Arthur Stanley House
Sustainability and Energy Statement

Westbrook Partners / 1921 Mortimer Investments Limited

July 2017

GREEN BUILDING DESIGN CONSULTANTS

SRE

Sustainability & Energy Statement

(Incl BREEAM LZC Feasibility statement)

1921 Mortimer Investments Ltd

FOR THE SITE AT:

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SRE Energy Specialists

This report has been completed by SRE Ltd with input from various energy and sustainability consultants either certified in SAP, iSBEM and dynamic modelling (IES) as well as BREEAM or with substantial experience in energy modelling and assessments. Please visit the SRE website for full details and individual qualifications.

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Executive Summary

This Sustainability and Energy Statement has been undertaken by SRE & Green Building Design Consultants for the Proposed Development at Arthur Stanley House, London for 1921 Mortimer Investments Ltd (the Client) in order to meet the Planning Policy requirements of the London Borough of Camden Council.

Sustainability issues relating to the site as a whole, the construction process, building design and operation have been considered.

In particular, the energy and water efficiency measures for the Proposed Development have been assessed in some detail.

This statement assesses 'Best Practice', energy efficiency measures and renewable energy solutions for the Proposed Development. The inclusion of energy efficiency measures has been discussed to minimise on-site energy use compared to a building regulation compliant design. These include improved insulation levels, high specification glazing and energy efficient lighting and appliances.

The feasibility of incorporating low and zero carbon energy sources has also been assessed with PV installations on the flat roof of both the office block and residential block being proposed for the site.

SAP and SBEM calculations have been carried out to confirm the energy strategy delivers a high standard of fabric efficiency in conjunction with high efficiency heating systems to exceed Building Regulations 2013 Part L compliance for the commercial and residential units.

Water efficiency measures have been considered and the Proposed Development will achieve a predicted water consumption of no greater than 17.61 litres per person per day for the commercial units and no greater than 110 litres per person per day for the residential units.

The Proposed Development will meet all relevant policies and requirements set out within the Camden Local Plan and the London Plan, the result of which is the provision of a resource efficient, sustainable development. The following standards are being proposed:

Residential Block

- A thermally efficient building fabric specification as per Table 8
- Accredited Construction Details for all applicable thermal bridges (and IG Hi-Therm lintels for the dwellings)
- Air-permeability of ~4m^3/hr/m^2
- A communal CHP system with HIU to each dwelling
- 2.7 kWp PV Array on the flat roof of the residential block
- AC units to provide comfort cooling
- Efficient lighting design to reduce power consumption
- Efficient water fittings to reduce indoor water demand
- Home Quality Mark 'level 3' compliance

Commercial Block

- A thermally efficient building fabric specification as per Table 8
- Accredited Construction Details for all applicable thermal bridges (and IG Hi-Therm lintels for the dwellings)
- Air-permeability of ~5m^3/hr/m^2
- VRV system to provide heating and cooling for offices
- 10.4kWp PV Array on the flat roof of plant room
- Efficient lighting design as per Figure 10

- Separate metering for all major commercial energy loads, which includes 'out-of-range' values (minimum of heating, cooling, lighting and ventilation)
- Efficient water fittings to reduce indoor water demand
- BREEAM 2014 'Excellent' compliance overall

Unit Type	Commercial	Residential
Energy Baseline (tonnesCO_2/ yr)	41.05	14.07
Be Lean (tonnesCO_2/ yr)	30.67	13.89
Be Clean (tonnesCO_2/ yr)	23.47	9.68
Be Green (tonnesCO_2/ yr)	19.17	9.03
Total Cumulative Savings	**53.30%**	**35.80%**

Table 1: Proposed Solution Summary

Table 1 (above), and Figures 1 and 2 (below) demonstrate that the site-wide estimated emissions have been reduced in accordance with the Camden Local Plan and the London Plan.

A 19% improvement over Building Regulations Part L1A (dwellings) and 35% improvement over Part L2A (commercial) 2013 target emissions rates, compared to a compliant gas based solution, have been achieved by implementing the "be lean, be clean, be green" national energy policy methodology.

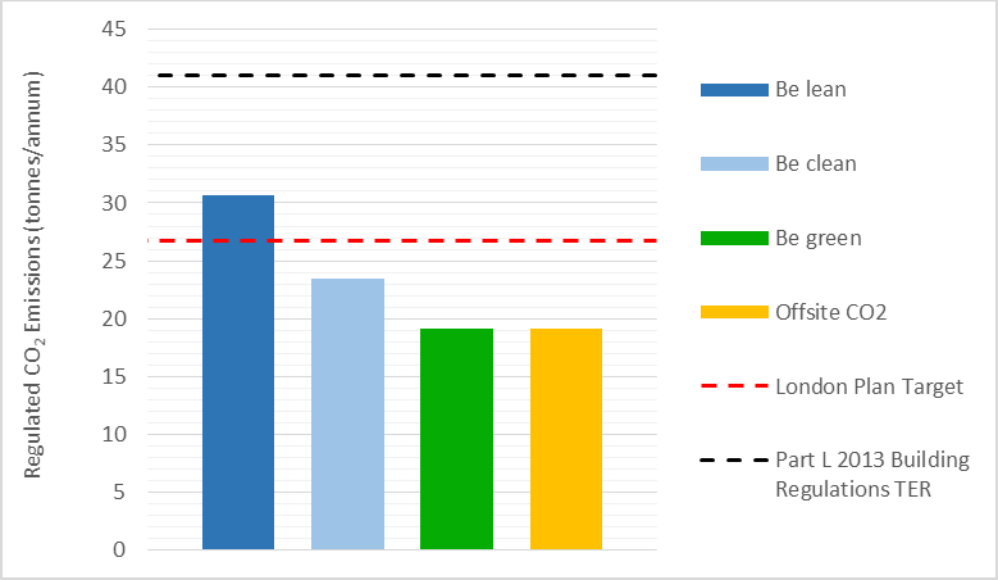


Figure 1: 'Lean, clean and green' Summary New Commercial Areas

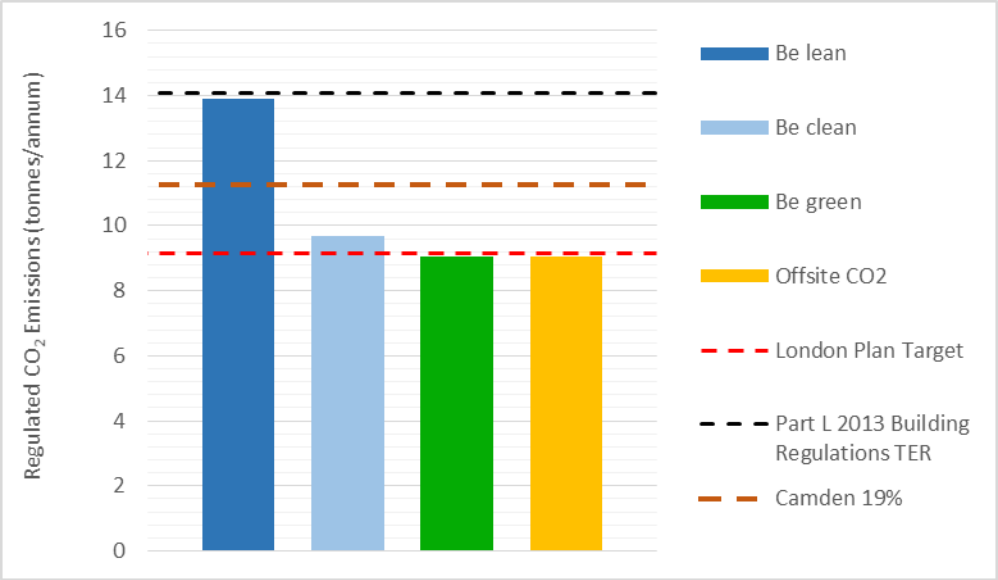


Figure 2: 'Lean, clean and green' Summary Residential Units

1.0 Introduction

1.0.1 The Sustainability and Energy Statement (BREEAM LZC feasibility report) has been prepared by SRE with Green Building Design Consultants in support of the planning application for Arthur Stanley House, Camden (Proposed Development) for 1921 Mortimer Investments Ltd (the Client).

1.0.2 The Statement provides a prediction of the Proposed Development's energy baseline requirement compared to a Building Regulation compliant design, outlines the use of energy efficiency measures, and assesses suitable renewable energy technologies in relation to the site layout, building design, energy demand and in response to the relevant planning requirements for the new build units.

1.0.3 The Statement also details how the Proposed Development responds to the relevant planning requirements as part of an overall sustainability assessment, and addresses key factors in relation to sustainability under the following headings:

- Site Location and Land Use
- Construction Processes
- Materials
- Water
- Pollution Impacts
- Health and Wellbeing

1.0.4 This statement will also address issues of a wider context such as urban design and social impacts to ensure the development relates to the community it sits in and enhances the local environment (social, natural and economic) of the surrounding area.

1.1 The Proposed Development

1.1.1 The Proposed Development at Arthur Stanley House, Camden is a mixed-use development that consists of the extension of an existing commercial building to comprise of a Basement, Lower Ground, Ground and Seven upper storeys of commercial space with a reception area on the ground floor. There will also be an additional nine new dwellings spread over a Lower Ground, Ground and three upper storeys in a separate conjoined block at the rear.

Figure 3: Proposed Development Elevations. Southeast (left) shows the façade of the commercial space, Northeast (right) shows the façade of the residential space

1.1.2 The existing site consists of a vacant former hospital building, which will be refurbished for commercial use with a rear extension added. A new building composed of one lower ground and three upper storeys is proposed to the rear for the residential units as part of the new mixed use development. The Ground floor plans for both blocks are included in Appendix A with further details within the architect's drawings.

2.0 Applicable Standards and Policy

2.0.1 The World Commission on Environment and Development (WCED) report: Our Common Future, describes Sustainable Development as development that:

"meets the needs of the present without compromising the ability of future generations to meet their own needs."

2.0.2 The broad concept of Sustainable Development is taken into account within the Sustainability and Energy Statement. However, the focus is on successfully meeting the requirements of planning policy and guidance, with key documents listed below.

2.0.3 The outline approach for the Proposed Development is to address the site wide sustainability issues with the aim of:

- minimising the Proposed Development's overall environmental impact during construction and operation
- developing housing suitable for local needs
- integrating with other local residential neighbourhoods

2.1 National Standards

2.1.1 National Standards are the legal requirements within the UK Construction industry and recent changes resulted from the Deregulation Act 2015 which attempted to streamline construction compliance issues to one overall compliance requirement under the Building Regulations.

