, calculated using SAP 10 emission factors is the target that must be reached and improved upon by the proposals for the proposals in this Energy Assessment in order to comply with the energy policies contained within LB Hillingdon and GLA plans. This will be achieved through the implementation of fabric efficiency, energy-reduction and carbon-saving measures as outlined in the ensuing sections.

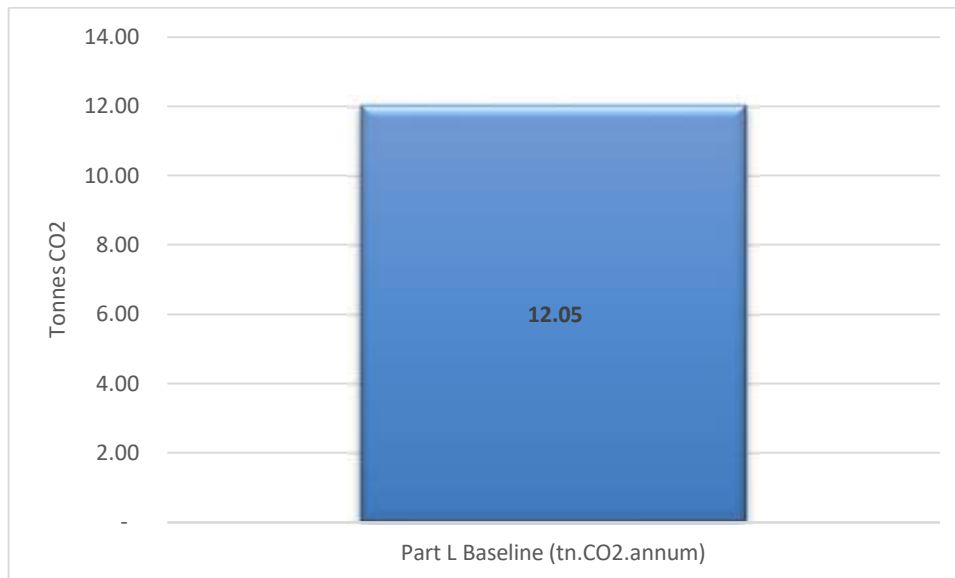


Fig 5.3 – Target CO₂ emissions for Development

Applying the London Plan Energy Hierarchy: Stage 1 – Be Lean

- 5.9 The Greater London Authority seeks a ‘fabric first’ approach to reducing the carbon footprint of London’s 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.

Fabric Efficiency

- 5.10 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. Very broadly, the better (i.e. lower) the U-value of a buildings fabric, the less energy is required to maintain comfortable conditions inside the building. Therefore, the following U-Values are proposed for the development:

Table 5.2 Proposed U-Values

Elements	New Thermal Elements: U-Values – W/m ² K	Comment
External Wall	0.15	n/a
Spandrel Panel Window Infill	0.35	
Ground Floor	0.12	n/a
Exposed Roof	0.16	n/a
Windows/Glazing	1.5	Assumed as double-glazed with a G-value of 0.4 and Light Transmittance value of 0.744
Rooflights	1.4	Assumed as double-glazed with a G-value of 0.4 and Light Transmittance value of 0.744
External Solid Doors/Roller Shutter Doors	1.5	-

Air Permeability

- 5.11 The designed Air Permeability Rate (APR) has been set at 4 m³/h.m² @ 50Pa for each unit.

Lighting Strategy²

- 5.12 The strategy proposes to reduce lighting loads in areas which benefit from large amounts of natural light. Particular focus has been given to the warehouse areas, where lighting would typically represent a large energy load. This energy demand will be limited by the application of more efficient lighting and use of occupancy sensors throughout. The following lighting design requirements are therefore recommended:

Table 4.3 –Lighting Datasheet

Lighting zone	Luminaire Lumens / Circuit Watt	Light Output Ratio	Photocell Dimming (Parasitic Power – W/m ²)	Occupancy Sensing – On/Off (Parasitic Power – w/m ²)
Reception/Office Areas	105	1	No	Yes (0.3 W/m ²)
WC Areas	105	1	No	Yes (0.3 W/m ²)
Warehouse Areas	115	1	No ³	No

Space & Water Heating

- 5.13 The intention is for the main warehouse floor areas to remain unheated, save for frost protection, with all ancillary accommodation being heated. In line with the GLA's Energy Hierarchy, the heating system proposed for these areas at the 'Be-Lean' stage is a gas-fired Low-Temperature Hot Water (LTHW) system with radiator outlets and a minimum efficiency of 91%.
- 5.14 WCs will be heated via electric panel radiators.
- 5.15 The hot water demand is anticipated to be low in a building such as this. At this stage of the project, an instantaneous electric hot water system has been assumed for each unit.

Ventilation Strategy

- 5.16 The only mechanical ventilation proposed is in the WC's, which is assumed to be served via a basic extract fan (remote from zone) with an SFP of 0.5 W/l-s.

² The development is being brought forward as shell & core, with all HVAC and Lighting systems installed by tenants. Therefore, the inputs laid out for M&E are assumptions and will be passed through to prospective tenants.

³ Daylight dimming on light fittings will be installed by the incoming tenant, not the developer and therefore has not been included at this point.

Be Lean Stage CO₂ Reductions

- 5.17 The following tables and graphs represent the lean stage improvements for the development over the Target Emission Rate (TER) baseline emissions:

Table 5.4 –Lean Stage CO₂ Reductions

	Be-Lean Regulated Emissions (Tonnes.CO ₂ .yr)	Be-Lean Energy Demand (kWh.yr)
Proposed Development	10.40	45,847.81
Difference over Baseline	1.64	9,843.11
% Difference	13.64%	17.67%

- 5.18 As detailed above, the measures as taken at ‘Be-Lean’ stage would result in a **13.64%** reduction in the sitewide regulated CO₂ emissions over the Building Regulations Part L 2013 Target Emission Rate – arrived at using SAP 10 emission factors.

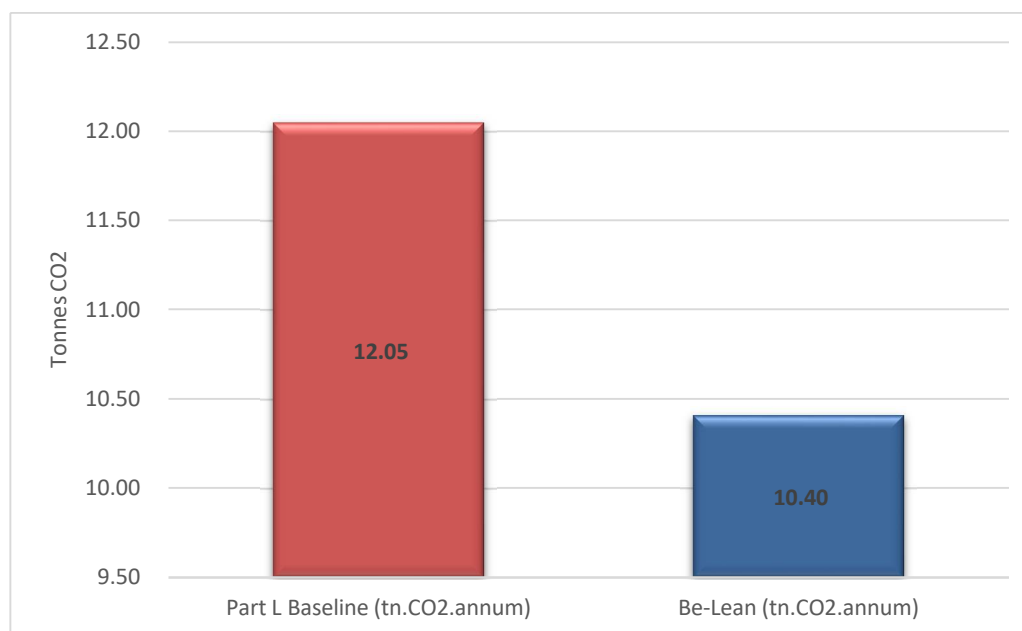


Fig 5.4 Graph of Lean Stage CO₂ reductions

Applying the Energy Hierarchy: Stage 2 – Be Clean

5.19 In accordance with the 'GLA guidance on preparing Energy Assessments', the 'Be-Clean' stage requires that any energy supplied to major developments should be as efficient as possible by selecting energy systems in accordance with the following hierarchy:

1. Connection to an area wide heat network;
2. Communal heating system (site-wide or building-level); and
3. Individual heating systems.