2.1.2 These requirements replace various assessment methods previously used to demonstrate best practice in terms of design, and combine what are thought to be the pertinent issues into the Building Regulations, thus removing the need for compliance under third party assessment methodologies such as the Code for Sustainable Homes and lifetime homes.

2.2 Planning Policies

2.2.1 The following planning policy and guidance has been used to inform the strategy and to ensure that the Proposed Development meets all requirements imposed on it through Planning Policy:

- Camden Local Plan – 2017

Supporting Policies

- London Plan 2016 (including FALP)
- Mayor of London Sustainable Design and Construction SPG – April 2014
- Camden Planning Guidance 3 – Sustainability

Key Planning Policies – Camden Local Plan

2.2.2 The Sustainability & Energy Statement primarily aims to address the requirements of the Local Plan Policy CC1, with policies CC2-5 also being of relevance:

Climate Change Mitigation

Any new development in Camden has the potential to increase carbon dioxide emissions in the borough. If we are to achieve local, and support national, carbon dioxide reduction targets, it is crucial that planning policy limits carbon dioxide emissions from new development wherever possible and supports sensitive energy efficiency improvements to existing buildings.

Policy CC1 Climate Change mitigation

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

- *promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;*
- *require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;*
- *ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;*
- *support and encourage sensitive energy efficiency improvements to existing buildings;*
- *require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and*
- *expect all developments to optimise resource efficiency.*

For decentralised energy networks, we will promote decentralised energy by:

- *working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;*
- *protecting existing decentralised energy networks (e.g. at Gower Street Bloomsbury, Kings Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and*
- *requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.*

The Energy Hierarchy

The Council's Sustainability Plan 'Green Action for Change' commits the Council to seek low and where possible zero carbon buildings. New developments in Camden will be expected to be designed to minimise energy use and CO^2 emissions in operation through the application of the "energy hierarchy". The energy hierarchy is a sequence of steps that minimise the energy consumption of a building. Buildings designed in line with the energy hierarchy prioritise lower cost passive design measures, such as improved fabric performance over higher cost active systems such as renewable energy technologies.

All new residential development will be required to demonstrate a 19% CO^2 reduction below Part L 2013 Building Regulations (in addition to any requirements for renewable energy). This can be demonstrated through an energy statement or sustainability statement.

Be lean:

Proposals should demonstrate how passive design measures including the development orientation, form, mass, and window sizes and positions have been taken into consideration to reduce energy demand, demonstrating that the minimum energy efficiency requirements

required under building regulations will be met and where possible exceeded. This is in line with stage one of the energy hierarchy 'Be lean'.

Be clean:

The second stage of the energy hierarchy 'Be clean' should demonstrate how the development will supply energy efficiently through decentralised energy. Please refer to the section below on decentralised energy generation.

Be green:

The Council will expect developments of five or more dwellings and/or more than 500 m^2 of any gross internal floor space to achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation (which can include sources of site related decentralised renewable energy) unless it can be demonstrated that such provision is not feasible. This is in line with stage three of the energy hierarchy 'Be green'. The 20% reduction should be calculated from the regulated CO^2 emissions of the development after all proposed energy efficiency measures and any CO^2 reduction from non-renewable decentralised energy (e.g. CHP) have been incorporated.

All major developments will also be expected to demonstrate how relevant London Plan targets for CO^2 reduction, including targets for renewable energy, have been met. Where it is demonstrated that the required London Plan reductions in carbon dioxide emissions cannot be met on site, the Council will require a financial contribution to an agreed borough wide programme to provide for local low carbon projects. The borough wide programme will be connected to key projects identified in the Council's Green Action for Change.

Policy CC2 Adapting to Climate Change

- *Encourage new build residential development to use the Home Quality Mark and Passivhaus design standards;*
- *Expecting developments (conversions/extensions) of 500m^2 of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and*
- *Expecting non-domestic developments of 500m^2 of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.*

Policy CC3 Water and flooding

We will require development to:

- *Incorporate water efficiency measure;*
- *avoid harm to the water environment and improve water quality;*
- *utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy, unless inappropriate, to achieve a greenfield run-off rate where feasible; and*
- *not locate vulnerable development (such as basement dwellings) in flood-prone areas*

Policy CC4 Air Quality

The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and

the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

Policy CC5 Waste

The Council will seek to make Camden a low waste borough. We will:

- *aim to reduce the amount of waste produced in the borough and increase recycling and the reuse of materials to meet the London Plan targets of 50% of household waste recycled/composted by 2020 and aspiring to achieve 60% by 2031;*
- *deal with North London's waste by working with our partner boroughs in North London to produce a Waste Plan, which will ensure that sufficient land is allocated to manage the amount of waste apportioned to the area in the London Plan;*
- *safeguard Camden's existing waste site at Regis Road unless a suitable compensatory waste site is provided that replaces the maximum throughput achievable at the existing site; and*
- *make sure that developments include facilities for the storage and collection of waste and recycling.*

Key Planning Policies – London Plan 2015 (including FALP)

2.2.3 The Sustainability & Energy Statement primarily aims to address the requirements of the London Plan Policy 5.2.

Policy 5.2. Minimising Carbon Dioxide Emissions

The Mayor will work with Boroughs and developers to ensure that "major developments[1]" meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

	Improvement on 2013 Building Regulations Residential Buildings	Improvement on 2013 Building Regulations Non-domestic buildings
2010-2013	19%	19%
2013-2016	35%	35%
2016-2019	Zero carbon	As per building regulations requirements
2019-2031		Zero Carbon

[1] Defined within the London Plan (2016) as developments where 10+ units are to be constructed OR where the floor area is 1000m²+

Table 2: London Plan CO_2 emissions reduction requirements

Key Planning Policies – Camden Planning Guidance 3 – Sustainability

Camden CPG3 is a broad advisory document that the entire range of sustainability thresholds employed by the London Borough of Camden.

"The Council is committed to reducing Camden's carbon emissions. This will be achieved by implementing large scale projects such as installing decentralised energy networks alongside smaller scale measures, such as improving the insulation and energy performance of existing buildings."

Applicability to Proposed Development

2.2.4 The Proposed Development will deliver the following sustainability and energy standards based on the applicable planning policies.

2.2.5 The residential block is considered a 'minor' residential development in the context of the London Plan requirements as it contains <10 dwellings, yet 'major' in the context of the Camden Local Plan as it contains > 5 dwellings. Therefore it is expected to achieve:

- 19% improvement over Building Regulations 2013 Part L1A.
- An additional 20% carbon offset from Low or Zero Carbon Technologies once all proposed energy efficiency measures have been accounted for.
- Home Quality Mark level 3
- General sustainability measures (CC3-5)

2.2.6 The commercial space is considered a 'major' development in both the Camden and London Plans due to the proposed new floor space being >500m^2 and >1000m^2 respectively. Therefore the full context of Policies CC1 and CC2of the Camden Local Plan and Policy 5.2 of the London Plan will be applicable for the commercial extension. The commercial space will therefore need to demonstrate:

- A 35% improvement over Building Regulations 2013 Part L1A compliance for the new extension. (London Plan)
- An additional 20% carbon offset from Low or Zero Carbon Technologies on the new extension once all proposed energy efficiency measures have been enforced. (CC1)
- A 19% improvement over Building Regulations 2013 Part L2B within the existing building.(CC1)
- BREEAM 'Excellent' rating for the new extension (CC2)
- General sustainability measures (CC3-5)

3.0 Sustainability Assessment

3.1 Site Location and Land Use

3.1.1 Site wide sustainability issues related to the Proposed Development have been considered. The Proposed Development consists of the main commercial building facing southeast with an open terraced roof on the seventh and restricted access terrace on the eighth floor, and the extensions forming terraced roofs at the rear of the building. Adjacent to this, to the northeast (rear) of the commercial building, is the proposed residential block. The footprint of the residential block is on the only existing external space (hard standing), therefore the only outdoor space would have to be located on the new rear terraces.

Contaminated Land

3.1.2 Environment Agency map data indicates no cases of pollution/contamination at the site or in the immediate vicinity (Figure 4). Whilst there are multiple sites in the surrounding area wherein radioactive substances have been permitted to be released into the sewers (mostly from former NHS and university buildings) and also an instance of chemicals being released into the atmosphere in 2002, both of these instances are unlikely to have any effect on the site in question.

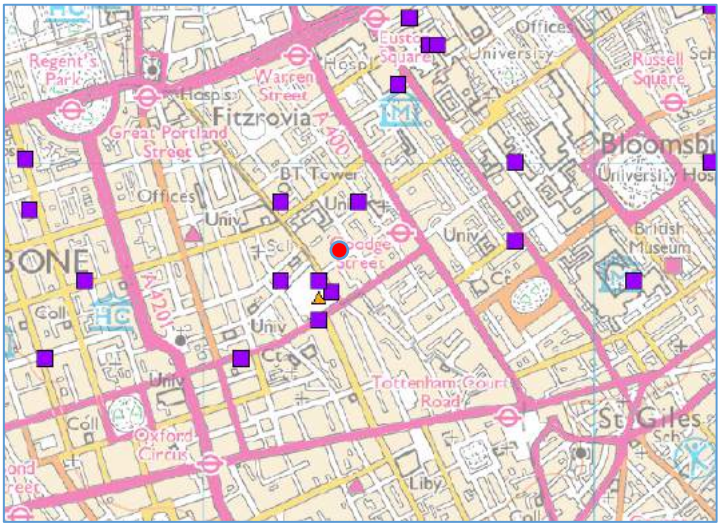


Figure 4: EA Pollution Map. Site marked by Red Circle

3.1.3 Environment agency map data also shows no sites of historic landfill disposal located at the site or within the surrounding area (Figure 5).

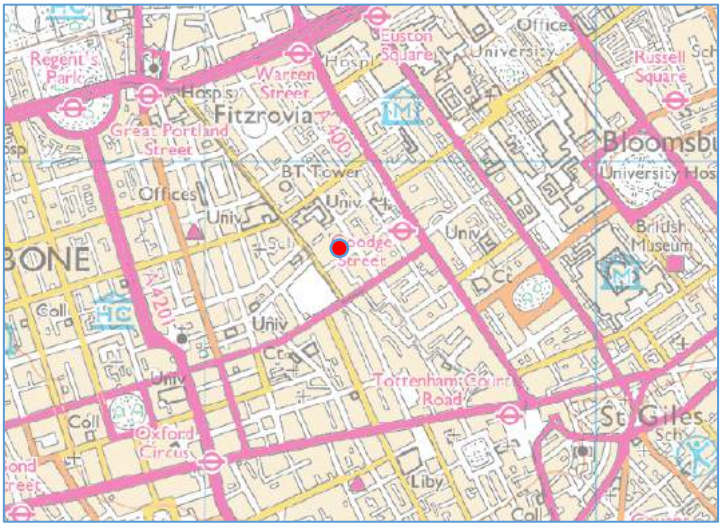


Figure 5: EA Landfill Map. Site marked by Red Circle

Flood Risk and Design

3.1.4 A Flood Risk analysis has been undertaken through the Environment Agency's flood mapping service (Figure 6) and the Proposed Development is shown to be located in Flood Zone 1.

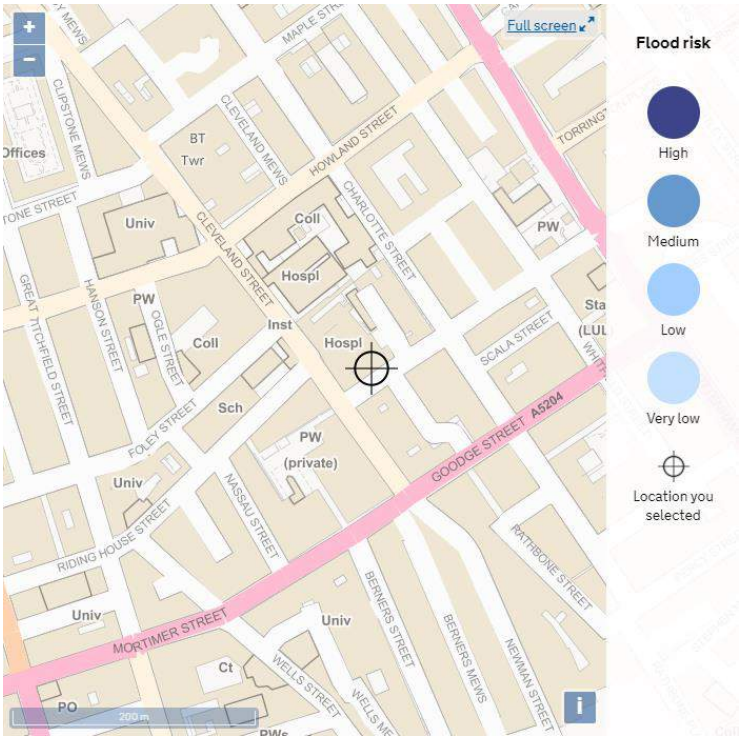


Figure 6: Flood Map – Environment Agency Flood Mapping Service

3.1.5 It should be noted that the Environment Agency's Flood Risk Mapping Service is only indicative and does not take into account the possibility of flooding from local sources and flash flooding potential.

3.1.6 As per the BREEAM Pol 03 criteria, a BREEAM compliant supplementary flood risk assessment (FRA) will be submitted as part of the formal planning application.

3.1.7 The full and comprehensive FRA will cover the risks of both on and off-site flooding to and from the development for all sources and it will demonstrate that the development will include sustainable drainage systems (SUDS) where applicable.

Biodiversity

3.1.8 As per the LE 01-05 criteria, a BREEAM compliant full and comprehensive ecology report of the on-site biodiversity (pre and post development) has been undertaken in support of the formal planning application by The Ecology Consultancy.

3.1.9 Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The proposed development currently consists of an existing office building and hard standing and is therefore expected to be of low ecological value

3.1.10 The compact urban nature and orientation of the site provides limited opportunities to enhance the ecology. However consideration will be given to enhancement measures that are feasible and appropriate to the character and context of the development.

3.1.11 Inclusion of living roofs and walls are technically feasible for the Proposed Development as referenced in the report. Their inclusion is not mandatory, but their feasibility for the site will need to be investigated in further detail at post-planning stage.

3.1.12 It has therefore been concluded that there is potential for a positive impact on the overall ecological value of the site and this will be qualified through the delivery of the BREEAM LE 1-5 criteria.

Transportation and Movement

3.1.13 The Proposed Development is located within ~3 minute safe walk of the nearest bust stop located on Goodge Street. This stop is served by 12 bus routes: (14, 24, 29, 73, 134, 390, N5, N20, N29, N73, N253, N279). In addition, the site is within ~300 metres safe walking distance of the Goodge Street Underground Station providing frequent underground services within London.

3.1.14 A Transport for London PTAL assessment has been carried out indicating that the location of the Proposed Development achieves PTAL rating of 6b, which represents outstanding access to public transport and the highest rating of accessibility.

3.1.15 The Proposed Development is also well served by local amenities with a food store, a restaurant, hotel, department store, and outdoor recreation space all located within a 1km radius.

3.1.16 As part of the Proposed Development, the use of alternative transport will be encouraged through the provision of safe, secure, indoor and outdoor cycle storage. The use of the cycling facilities and the local public transport networks will also be encouraged through the provision of relevant information and guidance to the building's occupants.

3.1.17 The site is also well served by cycle routes, with mostly on-road routes connecting the site to local amenities and services.

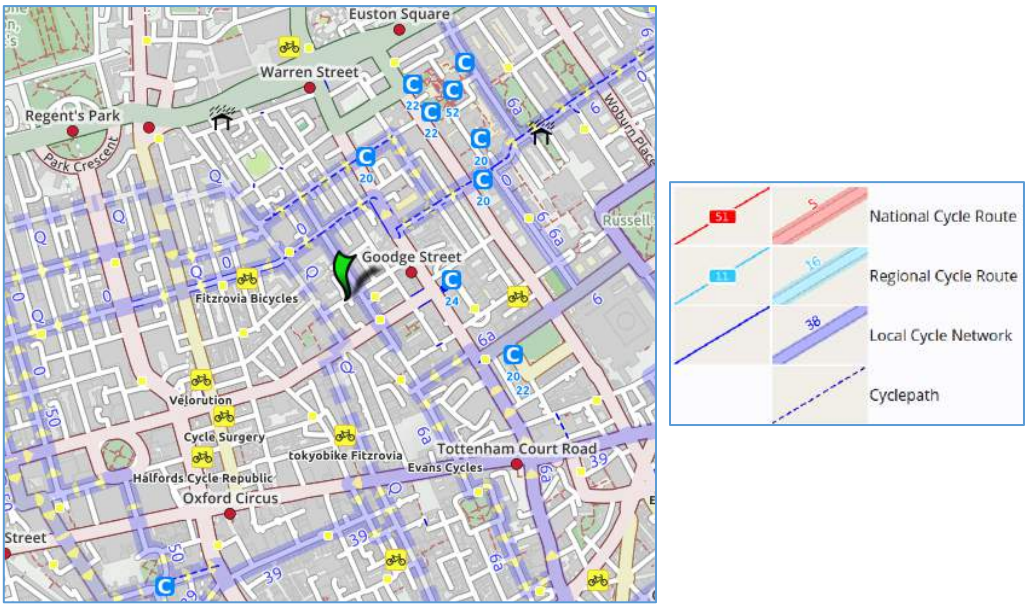


Figure 7: Nearby cycle routes and networks in relation to the site's location

3.1.18 The site is also adjacent to National Route 208, which links Raynes Park to Morden and provides a direct cycle route to Wimbledon train station as demonstrated in Figure 5 below.

3.1.19 The provision of cycle stores, and the sites close proximity to public transport facilities and amenities will aid in the promotion of sustainable transport choices by providing opportunities to walk and cycle.

3.1.20 A BREEAM compliant Transport Assessment and Travel Plan will need to be carried out and issued in support of planning.

3.2 Construction Processes

Construction Phase Waste Management

3.2.1 The Proposed Development will aim to minimise the waste produced from the site during the construction phase.

3.2.2 Poor specification of resources as part of the construction process can have a major environmental impact both in terms of the resources' manufacturing process, but also in terms of transport of the resources to site.

3.2.3 Surveys will be undertaken before significant work commences to ensure that the quantity of materials being delivered to site is correct and all materials, where possible are reused on site or segregated for recycling. A pre-refurbishment audit will also be undertaken in support of BREEAM and HQM. Ensuring the correct quantity of materials will ensure there is no wastage of materials on site, or excess pollution from surplus materials being returned to the supplier.

3.2.4 A comprehensive Resource Management Plan will be implemented from the outset of site works, following the principles of the waste hierarchy, with a target for 80% by volume (or 90% by tonnage) of the new build non-hazardous waste transported off site to be diverted from landfill. The pre-refurbishment audit conducted will be interred within the plan.

3.2.5 The construction waste generated as part of the redevelopment will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

3.2.6 Reusing materials on site will reduce the embodied energy of the development through the reuse of the energy that exists in that material. Transportation of new material to the site will be reduced, reducing the CO_2 emissions associated with transportation and material manufacture.

3.2.7 Where waste will need to be disposed of, this will be done in line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste recycling contractor. Nominal construction waste should be sent to landfill or for incineration unless this is unavoidable due to the materials found on the existing site.

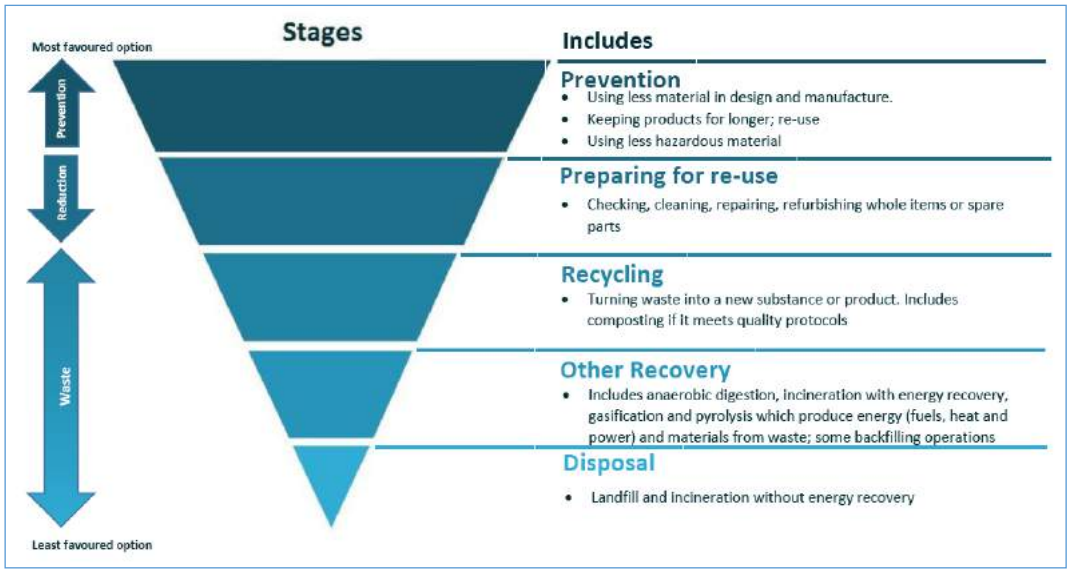


Figure 8: The Waste Hierarchy

3.2.8 The implementation of a Resource Management Plan will also be assessed as part of the BREEAM and HQM Wst 01 criteria.