Connection to an area wide heat network

5.20 By referencing the London Heat Map below, it is clear that there are no existing or proposed networks in the vicinity of the site. There is a 'proposed' network identified 1,339 meters to the east of the site, outside the 500-metre threshold stipulated by Policy DMEI 3.

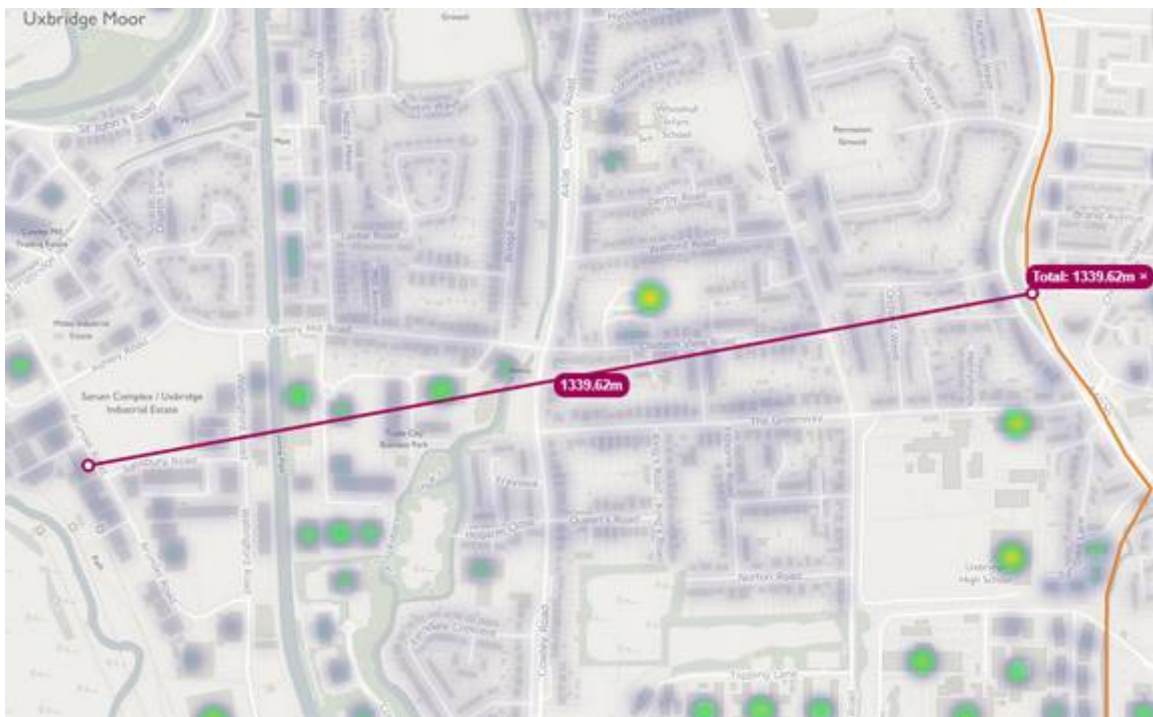


Fig 5.5 – London Heat Map

Communal heating system (site-wide or building level)

- 5.21 The development at Barton Buildings comprises of two industrial units, with a majority of the floor area not provided with any heating or cooling. The only areas to be heated are the ancillary office and WC areas. In this instance, as the heat load of the new buildings is so low, it is deemed the implications of installing the infrastructure and provision of a communal heating system would not be suitable for a development of this nature.
- 5.22 Therefore, the development's energy strategy will follow guidance by maximising carbon savings from additional on-site measures, including fabric energy efficiency and renewable technologies.

Individual heating system

- 5.23 As detailed in the next section, the small heating and cooling demand to the office and reception areas will be met by individual air source heat pumps.

Applying the Energy Hierarchy: Stage 3 – Be Green

5.24 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 II, two systems were deemed to be viable for the scheme:

- Air-Source Heat Pumps providing heating and cooling to office and receptions areas.
- Photovoltaic Arrays (serving all of the development).

Low-Carbon/Renewable Technology System 2 – Air-Source Heat Pumps to ancillary areas

5.25 The first low-carbon/renewable energy proposed for the units is an air-source heat pump (ASHP). ASHPs with the following specifications have been assumed for each commercial unit;

- The proposed ASHP for the ancillary areas is a conventional VRF air source heat pump system⁴.
- Cooling plant will have a minimum Energy Efficiency Ratio (EER) of 4 and SEER of 5.
- The ASHP will have a minimum COP of 4 for heating.
- HVAC system controls installed will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values as well as local time and temperature control.

Low-Carbon/Renewable Technology System 1 – Photovoltaic Array

5.26 The low-carbon/renewable energy proposed for the development is a Photovoltaic (PV) array. The proposed PV will be mounted on the south-east facing roof of Unit(s) 1 and 2. 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.

5.27 The carbon offset from the installation will contribute towards an overall developments CO₂ reduction. In order to achieve the necessary carbon reduction to achieve compliance, a 70 m² array of mono-crystalline PV panels will be provided across the entire development. Included in the table below is a break-down of the PV

Table 5.5 – PV Array Details

Area	PV Area (m ²)	PV Peak Power (kWp)	PV Energy Generation (kWh.annum)
Proposed Development	70 m ²	13.6 kWp	9,322.89 kWh

⁴ This is a planning stage assumption and subject to change at Stage 3 Detail Design.

5.28 This energy assessment has identified a roof mounted PV array totalling 13.6 kWp across the development will generate 9,316.6 kWh of renewable electricity per annum sitewide.

Be Green Stage CO₂ Reductions

5.29 The following tables and graphs represent the 'Be-Green' improvements for the development;

Table 5.6 – Green Stage CO₂ Reductions

	Be-Green Regulated Emissions (Tonnes.CO ₂ .yr)	Be-Green Energy Demand (kWh.annum)
Proposed Development	7.26	31,226.89
Difference over Baseline	3.15	14,620.92
% Difference	39.77%	43.93%

5.30 As detailed above, the measures as taken at 'Be-Green' stage would result in a **39.77%** reduction in sitewide regulated CO₂ emissions over the Baseline emissions.

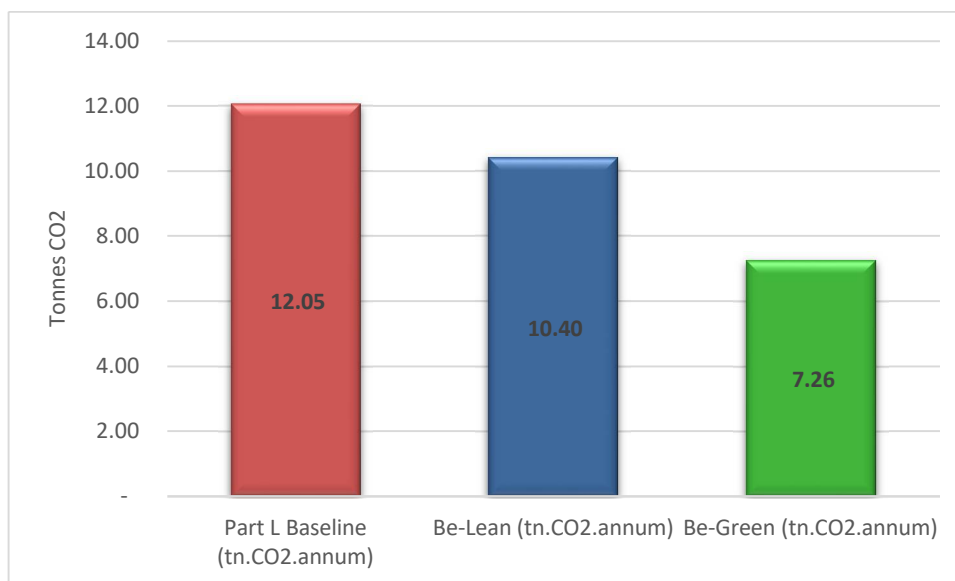


Fig 5.6 Graph of Green Stage CO₂ reduction over Baseline

CO₂ Reduction Charts

5.31 In accordance with the 'GLA guidance on preparing energy assessments', the final carbon emissions and predicted savings are presented below for the entire development.

Table 5.7 – Sitewide Unregulated and Regulated CO₂ emissions and savings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	12.05	28.60
After energy demand reduction	10.40	28.60
After heat network / CHP	n/a	n/a
After renewable energy	7.26	28.60
	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	1.64	13.64%
Savings from heat network / CHP	n/a	n/a
Savings from renewable energy	3.15	26.14%
Cumulative on-site savings	4.79	39.77%

5.32 As seen in the charts above, the cumulative on-site savings for the development is **39.77%**, in line with the London Borough of Hillingdon and GLA energy policy for minimum CO₂ reductions in major non-residential developments.

6 CONCLUSION

- 6.1 This Sustainability and Energy Statement has been prepared by Envision on behalf of Cyril Leonard (The Applicant) and is submitted in support of a full planning application for the erection a single industrial unit, along with associated car parking and landscaped areas at Barton Buildings, Uxbridge Industrial Estate.
- 6.2 To minimise energy consumption by the development and to assist in achieving a Building Regulation Part L2A 2013 compliant development, the following design measures are proposed:
- Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;
 - Reduced Air Permeability, lower than standard Buildings Regulations, and in accordance with prospective development building occupiers;
 - HVAC system controls ensure installed equipment will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values;
 - High efficiency LED lighting utilising occupancy sensing in back-of-house areas;
 - High-efficient Air-Source Heat Pumps providing efficient space heating and cooling to office and reception areas;
 - A 13.6 kWp PV array on the south-east facing roof.
- 6.3 Analysis of the outline design using accepted approaches and the energy hierarchy have indicated the development can exceed the minimum performance requirement of 35% lower carbon emissions over 2013 Building Regulations – calculated using SAP 10 emission factors. The strategy proposed follows the three-step ‘Energy Hierarchy’ and meets all policies as outlined in Section 3 of the report. The developments overall reduction in carbon emissions over the Part L 2013 (using SAP 10 emission figures) baseline is **39.77%**, therefore complying with LB Hillingdon and GLA policy on CO₂ reductions in major non-residential developments.
- 6.4 Further optimising of the heat pump and PV installation will be assessed at the detail-design phase. For this report, the solutions have been optimised to suit the predicted energy consumption and carbon emissions as per Envision’s calculations.
- 6.5 In addition, the scheme will deliver a series of sustainability measures which are compatible with the GLA and Hillingdon’s requirements for sustainable design and construction:
- An ecologically beneficial landscaping scheme, to deliver site-wide ecological enhancement;
 - Sustainable material selections with the proposed design to undergo a Whole-Life Cycle Carbon Assessment to identify and reduce embodied carbon;
 - Incorporation of climate adaptation measures, including permeable paving and landscaping;
 - Water conservation measures within the development will be encouraged through the specification of a water leak detection system;

- The scheme will incorporate a range of SuDs measures including permeable paving.

6.6 The development is considered to comply with the sustainability requirements outlined by LB Hillingdon and GLA local development documents.

APPENDIX I – BREEAM PREDICTIVE ASSESSMENT

BREEAM Pre-Assessment

Barton Buildings

Prepared for Cyril Leonard



Issue	Date	Reason for Issue	Author	Approved
1	17th March 2020	Planning	SR	Simon Rainsford

Key Statistics

Project Name: Barton Buildings
Prepared for: Cyril Leonard
Building Type: Industrial
Project Stage: Pre-Assessment
Scheme: BREEAM NC 2018
Manual Version: SD5078 Issue 2.0
Project type: Shell Only
Target Score: Very Good

Will the building be heated and/or cooled?	Yes
Commercial/industrial refrigeration and storage systems	No
Building user transportation systems (Lifts)	No
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 facilities only provided within the residential areas of long term stay?	No
Unregulated water uses present? (e.g. vehicle wash system, irrigation)	No
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

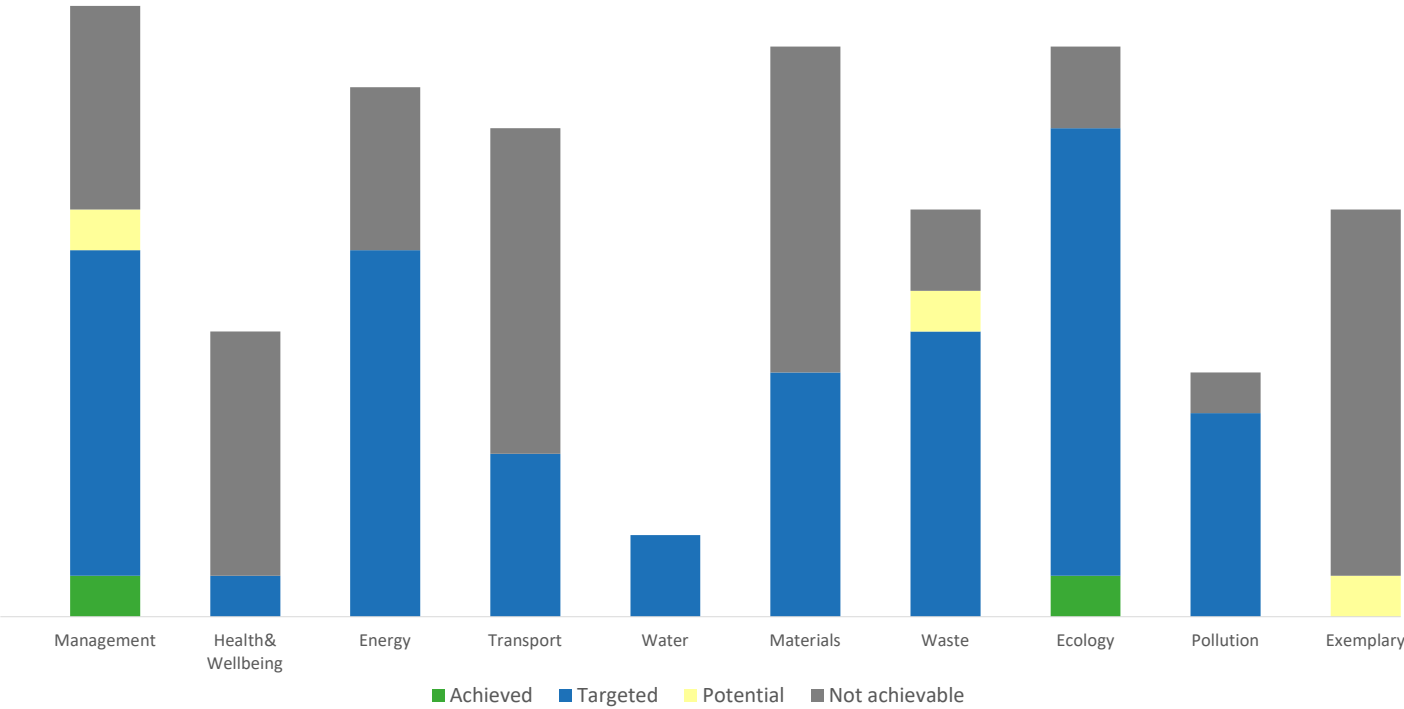


Envision

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

+44 (0)207 4860680
www.envisioneco.com

Summary



A BREEAM assessment has been undertaken for the proposed development of two trade units totalling 1168 m2, plus external service yard area and landscaping. The development type has been defined, under BREEAM standards, as ‘Industrial’, and the two units will be assessed as one ‘similar buildings’ shell only assessment, under the most recent version of BREEAM UK New Construction 2018.

BREEAM ratings are awarded based on achievement of relevant minimum standards and % score. The following 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.