Resource Management

3.2.9 Policies will be put in place for management of site impacts such as air and water pollution in line with industry best practice. Monitoring and reporting on carbon emissions and water use from site related activities will take place in line with national benchmarks.

3.2.10 The overall management of the construction waste will be monitored through the Considerate Constructors Scheme as part of Best Practice Site Management.

Considerate Constructors Scheme

3.2.11 The Considerate Constructors Scheme is a national, voluntary scheme, which is adopted by participating construction companies and everyone involved on the construction site. The scheme aims to assist and encourage contractors to carry out their operations in a safe and considerate manner, with due regard and causing minimum disturbance to local residents, businesses, passing pedestrians and road users.

3.2.12 As part of the overall management of the site, the main contractor will be encouraged to sign up to the Considerate Constructors Scheme[2] to ensure that high standards of construction are achieved. As per the BREEAM Man 01 criteria, a minimum score of 25 or above should be sought, with a minimum of 5 scored within each section. Targeting 35/50 will be sought.

3.2.13 The Scheme looks at the various aspects of construction work and sets appropriate standards in a number of categories relevant during the construction phase of a project, such as:

- Considerate
- Environment
- Cleanliness
- Good Neighbour
- Respectful
- Safe
- Responsible
- Accountable

3.3 Materials

3.3.1 The Proposed Development will use high quality, low impact materials. The form of construction for the scheme will be a concrete frame construction with brick cavity external walls, and all main structural elements of the construction will aim to achieve a Green Guide to Specification rating of A+ to D[3]. The BRE Green Guide to Specification assesses the environmental rating of materials against 11 weighted criteria, giving an overall grade from A+ to E.

3.3.2 Any materials used in a form of hard landscaping or boundary definition should also achieve a Green Guide rating of A/A+.

3.3.3 All timber is used on site will be legally sourced and certified and be from FSC and/or PEFC sources and all other materials sourced from suppliers who have an accredited Environmental Management System (EMS) (ISO14001, BS8555 or BES6001) for the extraction and process stages of the material manufacturing, ensuring that any environmental impact caused by the

2 http://www.considerateconstructorsscheme.org.uk
3 The Building Research Establishment – Green Guide to Specification 2008

building materials is analysed and mitigated where possible. Chain of custody certification will confirm this.

3.3.4 As standard industry best practice all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the Proposed Developments effect on global Climate Change.

3.3.5 Specified materials will be assessed in detail as part of the BREEAM & HQM assessment for the Proposed Development, contributing to sections Mat 01 - Mat 04 of BREEAM.

3.4 Water

3.4.1 London has been declared an area of serious water stress. Water is a vital resource and efficient usage should be encouraged in all buildings. The Proposed Development aims to significantly reduce mains water use through a combination of efficiency measures.

Surface Water Run-off

3.4.2 In line with Camden Local Plan Policy CC3 the site will aim to minimise the risk of Surface Water Flooding.

3.4.3 The Proposed Development consists of the refurbishment of the existing commercial building and the added residential block at the rear of the property where there is presently hardstanding. In line with Policy CC3 Water and Flooding of the Camden Local Plan, developments are required to utilise Sustainable Drainage Systems (SuDs) in order to reduce the surface water discharge unless demonstrated that this is not feasible.

3.4.4 The use of appropriate attenuation techniques and soakaways has been proposed for placement within the reside also be investigated as part of detailed design in order to reduce the overall flow and volume of surface water off the site. As a basement is proposed, it is unlikely that the onsite drainage will be achieved. It must be confirmed by a suitably qualified professional that flooding of the property will not occur in the event of local drainage system failure as per the Pol 03 criteria of the BREEAM Assessment.

Water Efficiency

3.4.5 Water efficiency will be managed in the Proposed Development through the use of fittings with a low capacity or flow restrictors. Where appropriate, aerating tap heads would also be fitted to taps to give the illusion of a higher flow of water.

3.4.6 The Proposed Development will reduce predicted potable water use for the commercial space to improve beyond the baseline performance by >50% under Wat 01 of the BREEAM Assessment through the following indicative specification:

- Kitchen sink taps to have a flow rate of 5 litres/min or less
- Hand-wash basin taps to have a flow rate of 3.75 litres/min or less
- WCs to have an effective flush volume of 2.95 litres or less (e.g. 4/2.6 litre dual flush)
- Showers to have a flow rate of 6 litres/min or less

3.4.7 Based on the BREEAM Water Efficiency Calculator, the specification listed will achieve a predicted water use of 17.61 litres per person per day.

3.4.8 For the Residential Block and in line with the Camden Local Plan Policy 8.56 to achieve water efficiency compliance of <110litres per head per day, water use for the residential units will be managed through the use of restricted flow rates on fittings. The Proposed Development

will reduce predicted internal potable water use to <110 litres/person/day[4] in line with the Camden Local Plan standards through the following indicative specifications:

- Kitchen sink taps have a flow rate of 5 litres/min or less
- Bathroom basin taps have a flow rate of 4 litres/min or less
- Low Flow Showers (not more than 6 litres/min)
- Dual Flush WC's (4/2.6 Litre)
- Baths (160 litres capacity)
- Washing Machine (5.5 litres/kg dry load)
- Dishwasher (1.25 litres/place setting)

3.4.9 Summary Part G calculations are provided in Appendix B.

3.5 Pollution Impacts

3.5.1 Pollution from the construction and operational phases of the Proposed Development will be addressed in order to minimise negative effects on the environment from waste and resource usage.

3.5.2 An air quality assessment has been undertaken by Waterman Infrastructure & Environment Limited that explores the existing air quality at and surrounding the site, the proposed impact that the development may have on air quality, before recommending measures to mitigate the impacts.

Energy and CO_2 Emissions

3.5.3 The Proposed Development's predicted energy use, suitable energy efficiency measures, low carbon and renewable technologies and associated CO_2 emissions reductions are assessed in detail in Section 4.0. As per Policy CC1 from the Camden Local Plan and Policy 5.2 of the London Plan, the Proposed Development must make a full contribution in following the London energy hierarchy, achieve at least 19% improvement over Building Regulations 2013 Part L1A for the residential units and 35% improvement over Building Regulations 2013 Part L2A for the new commercial extension, as well as both areas providing a 20% carbon offset from renewables after energy efficiency measures have been accounted for. The Proposed Development will strive to achieve at least 8 credits under the Ene 01 section as part of the BREEAM assessment.

3.5.4 As mentioned within Paragraph 3.3.4, all insulation on the site will have a GWP of less than 5, and an ODP of Zero.

Light Pollution

3.5.5 Light Pollution will be minimised where possible through the careful specification and positioning of any external lighting around the Proposed Development, ensuring that no lighting negatively impacts on the surrounding residential and commercial units. Special attention should be given to security lighting (where fitted) to ensure it is appropriately focussed and controlled.

3.5.6 All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight and timer controlled. All relevant BREEAM methodology will be followed as stated under Pol 04 of the BREEAM assessment.

Operational Waste

[4] As predicted through the BRE Water Efficiency Calculator Tool for New Dwellings

3.5.7 The Proposed Development will have comprehensive recycling facilities where internal recycling bins are provided in accessible locations in order to facilitate waste recycling by the occupants of both the commercial and residential space.

3.5.8 As with many aspects of operational use within buildings, the performance is highly dependent on the users of the building. Therefore, information on the waste that can be recycled and the waste collections days will be provided to occupants as part of the Building User Guide, required for BREEAM and HQM.

Noise Pollution

3.5.9 Due to the type of activities on the site, it is not anticipated that the Proposed Development will produce noise of any significance above what would be associated with the previous use of the building and the surrounding area.

3.5.10 The Proposed Development will be fully compliant with Building Regulations Part E – Resistance to the passage of sound and acoustic (sound) testing will be performed on all intermediate wall and floor types by a suitably qualified professional. Improvements over Building Regulations will be sought for the residential units with ambient internal noise levels assessed in the commercial spaces.

3.5.11 The issue of noise pollution will also be considered in detail through the BREEAM & HQM assessment of the Proposed Development. A pre-programme report of recommendations to reduce environmental noise pollution has been completed by Sandy Brown Consultants.

3.6 Health and Wellbeing

Design Security

3.6.1 Based on previous, the Proposed Development will incorporate design considerations from an Architectural Liaison Officer (ALO) or Crime Prevention Development Officer, to ensure the development adopts security measures appropriate for the site.

3.6.2 All recommendations will be adopted into the final design, with an aim of achieving the Secured by Design: Section 2 award for residential units.

3.6.3 External (and communal internal) lighting will be of an energy efficient type with daylight cut-off switches and PIR sensors where appropriate. Security lighting will be PIR and Daylight controlled with a maximum output of 150 watts. Security lighting will be appropriately installed to prevent light pollution caused by inappropriately focussed or positioned lights.

Cooling Hierarchy

3.6.4 The Proposed Development has significant amount of glazing on the south east facing facade, and therefore has significant potential for positive solar gains, but could experience overheating during periods of excessive summer temperatures if sustainable measures are not put in place.

3.6.5 The London Plan Policy 5.9 sets out a cooling hierarchy of design measures that will reduce potential overheating and reliance on air conditioning systems especially for residential units. Table 3 below sets out the design measures in relation to the Proposed Development.

London Plan Cooling Hierarchy	Proposed Design Measures
Minimising internal heat generation through energy efficient design	Limiting amount of pipework and heat losses through good design and mechanical risers in central locations
Reducing the amount of heat entering the building in summer	All units could have internal blinds, although currently the design does not have them incorporated
Use of thermal mass and high ceilings to manage the heat within the building	The building will comprise of a traditional construction in order to allow for medium-high thermal mass to reduce overheating risks.
Passive Ventilation	The majority of windows will be openable in order to allow natural ventilation with all offices and houses benefiting from effective cross-ventilation.
Mechanical Ventilation	Standard extract fans from wet rooms only have been proposed at this stage due to sufficient potential for natural ventilation and in order to reduce overall energy use and CO_2 emissions.