BREEAM Rating	% score	
Outstanding	≥ 85	
Excellent	≥ 70	
Very Good	≥ 55	
Good	≥ 45	The results, as illustrated in the graph, indicates available, targeted, potential and achieved credits. The current targeted score as detailed overleaf confirm that the development could achieve a score of 57% , providing a suitable buffer over the 55% required for a BREEAM Very Good rating, along with meeting the minimum requirements for this rating level. In addition, potential credits are possible, taking the score to 60%.
Pass	≥ 30	





Project Name: **Barton Buildings**

Building Type: **Industrial**

Project Type: **Shell Only**

Targeted BREEAM rating % **57.72** **Very Good**

Potential BREEAM rating % **60.32** **Very Good**

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
MANAGEMENT							
Man 01	Project Brief and Design	Project Delivery Planning	1	0		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	0		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?				2	BREEAM target must be formally agreed with the design team.
		BREEAM Advisory Professionals (AP) (Concept Design)	1	1		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		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	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	0		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		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				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		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 implementation 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?				4	BREEAM target must be formally agreed with the main contractor.
		BREEAM AP (Site)	1	1		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		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		4	Principal contractor monitor energy and water consumption on site.
		Monitoring of Construction Site Impacts - Transport of Construction Materials and Waste	1	1		4	Principal contractor to monitor fuel consumption of transport of materials and waste to/from site.
Man 04	Commissioning and Handover	Testing and Inspecting Building Fabric	1	0	1	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.

MANAGEMENT	TOTAL	15	9	1
	% of total score	12.00%	7.20%	0.80%
	% of each credit	0.80%		



Project Name: **Barton Buildings**

Building Type: **Industrial**

Project Type: **Shell Only**

Targeted BREEAM rating % **55.52** **Very Good**

Potential BREEAM rating % **58.12** **Very Good**

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
MANAGEMENT							
Man 01	Project Brief and Design	Project Delivery Planning	1	0		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	0		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?				2	BREEAM target must be formally agreed with the design team.
		BREEAM Advisory Professionals (AP) (Concept Design)	1	1		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		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	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	0		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		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				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		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 implementation 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?				4	BREEAM target must be formally agreed with the main contractor.
		BREEAM AP (Site)	1	1		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		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		4	Principal contractor monitor energy and water consumption on site.
		Monitoring of Construction Site Impacts - Transport of Construction Materials and Waste	1	1		4	Principal contractor to monitor fuel consumption of transport of materials and waste to/from site.
Man 04	Commissioning and Handover	Testing and Inspecting Building Fabric	1	0	1	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.

MANAGEMENT	TOTAL	15	9	1
	% of total score	12.00%	7.20%	0.80%
	% of each credit	0.80%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
HEALTH & WELLBEING							
Hea 01	Visual Comfort	Daylighting	1	0		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	0		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 sought via BS 8206.
		Internal and External Lighting Levels, Zoning and Controls	1	1		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 05	Acoustic Performance	Acoustic Performance	1	0		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		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		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	0		4	There is an outside space providing building users with an external amenity area.

HEALTH & WELLBEING	TOTAL	7	1	0
	% of total score	7.00%	1.00%	0.00%
	% of each credit	1.00%		

ENERGY							
Ene 01	Reduction of Energy Use and Carbon Emissions	Energy Performance Minimum Standard: 4 credits Excellent, 6 credits Outstanding	9	4		4	Credits are achieved through energy modelling (BRUKL report) and reduction in regulated CO ₂ emissions.
Ene 03	External Lighting	External Lighting	1	1		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		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		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; desiccant 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		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 CO ₂ emissions.

ENERGY	TOTAL	13	6	0
	% of total score	9.50%	4.38%	0.00%
	% of each credit	0.73%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
TRANSPORT							
Tra 01	Transport Assessment and Travel Plan	Travel plan	2	2		2-4	Travel Plan and Transport Assessment to be carried out at early design stages clearly considering the impact onto the surrounding infrastructure and to calculate the public transport Accessibility Index (AI) for the assessed building.
Tra 02	Sustainable Transport Measures	1. The existing AI calculated in Tra 01	10	2		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. AI for the site is confirmed 1.08 therefore this credit can't be achieved as a minimum AI is 8.
		2. Demonstrate an increase over the existing Accessibility Index.				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.				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.				2-4	Electric recharging stations.
		5. Set up a car sharing group or facility to facilitate and encourage building users to car share. Raise awareness of the sharing scheme.				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.				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				2-4	Industrial: provide 1 cycling space for 10 staff. Assumed 60 staff - 6 cycle spaces
		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.				2-4	Option 7 must be achieved in addition to at least 2 compliant cyclist facilities.
		9. At least three existing accessible amenities are present within 500m of the main entrance.				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 building.
		10. Enhanced amenities				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.				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	4	0
	% of total score	14.50%	4.83%	0.00%
	% of each credit	1.21%		

WATER							
Wat 02	Water Monitoring	Water Monitoring Minimum Standard: Criterion 1 - water meter on mains Good, Very Good, Excellent and Outstanding	1	1		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		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.

WATER	TOTAL	2	2	0
	% of total score	2.00%	2.00%	0.00%
	% of each credit	1.00%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
MATERIALS							
Mat 01	Environmental Impacts from Construction Products - Building Life Cycle Assessment (LCA)	Superstructure - Concept Design	6	3		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				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	0		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	0		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				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	0		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	2		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		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	0		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				2	
		Developed Design				3	
		Technical Design				4	
		Construction				5	

MATERIALS	TOTAL	14	6	0
	% of total score	22.00%	9.43%	0.00%
	% of each credit	1.57%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
WASTE							
Wst 01	Construction Waste Management	Pre-demolition Audit Minimum Standard: 1 credit Outstanding	1	1		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		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		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				4	As per Wst 01 above.
		Project Sustainable Aggregate Points	1	0	1	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		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 05	Adaptation to Climate Change	Resilience of structure, fabric, building services and renewables installation	1	0		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		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	1		4	Provide an update during RIBA Stage 4, how the recommendations have been implemented i.e. plant replacement, horizontal / vertical expansion, refurbishment potential etc.

WASTE	TOTAL	10	7	1
	% of total score	8.00%	5.60%	0.80%
	% of each credit	0.80%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
LAND USE & ECOLOGY							
LE 01	Site Selection	Previously Occupied Land	1	1		4	At lest 75% of new development footprint is built on the previously occupied land.
		Contaminated Land	1	0		4	Specialist’s land contamination report and summary details of the implementation plan of the remediation strategy to be developed.
Ecology Route Selection						1	Route 1: Project team member Route 2: Suitably Qualified Ecologist (SQE)
LE 02	Ecological Risks and Opportunities	Pre-requisite: Statutory Obligations				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	1	1		1	Route 2: SQE appointed to carry out survey and evaluation of the site.
		Determining Ecological Outcomes	1	1		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				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		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		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				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	3	2		4	Route 2: SQE to provide calculations of the change in ecological value (up to 3 credits)
		Ecological Enhancement	1	1		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)
LE 05	Long Term Ecology Management and Maintenance	Prerequisite: Statutory Obligations, Planning and Site Implementation				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	1	1		4	Route 2: Project team liaise with stakeholders to monitor and review implementation effectiveness and maintenance solutions.
		Landscape and Ecology Management Plan	1	1		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
	% of total score	19.00%	16.08%	0.00%
	% of each credit	1.46%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
POLLUTION							
Pol 03	Flood and Surface Water Management	Flood Resilience	2	2		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	1		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	1		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		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.

POLLUTION	TOTAL	6	5	0
	% of total score	6.00%	5.00%	0.00%
	% of each credit	1.00%		

Credit Ref.	Credit Title	Credit Name	Available	Targeted	Potential	RIBA Stage	Comments / Actions
EXEMPLARY							
Man 03	Responsible Construction Practices	Responsible Construction Practices	1	0	1	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		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		4	Lighting in each zone can be manually dimmed down to 20%.
Hea 02	Indoor Air Quality	Emissions by Construction Products	0	0		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		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	0	0		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		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	0	0		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	0		4	Carry out LCA options of at least 3 signigatly different core building services.
		LCA and LCC Alignment	1	0		4	Align LCA and LCC options appraisal activity. Both credits LCA and LCC must be achieved.
		Third Party Verification	1	0		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		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		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		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	0	0		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		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	0	1
	% of total score	10.00%	0.00%	1.00%
	% of each credit	1.00%		

APPENDIX II – LZC ANALYSIS

Renewable Technology	Rating (out of 5)	Comment
Photovoltaics	****	The roof is relatively free from shading and generally flat which is well suited for PV installation. PV capital costs are generally lower than alternative renewable systems. Electricity generation allows possibility of exporting back to the National Grid. The introduction of PV panels would work more effectively with the proposed building services solution than solar thermal panels due to the low water demand.
Solar Thermal	**	The anticipated year-round hot water demand from the development is not deemed sufficient enough to justify the use of a solar thermal system. The proposed DHW system (electric instantaneous) will already provide hot water – the use of a solar thermal system would be an over-design.
Wind Turbine	*	The noise, vibration and aesthetic considerations and low average wind speed (4.3 m/s at 10 metre height) make wind turbines unviable.
Ground Source Heat Pump	**	Area required for horizontal trenches or bore holes. Bore holes can be expensive. Lower heating temperature suited low heat demands. Large carbon savings can be made and system can produce adequate hot water temperatures, possibly with no additional heat sources, i.e. electric immersion heater. High capital cost for project of this nature
Air Source Heat Pump	****	ASHPs are 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. This makes ASHPs the preferred renewable technology for the provision of heating and cooling to ancillary areas in each unit.
Biomass Communal Boiler	*	The significant plant and storage space required for a biomass boiler is unsuitable for a development of this size. In addition, the lack of a constant heat demand means a biomass boiler would not operate effectively as they are best operated at full load for long periods of time as they are unable to effectively modulate as gas boilers can.

APPENDIX III – GLA SAP 10 CALCULATION 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 TFE.

DOMESTIC ENERGY CONSUMPTION AND CO ₂ ANALYSIS													SAP 2012 CO ₂ PERFORMANCE					SAP 10.0 CO ₂ PERFORMANCE					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 CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)					REGULATED CO ₂ EMISSIONS PER UNIT					Fabric Energy Efficiency (FEE)	
				Calculated TER 2012 (kgCO ₂ / m ²)	TER Worksheet TER 2012 (kgCO ₂ / m ²)	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 CO ₂ emissions (kgCO ₂ p.a.)	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	SAP 10.0 CO ₂ emissions (kgCO ₂ p.a.)
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												
Sum	0	0	0	0.0	-	0	N/A	0	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
NON-DOMESTIC ENERGY CONSUMPTION AND CO ₂ ANALYSIS																								
Building Use	Model Area (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: BRUKLINP or *SIM.CSV FILE				REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m ² p.a.) - TER BRUKL				REGULATED CO ₂ EMISSIONS				
				Calculated TER 2012 (kgCO ₂ / m ²)	BRUKL TER 2012 (kgCO ₂ / m ²)	Space Heating (kWh/m ² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m ² p.a.)	Fuel type Domestic Hot Water	Lighting (kWh/m ² p.a.)	Auxiliary (kWh/m ² p.a.)	Cooling (kWh/m ² p.a.)	Natural Gas	Grid Electricity	Equipment	2012 CO ₂ emissions (kgCO ₂ p.a.)	Natural Gas	Grid Electricity	Unregulated Grid Electricity	SAP10.0 CO ₂ emissions (kgCO ₂ p.a.)	BRUKL TER SAP10.0 (kgCO ₂ / m ²)			
Barton Buildings	1369	1	1369	15.3	15.3	12.05	Natural Gas	4.74	Natural Gas	22.03	0.14	1.72	0.216 kgCO ₂ /kWh	0.519 kgCO ₂ /kWh	0.519 kgCO ₂ /kWh		20,902	0.210 kgCO ₂ /kWh	0.233 kgCO ₂ /kWh	0.233 kgCO ₂ /kWh		11,980	8.8	
Sum	1,369	1	1,369	15.3	-	16,496	N/A	6,489	N/A	30,159	192	2,355	22,972	30,713	44,465	N/A	20,902	22,972	30,713	44,465	N/A	11,980	8.8	
SITE-WIDE ENERGY CONSUMPTION AND CO ₂ ANALYSIS																								
				Calculated		REGULATED ENERGY CONSUMPTION										REGULATED CO ₂ EMISSIONS					REGULATED CO ₂ EMISSIONS PER UNIT			

Use	Total Area (m²)	TER 2012 (kgCO ₂ / m²)	-	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.)		SAP 10.0 CO ₂ emissions (kgCO ₂ p.a.)	Calculated TER SAP 10.0 (kgCO ₂ / m²)	
Sum	1,369	15.3	-	16,496		6,489		30,159	192	2,355		20,902		11,980	8.8	

DOMESTIC ENERGY CONSUMPTION AND CO ₂ ANALYSIS															SAP 2012 CO ₂ PERFORMANCE					SAP 10.0 CO ₂ PERFORMANCE										FEES			
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 LEAN' SAP DER WORKSHEET										REGULATED CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)						REGULATED CO ₂ EMISSIONS PER UNIT						Fabric Energy Efficiency (FEE)					
				Calculated DER 2012 (kgCO ₂ / m ²)	DER Worksheet DER 2012 (kgCO ₂ / m ²)	Space Heating	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Secondary Heating system	Fuel type Space Heating	Lighting	Auxiliary	Cooling	Space Heating CO ₂ emissions (kgCO ₂ p.a.)	Domestic Hot Water CO ₂ emissions (kgCO ₂ p.a.)	Lighting CO ₂ emissions (kgCO ₂ p.a.)	Auxiliary CO ₂ emissions (kgCO ₂ p.a.)	Cooling CO ₂ emissions (kgCO ₂ p.a.)	2012 CO ₂ emissions (kgCO ₂ p.a.)	Space Heating CO ₂ emissions (kgCO ₂ p.a.)	Domestic Hot Water CO ₂ emissions (kgCO ₂ p.a.)	Lighting CO ₂ emissions (kgCO ₂ p.a.)	Auxiliary CO ₂ emissions (kgCO ₂ p.a.)	Cooling CO ₂ emissions (kgCO ₂ p.a.)	Unregulated (kgCO ₂ p.a.)	SAP 10.0 CO ₂ emissions (kgCO ₂ p.a.)	Calculated DER SAP 10.0 (kgCO ₂ / m ²)	Dwelling Fabric Energy Efficiency (DFEE) (kWh/m ²)				
				DER Sheet (Row 384)	DER Sheet [(Row 307a) + (Row 367a x 0.01)]	Select fuel type	DER Sheet [Row 310b + (Row 367b x 0.01)]	Select fuel type	DER Sheet [Row 309]	Select fuel type	DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315																				
Sum	0	0	0	0.0	-	0	N/A	0	N/A	0	N/A	0	0	0	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00			
NON-DOMESTIC ENERGY CONSUMPTION AND CO ₂ ANALYSIS																																	
Building Use	Model Area (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 LEAN' BER - SOURCE: BRUKL OUTPUT										REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m ² p.a.) 'BE LEAN' BER - SOURCE: BRUKLIN.P or 'SIM.CSV FILE					REGULATED CO ₂ EMISSIONS PER UNIT										Fabric Energy Efficiency (FEE)		
				Calculated BER 2012 (kgCO ₂ / m ²)	BRUKL BER 2012 (kgCO ₂ / m ²)	Space Heating (kWh/m ² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m ² p.a.)	Fuel type Domestic Hot Water		Lighting (kWh/m ² p.a.)	Auxiliary (kWh/m ² p.a.)	Cooling (kWh/m ² p.a.)	Natural Gas	Grid Electricity	Equipment		2012 CO ₂ emissions (kgCO ₂ p.a.)	Natural Gas	Grid Electricity	Equipment												
Barton Building	1369	1	1369	14.4	14.4	5.44	Natural Gas	4.5	Natural Gas			22.03	0.11	1.41		10	24	32		19,679	10	24	32										
Sum	1,369	1	1,369	14.4	-	7,447	N/A	6,161	N/A	N/A	N/A	30,159	151	1,930		13,608	32,254	44,000		19,679	13,608	32,254	44,000										
SITE-WIDE ENERGY CONSUMPTION AND CO ₂ ANALYSIS																																	
Use	Total Area (m ²)	Calculated BER 2012 (kgCO ₂ / m ²)	-	REGULATED ENERGY CONSUMPTION										REGULATED CO ₂ EMISSIONS					REGULATED CO ₂ EMISSIONS					Fabric Energy Efficiency (FEE)									
				Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Secondary Heating System (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.)																			
Sum	1,369	14.4	-	7,447		6,161		0		30,159	151	1,930		19,679																			