Table 3: London Plan Cooling Hierarchy

3.6.6 Robust levels of insulation will help reduce heat exiting and entering the buildings. As the main building will be made up of an existing concrete frame and brick infill with an additional new concrete frame structure, there will be good thermal mass in the main fabric and structure of the building. This will help reduce the potential risk of overheating in the summer months by absorbing solar radiation and allowing it to dissipate without being transmitted into the building itself. There will be a high amount of solar gains on the commercial building due to the significant amount of glazing on the south-east facade. Therefore, low-E solar glazing and internal blinds/ shutters may be used in both the commercial and residential units at post-planning stage in order to reduce the risk of overheating.

3.6.7 An outline overheating assessment following the London Plan overheating criteria (as per Table 4) has been undertaken on the offices using IES modelling in order to determine if they require an active cooling system. The residential units have not been analysed in detail due to nominal amount on glazing on the south west facing façade, a predominant percentage of which will be shaded by the commercial block and supported by the SAP outputs.

Criterion	Definition
1	The maximum number of hours that the operative temperature can exceed the threshold comfort temperature by 1°K or more during the occupied hours of a typical non-heating season (1st May to 30th September) should be no more than 3%
2	A daily limit of acceptability for the severity of overheating within any one day based on both temperature rise and its duration
3	An absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable

Table 4: Overheating Criteria London Plan

Unit	Criterion 1 Compliance	Criterion 2 Compliance	Criterion 3 Compliance	SBEM Compliance	Overall Overheating Risk
Offices	-	-	-	✓	NO

Table 5: Overheating Analysis Offices Arthur Stanley House

3.6.8 At present, an active cooling system is proposed for the offices, as based on the SBEM modelling undertaken they do not achieve compliance with the overheating criteria. The proposed cooling requirements will be less than the notional cooling requirements, which is supported by the SBEM outputs in Appendix C.

3.6.9 Detailed overheating analysis may be undertaken at post-planning stage in order to support both ongoing design work and BREEAM.

4.0 Energy Assessment

4.1 Energy Approach

4.1.1 The outline approach for the Proposed Development in addressing energy issues, and responding to the planning policies and guidance, is through minimising the building's overall environmental impact and reducing its resource use to exceed the performance standards required by Building Regulations.

4.1.2 The approach adopts the following standard energy strategy (in-line with general national energy policy) by seeking to:

- Use Less Energy (Be Lean) – minimise the overall environmental impact and energy use through energy efficiency measures - e.g. improved insulation and glazing.
- Use Clean Energy (Be Clean) – ensure that energy systems on-site (heat and power) are efficient and produce minimal CO_2 emissions - e.g. high efficiency boilers/heat pumps
- Use Renewable Energy (Be Green) – implement the use of suitable technologies to provide renewable and emission free energy sources.

4.1.3 The design has sought to greatly enhance the existing and new building envelope specification to minimise the overall energy demand and to implement good passive solar design where practicable.

4.1.4 The CO_2 Conversion Factors have been taken from Building Regulations 2013:

	CO_2 Conversion Factor ($kgCO_2/kWh$)
Electricity (mains)	0.529
Electricity (offset)	-0.529
Gas (mains)	0.216
Heating Oil	0.298
Wood Pellets	0.039
Woodchip	0.016

Table 6: CO_2 Conversion Factors

4.1.5 Carbon Dioxide (CO_2) is the main greenhouse gas[5] that is deemed responsible for anthropogenic climate change[6]. Although by mass it does not have as high radiative forcing effect as other gases (namely CH_4 – Methane), the sheer quantity released through combustion means that, overall, it has the most effect. It is also one of the more controllable – it can be directly controlled through reductions in fossil energy use.

4.2 Baseline Energy Prediction

4.2.1 The overall energy strategy for the Proposed Development, will be to use less energy, use clean energy and use renewable energy and to design an energy conscious building to positively influence the overall predicted energy demand.

4.2.2 The notional energy prediction for the Proposed Development uses the exact size and shape of the Proposed Development, but is based on notional U-values and heating specifications as per the Building Regulations 2013. The notional model defines the Target Emissions Rate (TER)

[5] Joint Science Academies' statement, 2005: Global response to climate change

[6] IPCC, 2007: Summary for Policymakers & Technical Summary. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

for both the residential and commercial buildings and the Target Fabric Energy Efficiency (TFEE) for the dwellings.

4.2.3 Building Regulations 2013 Part L defines the TER through the following formula:

$$TER_{2013} = C_H \times FF + C_{PF} + C_L$$

Figure 9: Building Regulations 2013 Part L TER calculation

4.2.1 In calculating the TER, a fuel factor is applied to the provision of space heating and hot water (C_H), which is then added to the energy use of pumps and fans (C_{PF}) and the internal lighting load (C_L). Therefore depending on the fuel source providing the heating and hot water for the Proposed Development, the target requirements will vary.

4.2.2 Energy modelling for the Proposed Development has been undertaken based on SAP 2012 (residential), SBEM v.5.2.g.3 (commercial) and in accordance with Building Regulations 2013. This modelling has been used to generate the energy baseline, which will provide an indication of the energy and CO_2 target emissions criteria that the Proposed Development will need to meet in order to achieve Building Regulations 2013 Part L compliance. The baseline specifications follow the London Plan guidance, in which heating is provided via gas boilers and active cooling (where present) would be provided by electrically powered equipment.

Unit Type	Energy Baseline (tonnesCO_2/ yr)	Target Fabric Energy Efficiency (TFEE) (kWh/m^2/yr)
Commercial	31.35	n/a
Residential	18.46	84.50

Table 7: Arthur Stanley House Energy Baseline

4.2.3 It has to be noted that due to the different methodology of calculating the TER and the energy baseline for residential units, when heat pumps are used to provide space heating, improvement results may vary when comparing the Dwelling Emissions Rate (DER) to the aforementioned two criteria. The DER/TER improvement will be higher than the DER/energy baseline improvement due to the fuel factor applied, as described in paragraph 4.2.1. For the purpose of this assessment, the energy baseline results have been used throughout in accordance with the London Plan criteria.

4.3 Energy Conservation Measures (be lean)

4.3.1 A number of energy conservation measures will be incorporated by the Client in-line with both the Policies detailed in Section 2 as well as general national 'Best Practice' guidance for delivering energy efficient buildings.

Passive Solar Design

4.3.2 The Proposed Development location and orientation have been determined by the existing building and site layout. Where possible the redevelopment and new elements have been designed to maximise opportunities for solar gain, whilst also considering the possible risk of overheating. Overheating can result from excessive solar gain combined with an airtight building with a high standard of fabric efficiency. If and where appropriate, solar gain via glazing will be controlled using appropriate glass (Low E) and internal blinds.

Insulation and Air Tightness

4.3.3 All new build elements will incorporate high performance insulation in the building envelope (walls, roofs and floors) to ensure that the space heating load will be reduced. Existing elements will be upgraded, for example, with the addition of external insulation and cladding.

4.3.4 The proposed U-values for the buildings have been calculated based on the current building specification as follows:

Element	Proposed U-Values
Roof	0.15
External Wall (new)	0.15
External Wall (existing)	0.15
Ground Floor	0.15
Internal Floors above unheated spaces (residential)	0.15
Windows (commercial and residential)	1.11 (g-value of 0.24)
Doors (commercial)	2.2

Table 8: Proposed U-values

4.3.5 Air tightness has been estimated as achieving a rate of ~4m^3/hr/m^2 or lower in the residential units and ~5m^3/hr/m^2 in the commercial space. This will be tested as part of Building Regulation compliance and to inform final As-Built SAP and SBEM calculations at post-construction stage.

Thermal Bridging

4.3.6 Thermal bridging is the process by which materials that directly connect the internal and external walls of a building (e.g. lintels and wall ties) transfer warmth out of the buildings through conduction. Thermal bridges occur where there are gaps or discontinuation of the insulation material. They are measured in W/mK and represent the additional heat loss from a point or element compared to the adjacent surfaces. Figure 10 below represents constructions where thermal bridging has not been taken into account, therefore there are increased heat losses through those details.

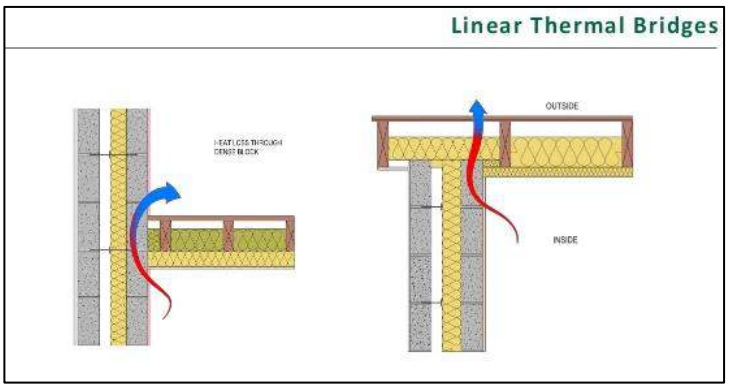


Figure 10: Thermal bridge representation (Source: Quinn Building Products)

4.3.7 Through careful selection of materials and construction techniques and attention to detail around materials junctions, it is possible to reduce the level of thermal bridging apparent within the buildings, in turn, reducing the heat losses.

4.3.8 Accredited Construction Details are proposed for all thermal bridges and IG-Hi Therm lintels for the residential units at the Proposed Development in order to comply with the requirements of the latest Building Regulations and reduce the space heating requirements.

Energy Efficient Lighting and Appliances

4.3.9 The Proposed Development will make use of low energy lighting in-line with BRE methodology and in excess of Building Regulation requirements.

4.3.10 Although appropriate appliances are expected not to be fitted as part of the development, advice will be provided to the occupants detailing the benefits of energy efficient appliances. Based on the BRE calculation methodology these measures will reduce electrical demand by around 10% - although it is not possible to quantify any reductions at this stage or through the SBEM calculations.

4.3.11 The buildings will ensure that any external lighting is positioned, controlled and focused to provide efficient safe and secure access without using excessive energy. This will comprise energy efficient luminaires or in the case of any specified security lighting, a maximum lamp capacity of 150W per fitting, supported by infrared, sensor and time controls as standard.