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 CO, PERFORMANCE

SAP 10.0 CO₂ PERFORMANCE

DOMESTIC ENERGY CONSUMPTION AND CO₂ ANALYSIS[illegible]NON-DOMESTIC ENERGY CONSUMPTION AND CO₂ ANALYSIS

Validation Check				REGULATED ENERGY CONSUMPTION BY END USE (kWh/m² p.a.) 'BE CLEAN' BER - SOURCE: BRUKL OUTPUT												REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m² 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 (kWh/m² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m² p.a.)	Fuel type Domestic Hot Water	Electricity generated by CHP (-)	Electricity generated by CHP (-) If applicable	Lighting (kWh/m² p.a.)	Auxiliary (kWh/m² p.a.)	Cooling (kWh/m² p.a.)	Natural Gas		Electricity Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) If applicable	Equipment	2012 CO₂ emissions (kgCO₂ p.a.)	Natural Gas		Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-) If applicable	Equipment	SAP 10.5 CO₂ emissions (kgCO₂ p.a.)	BRUKL BER SAP10.0 (kgCO₂ / m²)				
Barton Building	1369	1	1369	14.4	14.4	5.44	Natural Gas	4.5	Natural Gas	N/A	N/A	N/A	N/A	N/A	22.03	0.11	1.41	0.216 kgCO₂/kWh	0.519 kgCO₂/kWh	0.000 kgCO₂/kWh	0.519 kgCO₂/kWh	0.519 kgCO₂/kWh	19.679	0.210 kgCO₂/kWh	0.233 kgCO₂/kWh	0.000 kgCO₂/kWh	0.233 kgCO₂/kWh	0.233 kgCO₂/kWh	10.373	7.6					
Sum	1,369	1	1,369	14.4	-	7,447	N/A	6,161	N/A	0		36,159	151	1,930	13,608	32,254	0	0		44,000		19,679	13,608	32,254	0	0	44,000	10,373	7.6						

SITE-WIDE ENERGY CONSUMPTION AND CO₂ ANALYSIS

Use	Total Area (m²)	Calculated BER 2012 (kgCO ₂ / m²)	-	REGULATED ENERGY CONSUMPTION										REGULATED CO ₂ EMISSIONS			REGULATED CO ₂ 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.) <i>If applicable</i>	Secondary Heating System (kWh p.a.)	N/A	Lighting (kWh p.a.)						Auxiliary (kWh p.a.)	Cooling (kWh p.a.)
Sum	1,369	14.4	-	7,447		6,161		0		0	0		30,159	151	1,930			19,679	10,373	7.6

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	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

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)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Cumulative on site savings	0.0	0%
Annual savings from off-set payment	0.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	0	-
Cash in-lieu contribution (£)	0	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

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	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

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)	(%)
Be lean: Savings from energy demand reduction	0.0	0%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	0.0	0%
Cumulative on site savings	0.0	0%
Annual savings from off-set payment	0.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	0	-
Cash in-lieu contribution (£)	0	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

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 CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	20.9	
After energy demand reduction (be lean)	19.7	

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

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	12.0	
After energy demand reduction (be lean)	10.4	

After heat network connection (be clean)	19.7	
After renewable energy (be green)	16.2	

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)	(%)
Be lean: savings from energy demand reduction	1.2	6%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	3.5	17%
Total Cumulative Savings	4.7	22%
Annual savings from off-set payment	16.2	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	486	-
Cash in-lieu contribution (£)	46,210	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SITE-WIDE

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2013 baseline	20.9		
Be lean	19.7	1.2	6%
Be clean	19.7	0.0	0%
Be green	16.2	3.5	17%
Total Savings	-	4.7	22%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	486.4	-

After heat network connection (be clean)	10.4	
After renewable energy (be green)	7.3	

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

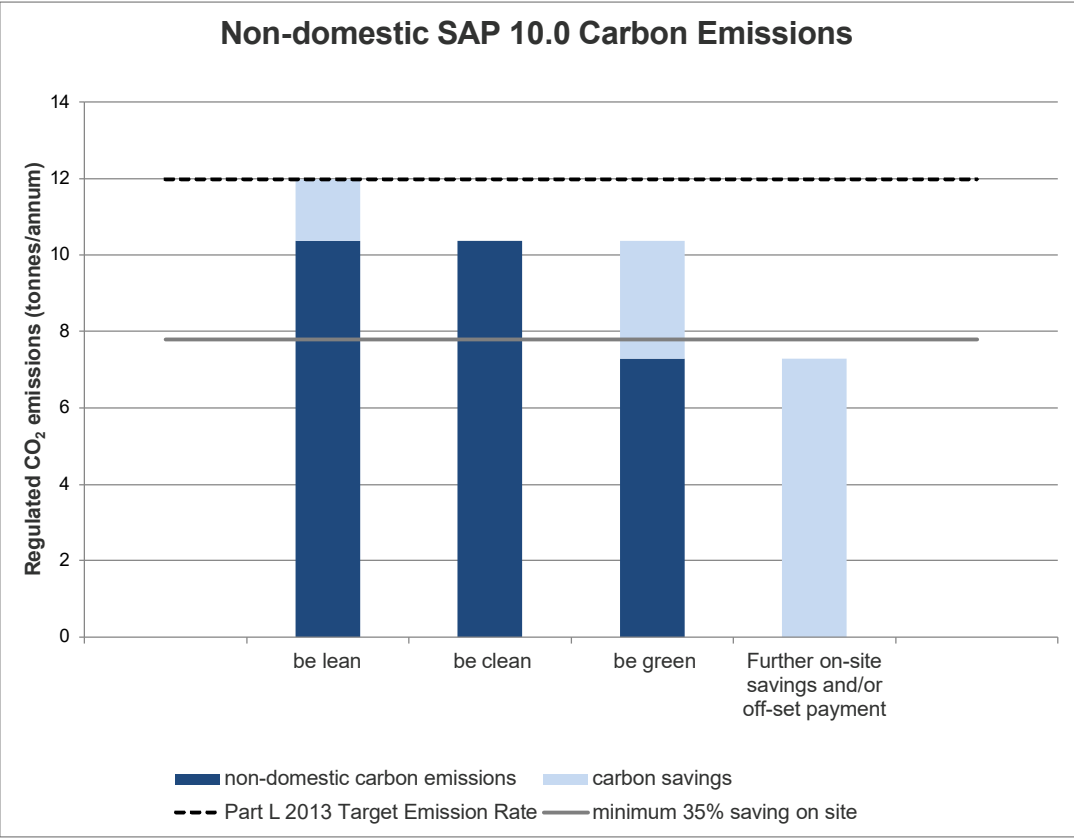
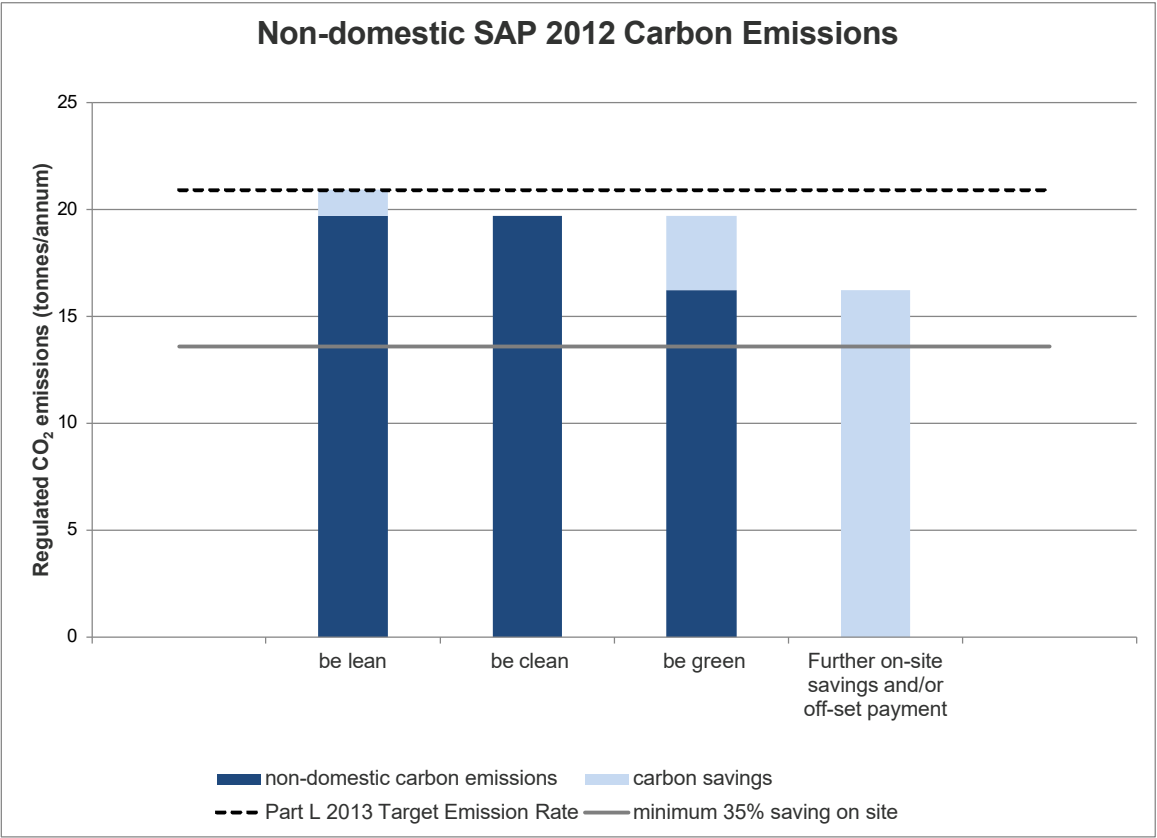
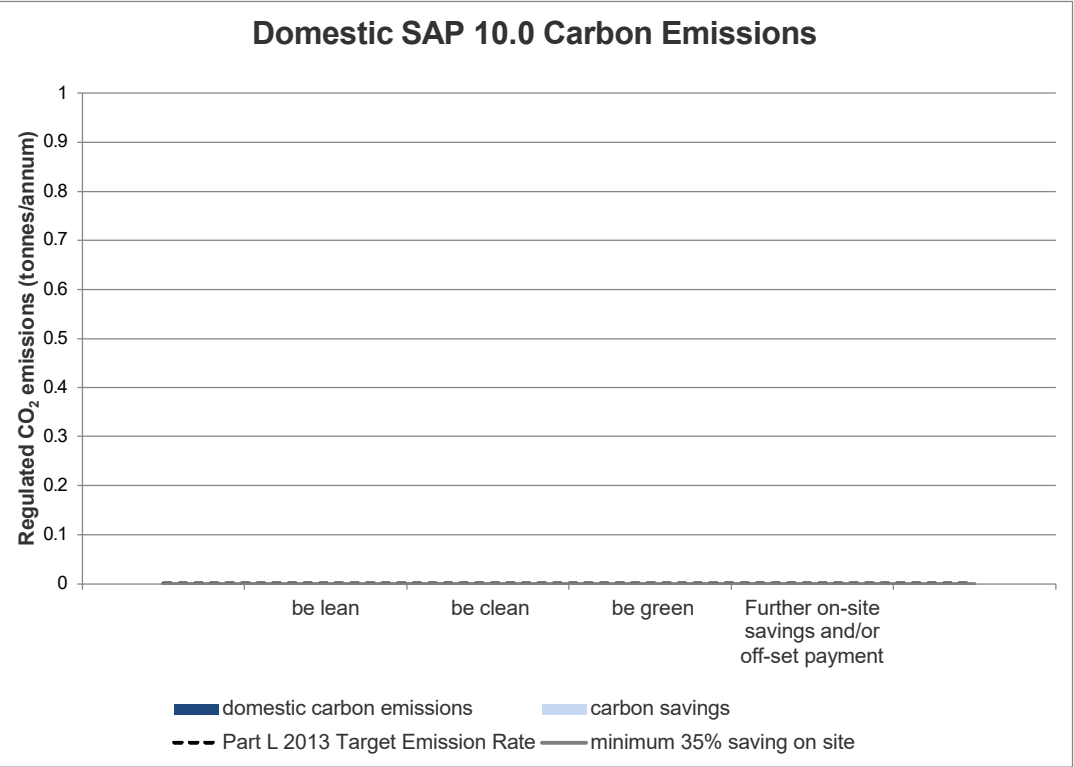
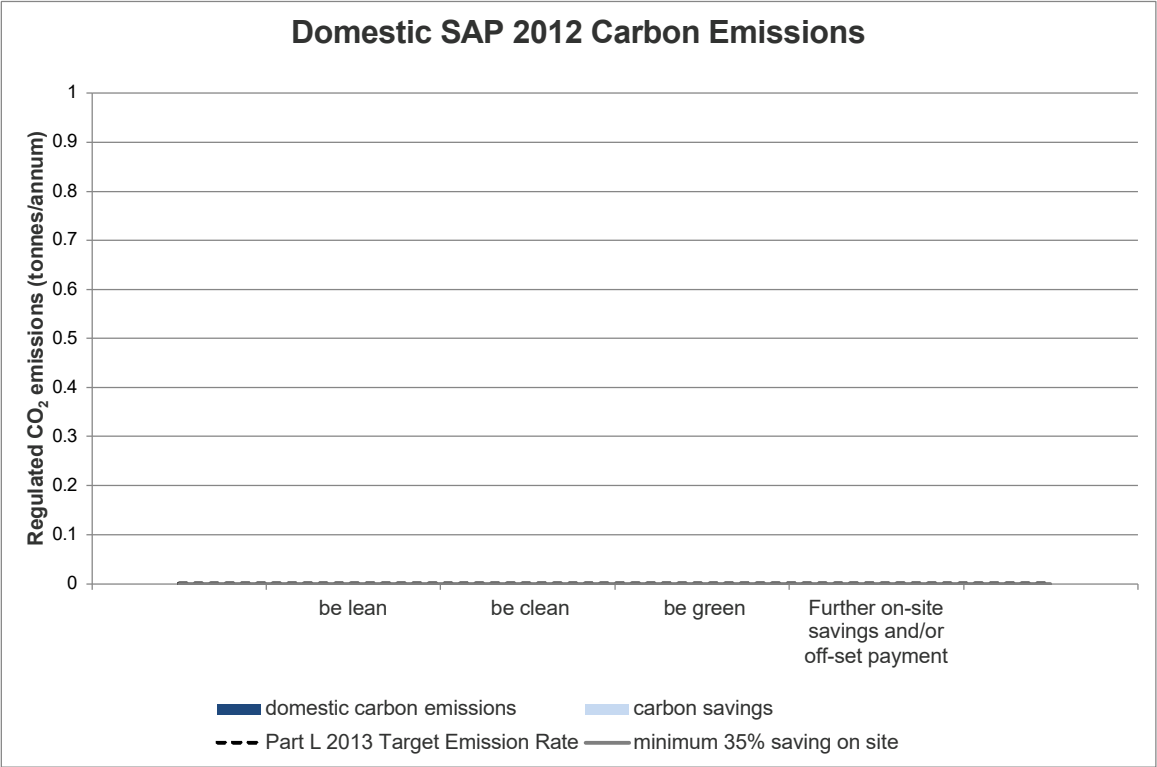
	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	1.6	13%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	3.1	26%
Total Cumulative Savings	4.7	39%
Annual savings from off-set payment	7.3	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	218	-
Cash in-lieu contribution (£)*	20,745	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2013 baseline	12.0		
Be lean	10.4	1.6	13%
Be clean	10.4	0.0	0%
Be green	7.3	3.1	26%
Total Savings	-	4.7	39%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	218.4	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	0.00	0.00	