4.3.12 The residential units will utilise 100% low energy efficient lighting, whilst the commercial areas will look to utilise high quality LED lighting, ensuring compliance with the appropriate Building Regulations 2013 Part L and BREEAM criteria.

Ventilation

4.3.13 In modern air-tight buildings, careful consideration needs to be given to the specification of ventilation systems to ensure moisture is removed and ventilation standards are met.

4.3.14 At present, it has been assumed that the building will be comprised of a concrete frame construction with brick cavity external walls and will have openable windows that will allow cross-ventilation to occur where possible. Mechanical Ventilation Heat Recovery (MVHR) is planned within the residential units extracting warm, moist air from the kitchens and wet rooms, before using the heat to warm the fresh air being supplied to the bedrooms and living areas. Standard mechanical extract fans have been proposed for the WCs within the commercial spaces.

Influence Energy Behaviour

4.3.15 The Proposed Development, both residential and commercial spaces, will be provided with a Building User Guide which will detail how to effectively use all the appliances and fittings installed and thereby minimise associated energy use and CO_2 emissions. This information will inform the occupants on how to gain maximum benefit from the appliances and energy systems provided and will help to positively influence their long-term energy behaviour.

4.3.16 Smart Meters monitor energy consumption within individual units and display real time consumption and cost data, avoiding the need for estimated billing and meter reading visits. They can monitor both gas and electricity consumption and enable occupants to manage their energy use more efficiently. The residential block will be supplied with Smart Meters (where available from the utility supplier).

4.3.17 The commercial premises will have separate metering for all major loads and per floor plate, which will contain 'out-of-range' values, and must cover at least heating, hot water, cooling and ventilation loads as part of the BREEAM assessment.

4.3.18 All major utilities now offer a 'green energy tariff' to business and domestic customers from either their own renewable sources (such as offshore wind farms) or are purchasing power from such sources for their green energy tariff. Although this does not qualify as a renewable energy technology, it is recommended that the Proposed Development be connected to a green electricity tariff as standard.

Unit Type	'Be Lean' (tonnesCO_2/ yr)	Savings over baseline	Dwelling Fabric Energy Efficiency (DFEE) (kWh/m^2/yr)
Commercial New	26.16	16.55%	n/a
Commercial Existing	46.01	26.11%	n/a
Residential	13.89	24.75%	74.44

Table 9: 'Be Lean' Arthur Stanley House

4.3.19 As a result of the 'be lean' measures outlined above, the Proposed Development is able to reduce the regulated CO_2 emissions by 16.55% for the new commercial areas, 26.11% for the existing commercial areas and 24.75% for the dwellings when compared to the energy baseline.

4.4 Energy Supply (be clean)

4.4.1 Through the use of on-site generation powered by fossil fuels (low carbon technologies) the Proposed Development can potentially achieve CO_2 savings.

4.4.2 Table 10 summarises the various 'clean energy' solutions that have been assessed for the Proposed Development and their feasibility.

Technology	Technically Feasible	Regulated CO_2 offset	Benefits	Weaknesses
District heating	✓	✓	Allows a mix of fuel sources to be utilised. Reduces space required in individual units for boilers and cylinders.	No existing networks within the immediate area.
Combined Heat & Power	✓	✓	Electrical generation alongside heat production.	Gas dependant. Only effective if space heating demand is sufficient for micro generation within each unit.
Communal gas fired boiler system	✓	×	Low NO_x emissions. Responsive system.	Low CO_2 offset.
Individual gas fired boiler system	✓	×	Low NO_x emissions. Responsive system.	Low CO_2 offset.

Table 10: Summary of 'Clean' Energy Provision

District Heat Networks

4.4.3 An initial scoping assessment of local decentralised heat and power options has been undertaken using the London Heat Map and there are no existing heat networks in the local area that the scheme could be connected to (yellow lines). However, Figure 11 shows the site's relative proximity to the proposed future network on Euston Road.

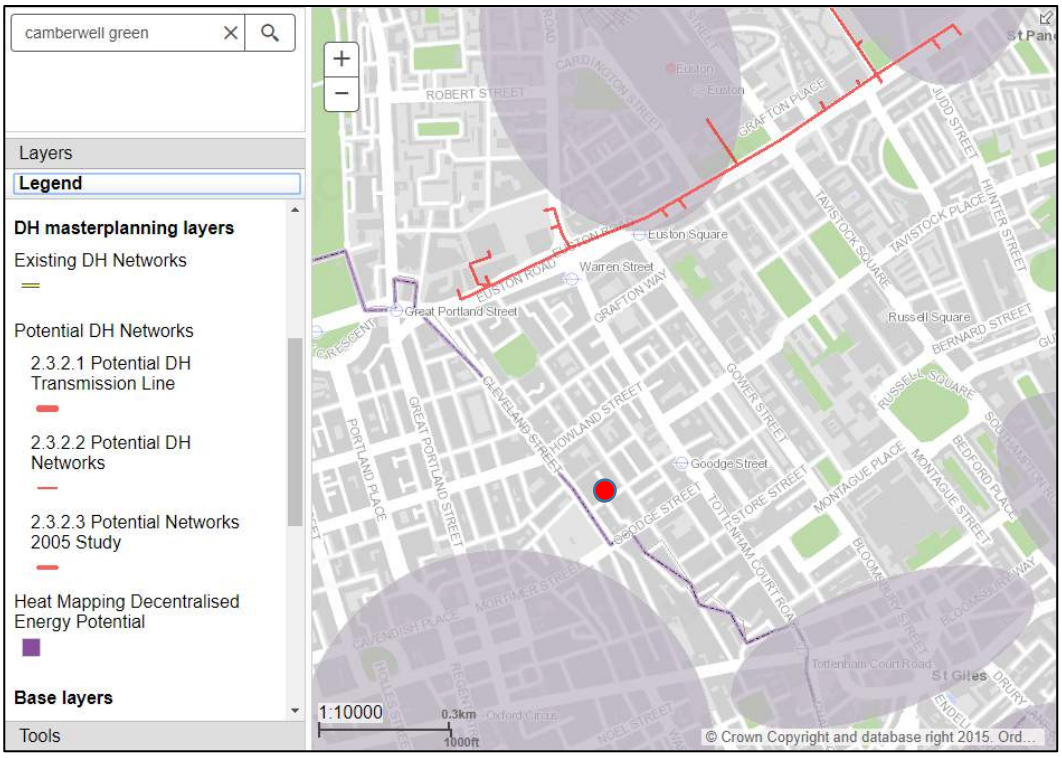


Figure 11: London Heat Map showing the nearby location of the proposed District Heating Network (Red Line) servicing Euston Road and the nearby stations in relation to Arthur Stanley House (Red circle)

4.4.4 At present the provision of a new district heating network is highly unlikely to be granted based on the site's size and distance from any existing networks. However, there remains the potential for a linkup to be installed in the future if/and when the Euston Road network is installed. The purple polygons in Figure 11 show areas where decentralised energy has been cited as potentially worthwhile. The site's proximity to two of these areas, whilst also being ~500m from a proposed network could mean that a future link-up may be possible. Therefore it has been proposed that a 'soft point' connection be installed in the plant room of the commercial building of Arthur Stanley House and residential block to future proof the buildings.

Combined Heat and Power (CHP)

4.4.5 The use of CHP has been considered in outline as a possible heating system, with the added benefit of on-site electrical generation. Further assessment of the heating loads and seasonal cycles would need to be completed at detailed design stage prior to any inclusion.

4.4.6 A CHP system can be an efficient way of generating electricity on-site with the benefit of reduced fuel costs (gas being cheaper than electricity) and reduced carbon emissions. Heat generated from the gas engine is used to produce hot water or steam for heating and domestic hot water.

4.4.7 With regards to the residential building, a separate micro/small scale communal CHP system would prove technically feasible but need to be managed and operated by the building operators. However for the commercial building, the low hot water demand and mix of heating and cooling provision will be more effectively addressed using heat pump solutions, so has been deemed technically unfeasible. Table 11 below shows the results from modelling the installation of such a system in the residential block.

Unit Type	'Be Lean and Be Clean' (tonnesCO_2/yr)	Savings from CHP
Residential	9.68	30.33%

Table 11: Improvements over the baseline as a result of 'lean' elements and the installation of CHP

4.4.8 Another consideration is the provision of adequate space internally or externally for two plant rooms. The bottom floors of the subterranean levels of each block have been deemed to be feasible locations for centralised plants as shown on the architect's planning drawings.

4.4.9 Should CHP be chosen to provide the space and water heating for the residential building, a micro unit would be proposed for the residential unit.

Active Cooling

4.4.10 Active Cooling is to be installed as means of providing comfort cooling and ensuring the buildings do not overheat. Each of the residential units in the form of a small AC unit with an Energy Efficiency Rating (EER) of 4.6, which can be controlled at variable speeds.

4.5 Renewable Energy Assessment (be green)

4.5.1 Table 12 summarises the various renewable energy solutions that have been assessed for the Proposed Development. These technologies will be compared alongside the proposed high efficiency gas boilers system.

Technology	Technically Feasible	Regulated CO_2 offset	Benefits	Weaknesses
Ground Source Heat Pumps	×	×	Provides space heating and a proportion of domestic hot water independent of gas.	Low overall CO_2 offset. 2.5x the area of each unit needed. Ground conditions dependant, borehole drilling costs.
Air Source Heat Pumps	✓	×	Provides space heating and a proportion of domestic hot water independent of gas.	Low overall CO_2 offset. Potential system noise. Low Carbon Solution
Biomass Boiler	×	✓	Low CO_2 emissions.	Fuel storage space, cost and security of supply. High NO_x emissions. Air quality implications.
Photovoltaics	✓	✓	High CO_2 offset and proven technology.	Susceptible to shading.
Solar Water Heating	×	✓	Efficient and integrates with a domestic heat pump or boiler.	Lower CO_2 offset as replacing gas supply. Susceptible to shading.
Wind Turbines	×	✓	Strong visual impact.	Poor output for turbine of a size likely to be accepted by planning authority

Table 12: Summary of Renewable Energy Assessment

The use of Heat Pump Technology

4.5.2 The use of heat pumps (HP) in place of a gas heating system can be feasible in terms of CO_2 emissions, but only if the system is well sized and ground conditions (for GSHPs) are such that a high Co-efficient of Performance (CoP) can be achieved on average.

4.5.3 Heat pumps will only deliver low grade heat (~50°C) efficiently, and therefore HP systems are generally relatively inefficient in providing Domestic Hot Water (DHW), as this requires additional electrical use (immersion or increased compressor use), unless a treated hot water system is used, or hot water provided via a separate system.

4.5.4 There is also the issue of 'future-proofing' a building – gas is a finite resource which is decreasing in availability and therefore increasing in cost. To maintain energy security it may be wise to ensure that, even if a building is specified with a gas system, there is the capability to move it to a heat pump based system at a later date, especially as the CO_2 emissions associated with electrical generation diminish through the wider use of renewable technologies.

4.5.5 It is possible to use a heat pump for the heating supply and a separate gas boiler for hot water demand. This maximises the performance of both technologies and minimises their environmental impact but results in significant capital cost and scores poorly in SAP calculations (due to the way SAP assesses mixed electric/gas systems).

Air Source Heat Pumps

4.5.6 The use of Air Source Heat Pumps (ASHP) has the potential to supply the Proposed Development with their heating and possibly hot water requirements, subject to the provision of oversized/low temperature radiators (air-to-water systems).

4.5.7 As with all Heat Pump systems ASHP systems consume electricity in order to operate - the Coefficient of Performance of the system is the ratio of electrical energy consumed, to heat energy emitted.

4.5.8 This is affected by a number of factors, including system design, outside air temperatures (solar irradiation) and patterns of use.

4.5.9 ASHPs tend to generate a lot of noise and therefore the space in which the pump is positioned would need to be adequately sound insulated in order to prevent disturbances to the building's occupants.

4.5.10 The only suitable location for the installation of a communal ASHP system for the commercial space of the Proposed Development is on the roof area. Due to the lack of available space and the noise generated from individual units, it has been deemed feasible for use on the residential units providing there is adequate sound insulation.

Unit Type	'Be Lean', CHP and backup ASHP (tonnesCO_2/yr)	Savings from CHP & ASHP
Residential	11.53	17.00%

Table 13: Improvements over the baseline as a result of implementing the 'be lean' solutions alongside a CHP system and backup ASHP

4.5.11 Table 13 shows the improvements over the baseline by using a CHP system with backup ASHP. The annual savings have been reduced as a result of the any electricity produced by the CHP being negated and consumed by the ASHP. Therefore it has deduced that using a backup ASHP is not a viable solution.

Variable Refrigerant Flow (VRF)/ Variable Refrigerant Volume (VRV)

4.5.12 A VRF/VRV system could potentially be installed at the Proposed Development, which would be suitable for all commercial areas. In order to make best use of a VRF/VRV system, small areas within the buildings or areas which could require a minimal amount of heating would be serviced by convection heaters. This would include areas such as communal hallways or toilets.

4.5.13 VRF/VRV systems allows the temperature of each individual space to be individually heated or cooled, providing a high level of user comfort, with relatively simple methods of control. Because of this, if used properly, a VRF system has potential to save energy as it can be used as required simultaneously within multiple spaces in a building.

4.5.14 Similar to an ASHP, a VRF/VRV system measures its energy efficiency as a Coefficient of Performance and Energy Efficiency Ratio. It is proposed that a SCoP of >4.5 and an SEER of >6 (SSEER of >5) are targeted in order to ensure efficient use of resources. In order to improve upon this, a specialist installer would need to be consulted for sizing and specification.

Unit Type	VRF 'Be Lean, Clean and Green' (tonnesCO_2/yr)	Savings from VRF
Commercial New	23.46	10.34%
Commercial Existing	38.07	17.24%

Table 14: VRF Performance on the commercial block

4.5.15 As per Table 14, the performance of a VRF gives significant savings in addition to the 'be lean' measures. As a CHP system cannot provide the required heating load to supply the building, and gas boilers still include the use of natural gas, a finite resort, it has been established that VRF will be used for the commercial building.

Ground Source Heat Pump

4.5.16 The use of a Ground Source Heat Pump would have the potential to supply the Proposed Development with a proportion of its space heating and hot water requirements subject to the provision of under floor heating (wet system) to maximise the GSHP system performance.

4.5.17 As the majority of the commercial space is the refurbishment of an existing building and there is limited ground available under the extension, it is not feasible to install a GSHP to serve this part of the development.

4.5.18 A GSHP usually requires an area that is 2.5x greater than that of the property it is aiming to heat. Bearing in mind the total area of the 9 residential units is ~638m^2, this would require an area of ~1595m^2 to be able to adequately service the dwellings.

4.5.19 Due to negligible external areas for a ground loop installation, and the cost and complexities of borehole drilling, the use of GSHP is not considered economically feasible or practical for the scheme.

4.5.20 In addition where compared to a gas baseline, a heat pump solution is unlikely to offer any substantial CO_2 savings over a gas fired heating solution.

Biomass Boiler

4.5.21 The use of a biomass boiler system to supply hot water and space heating has been deemed unpractical due to the complications in providing the regular fuel supply of pellets/chip to the

site to power a site of this scale. The London Borough of Camden is designated a Smoke Control Area and therefore a biomass boiler is restricted from being used in this area.

Photovoltaics

4.5.22 The installation of Photovoltaics (PV) could be used to offset electrical demand within the Proposed Development. The Photovoltaic array would be connected into the electrical system via an inverter or series of inverters, depending on system size and setup.

4.5.23 Noise will not be an issue – A PV system does not feature moving parts and is silent during operation.

4.5.24 Both the residential and commercial buildings feature flat roofs, therefore a PV mount system is appropriate which would be installed onto frames at an inclination of 5-15° (depending on warranty specifications) and provide a stable and secure structure for the array.

4.5.25 For the purposes of the study, a 265W monocrystalline module will be used as an example of a standard module. Triple junction technology requires a greater area per kWp with an equivalent 150W panel. Each panel covers an area of ~1.7m^2 (1.6m x 1m) and has a peak output of 265W. The Proposed Development will need to install a PV array in order to address Planning Policies, but the occupiers will have a direct benefit should they decide to apply for the Feed-in Tariff scheme.

4.5.26 As per policy CC1, an indicative outline assessment has been carried out in order to determine the maximum amount of PV that could be installed at the Proposed Development.

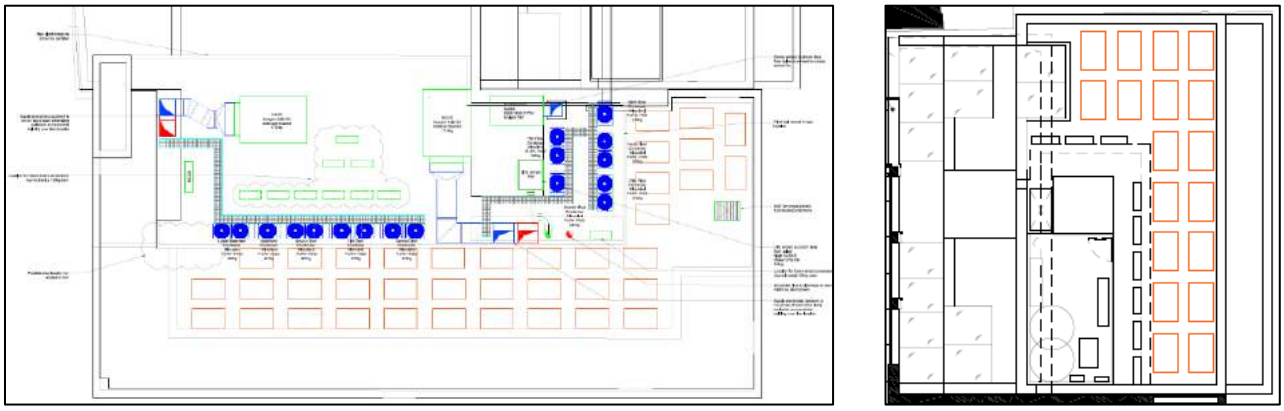


Figure 12: The potential PV layout on both the residential (right) building and commercial (left) building

4.5.27 The residential block is shaded from all angles, primarily by the commercial space to the south-east and therefore the performance of any PV installed will be hindered by lower light levels. Therefore the optimum model of PV to be used on this part of the development would be thin film/triple junction technology as these operate at a lower, yet consistent, efficiency in shaded and low light conditions.

4.5.28 The commercial space benefits from being a tall building and therefore is able to maximise daylighting opportunities on the upper storeys. Any PV on the roof of this building would achieve its maximum potential by placing a larger number of panels facing east, than to install a fewer number facing south and possibly inhibiting shading from the elevated towers on the roof.

4.5.29 It is suggested that Monocrystalline panels should be installed. These are the most efficient type of solar panels currently available as they operate at a higher consistent efficiency when installed in areas of minimal shading and maximum direct sunlight.

4.5.30 The indicative assessment demonstrates that the maximum PV that could be fitted on the flat roof of the residential block and commercial building is 2.7 kWp (based on 18x150W) and

10.53 kWp of PV respectively (this includes a nominal provision of space required for plant room/risers or other M&E services).

4.5.31 A detailed assessment conducted by a manufacturer or installer must be undertaken at post-planning stage in order to set out the optimal design for the PV installation based on the available roof area and confirm the findings of this report. Table 15 below analyses the performance of the PV system and predicted output, based on south facing PV panels on the roof of the commercial space and east facing PV panels on the residential block at an inclination of 15-30°. Table 15 also demonstrates the improvement over the baseline in combination with the proposed solution.

PV Split	Electricity generation (kWh/annum)	Addition of PV (tonnesCO_2/ yr)	Savings from PV
Commercial 10.53 kWp	7,734	31.67	38.85%
Residential 2.7 kWp	1,108.80	9.12	5.74%

Table 15: PV performance Arthur Stanley House

Solar Water Heating

4.5.32 The installation of Solar Water Heating (SWH) could be used to offset a proportion of the domestic hot water demand (DHW), subject to the installation of an appropriate hot water cylinder (dual coil) and space allowed within the design for the required insulated flow and return pipework.

4.5.33 Noise will not be an issue with SWH – the only moving part is the circulation pump, which is inside the property and should not be noticeable.

4.5.34 Unlike PV, where the overall performance is generally limited by available roof space and finances, the CO_2 offset achievable with SWH is limited by the occupancy and estimated hot water load of the unit – too large a system can overheat an individual hot water tank at peak solar insolation.

4.5.35 Due to the nominal demand of hot water in the commercial premises, and the insufficient roof area for installation on the roofs of buildings in addition to PV, this system is deemed as technically unfeasible and unpractical.