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



APPENDIX IV – BASELINE & BE-LEAN BRUKL REPORT

Project name

Shell and Core

Unit 1(Be-Lean)

As designed

Date: Tue May 18 16:59:47 2021

Administrative information

Building Details

Address: Barton Buildings Site, Uxbridge Industrial Estate,
London, UB8 2SN

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: Ciaran Dorrity**Telephone number:** 01908062819**Address:** Unit 2 Lodge Farm Business Centre,
Castlethorpe, MK19 7ESCriterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.3
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.3
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	14.4
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 -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	"Ground Floor - Reception_P_6"
Floor	0.25	0.12	0.12	"Ground Floor - Reception_S_3"
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	1.5	1.5	"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 -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* 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	<0.9

1- Be-Lean Split Hvac

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
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.					

2- BOH Heating (Be-Lean)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
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

1- Instantaneous Water Heaters (Be-Lean)

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.91	-
Standard value	0.9*	N/A
* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.		

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 - WC 4	-	-	0.4	-	-	-	-	-	-	-	-	N/A
Ground Floor - WC 2	-	-	0.4	-	-	-	-	-	-	-	-	N/A
Ground Floor - WC 1	-	-	0.4	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Ground Floor - Reception	NO
First floor - Office Mezz Floor	NO
Ground Floor - Unit 1 Warehouse	NO
Ground Floor - Stair Up 2	NO
Ground Floor - Incoming Services	NO

Shell and core configuration

Zone	Assumed shell?
Ground Floor - WC 4	NO
Ground Floor - WC 2	NO
Ground Floor - WC 1	NO
Ground Floor - WC Lobby	NO

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
Ground Floor - Reception	-	-	115	115	110
First floor - Office Mezz Floor	-	115	-	-	1053
Ground Floor - Unit 1 Warehouse	-	115	-	-	4279
Ground Floor - Stair Up 2	-	-	115	-	32
Ground Floor - Incoming Services	-	115	-	-	34
Ground Floor - WC 4	-	-	115	-	27
Ground Floor - WC 2	-	-	115	-	29
Ground Floor - WC 1	-	-	115	-	28
Ground Floor - WC Lobby	-	-	115	-	35

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	NO (-52.3%)	NO
First floor - Office Mezz Floor	NO (-68%)	NO
Ground Floor - Unit 1 Warehouse	NO (-97.2%)	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]	1369	1369
External area [m ²]	4291.6	4291.6
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	4	7
Average conductance [W/K]	760.5	1496.04
Average U-value [W/m ² K]	0.18	0.35
Alpha value* [%]	9.92	30.68

* 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
100	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/m²]

	Actual	Notional
Heating	5.44	12.05
Cooling	1.41	1.72
Auxiliary	0.11	0.14
Lighting	22.03	21.15
Hot water	4.5	4.74
Equipment*	32.48	32.48
TOTAL **	33.5	39.8

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

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

Energy Production by Technology [kWh/m²]

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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	130.89	315.66
Primary energy* [kWh/m ²]	84.45	89.36
Total emissions [kg/m ²]	14.4	15.3

* 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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	80.5	109.2	25	8.1	0	0.89	3.74	0.91	5
	Notional	173.5	128.4	58.8	9.9	0	0.82	3.6	----	----
[ST] No Heating or Cooling										
	Actual	66.3	51.5	0	0	0	0	0	0	0
	Notional	192.6	127.3	0	0	0	0	0	----	----
[ST] Other local room heater - fanned, [HS] Room heater, [HFT] Natural Gas, [CFT] Natural Gas										
	Actual	128.4	12.2	46.5	0	4.8	0.77	0	0.91	0
	Notional	228.8	41.9	77.6	0	5.9	0.82	0	----	----

Key to terms

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

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-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	"Ground Floor - Reception_P_6"
Floor	0.2	0.12	"Ground Floor - Reception_S_3"
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	1.5	"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-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-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 V – BE-GREEN BRUKL REPORT

Project name

Shell and Core

Unit 1(Be-green)

As designed

Date: Tue May 18 17:15:26 2021

Administrative information

Building Details

Address: Barton Buildings Site, Uxbridge Industrial Estate,
London, UB8 2SN

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: Ciaran Dorrity**Telephone number:** 01908062819**Address:** Unit 2 Lodge Farm Business Centre,
Castlethorpe, MK19 7ESCriterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	11.8
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 -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	"Ground Floor - Reception_P_6"
Floor	0.25	0.12	0.12	"Ground Floor - Reception_S_3"
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	1.5	1.5	"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 -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* 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	<0.9

1- Be-green Split Hvac

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					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.					

2- BOH Heating (Be-green)

	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

1- Instantaneous Water Heaters (Be-green)

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	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		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
Ground Floor - WC 4	-	-	0.4	-	-	-	-	-	-	-	-	N/A
Ground Floor - WC 2	-	-	0.4	-	-	-	-	-	-	-	-	N/A
Ground Floor - WC 1	-	-	0.4	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Ground Floor - Reception	NO
First floor - Office Mezz Floor	NO
Ground Floor - Unit 1 Warehouse	NO
Ground Floor - Stair Up 2	NO
Ground Floor - Incoming Services	NO
Ground Floor - WC 4	NO

Shell and core configuration

Zone	Assumed shell?
Ground Floor - WC 2	NO
Ground Floor - WC 1	NO
Ground Floor - WC Lobby	NO

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Ground Floor - Reception		-	115	115	110
First floor - Office Mezz Floor		115	-	-	1053
Ground Floor - Unit 1 Warehouse		115	-	-	4279
Ground Floor - Stair Up 2		-	115	-	32
Ground Floor - Incoming Services		115	-	-	34
Ground Floor - WC 4		-	115	-	27
Ground Floor - WC 2		-	115	-	29
Ground Floor - WC 1		-	115	-	28
Ground Floor - WC Lobby		-	115	-	35

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	NO (-52.3%)	NO
First floor - Office Mezz Floor	NO (-68%)	NO
Ground Floor - Unit 1 Warehouse	NO (-97.2%)	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]	1369	1369
External area [m ²]	4291.6	4291.6
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	4	7
Average conductance [W/K]	760.5	1496.04
Average U-value [W/m ² K]	0.18	0.35
Alpha value* [%]	9.92	30.68

* 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
100	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/m²]

	Actual	Notional
Heating	1.98	5.26
Cooling	1.41	1.72
Auxiliary	0.11	0.14
Lighting	22.03	21.15
Hot water	4.09	4.74
Equipment*	32.48	32.48
TOTAL **	29.63	33.01

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

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	6.81	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	130.89	315.66
Primary energy* [kWh/m ²]	90.97	86.42
Total emissions [kg/m ²]	11.8	15.5

* 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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	80.5	109.2	5.7	8.1	0	3.92	3.74	4	5
	Notional	173.5	128.4	19.8	9.9	0	2.43	3.6	----	----
[ST] No Heating or Cooling										
	Actual	66.3	51.5	0	0	0	0	0	0	0
	Notional	192.6	127.3	0	0	0	0	0	----	----
[ST] Other local room heater - fanned, [HS] Room heater, [HFT] Electricity, [CFT] Natural Gas										
	Actual	128.4	12.2	42.3	0	4.7	0.84	0	1	0
	Notional	228.8	41.9	77.6	0	5.9	0.82	0	----	----

Key to terms

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

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-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	"Ground Floor - Reception_P_6"
Floor	0.2	0.12	"Ground Floor - Reception_S_3"
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	1.5	"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-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-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