Wind Power

4.5.36 Due to the location and nature of the site, it is not likely to lend itself to the use of wind turbines.

4.5.37 There is no suitable area for the installation of either a horizontal or vertical wind turbine. Air flow within cities is often turbulent due to the number and varying heights of other buildings which would reduce the efficiency of any turbine installed. Finally, an active turbine may also cause the building to vibrate, or otherwise structurally damage the building due to its contact motion, therefore by taking these factors into consideration, it has been deemed technically unfeasible to install a wind turbine at the Proposed Development.

4.6 Energy Summary

4.6.1 Table 16 lays out the various energy strategies that have been proposed for both the existing and new commercial block and the residential building, encompassing the following savings:

Unit Type and Solution	Proposed Strategy Impact (tonnesCO_2/yr)	Savings from Proposed Strategy
Residential – 'Be lean', CHP and PV	19.17	53.30%
Commercial New – 'Be lean', VRF and PV	9.04	35.75%
Commercial Existing – 'Be lean' and VRF,	38.07	38.85%

Table 16: The proposed energy strategy, its impact and savings on the baseline model for each block of the development

4.6.2 The 35% savings required from the London Plan have been exceeded by both the Residential and new commercial block, in the latter case by 18.3%.and saving an estimated 21.88 tonnesCO2/yr.

4.6.3 Whilst the residential block has met and exceeded the requirements set out by the policies within the London Plan, an additional 1.3 tonnesCO2/yr would need to be offset in order to meet the 20% target set by the London Borough of Camden Council. In line with paragraph 8.12 of the Camden Local Plan, this can be offset via ''a financial contribution to an agreed borough wide programme to provide for local low carbon projects''.

5.0 Life Cycle Cost Analysis – Simple Payback

5.1 *Commercial* – Construction

5.1.1 The installation of VRF and Solar PV does not incur high costs when incorporated into the construction phase of the development. While both require 'specialist installers' in the form of qualified plumbers and solar installers, there are a large number of companies who can supply these services in the Greater London area, ensuring that prices remain competitive.

Operation

5.1.2 VRF Systems and Solar PV both have relatively low operational costs. The costs included in this section are: utilities, cleaning and management costs.

5.1.3 Future prices for utilities are extremely difficult to predict, especially over a long period of time such as 60 years. It would not be unreasonable to assume that due to decreasing global fossil fuel reserves, the cost of gas could increase exponentially over the lifespan of the Proposed Development.

5.1.4 However, for the purposes of this study, the real and discounted costs of the utilities have been calculated using the trends seen over the past 10 years since 2007, which have been extended to the year 2076. Although energy prices are never linear, this should give a conservative but fair estimation of the potential future unit costs.

5.1.5 VRF systems require minimal cleaning of the air filters, additionally Solar PV panels situated beyond 15 degrees are self-cleaned by rain. The costs of cleaning the energy system should be negligible over the life of the system.

5.1.6 VRF systems require no management as automatic room thermostats can be set to maintain a constant temperature. Additionally, modern systems have a user-friendly interface, making it easy for members of staff with no training to quickly adjust the settings if desired.

5.1.7 Solar PV also requires no management once they have been installed. The only requirement would be to check the levels of energy production on a clear, fine day to ensure that the expected production is being achieved. This could be carried out routinely by a member of staff to avoid additional management costs.

Maintenance

5.1.8 This section includes the costs related to: planned maintenance, replacements and repairs.

5.1.9 VRF Systems require minimal maintenance and PV panels require next to none once installed. An annual VRF service cost depends on the size of the system but due to advanced technology, they have a low margin of error. PV panels do not require servicing or maintenance. Maintenance costs are therefore negligible.

5.1.10 A VRF system should have a life span of around 20 years depending on its use and quality of maintenance.

5.1.11 According to the Energy Saving Trust, the standard estimated lifespan of PV panels is 25 years. Inverters will also need replacing during this period.

5.1.12 Given that the PV is external and that issues may arise with the VRF, the sum equivalent to 20% of the total capital costs has been allocated for repairs to the systems during the lifetime of the building.

5.1.13 Calculations assume a rate of inflation of 2.3% and UK interest rate of 0.25%.

5.1.14 Payback is assumed as costs saved on electricity due to self-generation from PV and VRF. Electricity is assumed at a cost of 14.9p per kWp in 2017.

	60 year Cost		60 year Savings	
	Real	Discounted	Real	Discounted
Construction				
Capital costs	£ 9,345	£ 9,345		
Installation	£ 4,106	£ 4,106		
Sub-total	**£ 13,451**	**£ 13,451**		
Operation				
Gas Utility	£ -	£ -		
Electric Utility	£ 792,587	£ 792,587		
Electric Generation			£ 117,226	£ 117,226
Cleaning	Negligible			
Management	Negligible			
Sub-total	**£ 792,587**	**£ 792,587**	**£ 117,226**	**£ 117,226**
Maintanance				
Planned Maintanance	Negligible			
Replacements	£ 33,421	£ 33,338		
Repairs	£ 6,684	£ 6,668		
Sub-total	**£ 40,105**	**£ 40,005**		
	Real	**Discounted**		
Total	**£ 728,917**	**£ 728,817**		

Figure 13: Life Cycle Costing for the VRF and PV solution on the commercial block

5.2 *Residential* – Construction

5.2.1 Similar to the commercial installation fees, the installation of CHP does not incur high costs when incorporated into the construction phase of the development. While both require 'specialist installers' in the form of qualified plumbers and solar installers, there are a large number of companies who can supply these services in the Greater London area, ensuring that prices remain competitive.

Operation

5.2.2 Solar PV and CHP both have relatively low operational costs. The costs included in this section are: utilities, cleaning and management costs.

5.2.3 Future prices for utilities are extremely difficult to predict, especially over a long period of time such as 60 years. It would not be unreasonable to assume that due to decreasing global fossil fuel reserves, the cost of gas could increase exponentially over the lifespan of the Proposed Development.

5.2.4 However, for the purposes of this study, the real and discounted costs of the utilities have been calculated using the trends seen over the past 10 years since 2007, which have been extended to the year 2076. Although energy prices are never linear, this should give a conservative but fair estimation of the potential future unit costs.

5.2.5 VRF systems require minimal cleaning of the air filters, additionally Solar PV panels situated beyond 15 degrees are self-cleaned by rain. The costs of cleaning the energy system should be negligible over the life of the system.

5.2.6 VRF systems require no management as automatic room thermostats can be set to maintain a constant temperature. Additionally, modern systems have a user-friendly interface, making it easy for members of staff with no training to quickly adjust the settings if desired.

Maintenance

5.2.7 This section includes the costs related to: planned maintenance, replacements and repairs.

5.2.8 SAV CHP systems require maintenance around every 10,000 operating hours or roughly every two years. This service mainly consists of changing the oil, filters and spark plugs and costs £1,460. With a life span of around 15 years, this would require around 7 services throughout its operation.

5.2.9 As with the commercial space, the sum equivalent of 20% of the total capital costs has been allocated for repairs to the systems during the lifetime of the building. Payback has also been assumed again as the costs saved on electricity due to self-generation from PV and CHP.

5.2.10 Calculations assume a rate of inflation of 2.3% and UK interest rate of 0.25%.

	60 year Cost		60 year Savings	
	Real	Discounted	Real	Discounted
Construction				
Capital costs	£ 1,755	£ 1,755		
Installation	£ 540	£ 540		
Sub-total	**£ 2,295**	**£ 2,295**		
Operation				
Gas Utility	£ 260,541	£ 259,897		
Electric Utility	£ -	£ -		
Electric Generation			£ 603,401	£ 603,401
Cleaning	Negligible			
Management	Negligible			
Sub-total	**£ 260,541**	**£ 259,897**	**£ 603,401**	**£ 603,401**
Maintanance				
Planned Maintanance	Negligible			
Replacements	£ 8,570	£ 8,548		
Repairs	£ 1,714	£ 1,710		
Sub-total	**£ 10,283**	**£ 10,258**		
	Real	Discounted		
Total	**-£ 330,282**	**-£ 330,952**		

Figure 14: Life Cycle Costing for the CHP and PV solution on the residential block

6.0 Summary

6.0.1 The Proposed Development at Arthur Stanley House, London will comprise of a Basement, Lower Ground, Ground and Seven upper storeys of commercial space with a reception area and nine new residential dwellings spread over a Lower Ground, Ground and three upper storeys.

6.0.2 The Proposed Development will deliver energy efficiency measures throughout the scheme and, by providing a very good thermal envelope in combination with the installation of highly efficient heating systems and the added benefit of on-site electricity generation, a 19% improvement will be achieved for the residential units and a 35% improvement for the offices over the energy baseline as per the Merton Core Strategy and the London Plan.

6.0.3 Overall, the residential units will provide a modern, resource efficient, sustainable site, which responds positively to the relevant sustainability planning policies and deliver the following measures:

- A thermally efficient building fabric specification as per Table 8
- Accredited Construction Details for all applicable thermal bridges (and IG Hi-Therm lintels for the dwellings)
- Air-permeability of ~4m3/hr/m2
- A communal CHP system with HIU to each dwelling
- 2.7 kWp PV Array on the flat roof of the residential block
- AC units to provide comfort cooling
- Efficient lighting design to reduce power consumption
- Efficient water fittings to reduce indoor water demand
- Home Quality Mark 'level 3' compliance

6.0.4 The following measures have also been specified for the commercial block in order to provide an equally modern and sustainable development:

- A thermally efficient building fabric specification as per Table 8
- Accredited Construction Details for all applicable thermal bridges (and IG Hi-Therm lintels for the dwellings)
- Air-permeability of ~5m^3/hr/m^2
- Centralised VRV system to provide heating and cooling for offices
- 10.53kWp PV Array on the flat roof of plant room
- Efficient lighting design as per Figure 10
- Separate metering for all major commercial energy loads, which includes 'out-of-range' values (minimum of heating, cooling, lighting and ventilation)
- Efficient water fittings to reduce indoor water demand
- BREEAM 2014 'Excellent' compliance overall

Unit Type	Commercial	Residential
Energy Baseline (tonnesCO_2/ yr)	41.05	14.07
Be Lean (tonnesCO_2/ yr)	30.67	13.89
Be Clean (tonnesCO_2/ yr)	23.47	9.68
Be Green (tonnesCO_2/ yr)	19.17	9.12

Total Cumulative Savings	**53.30%**	**35.16%**

Table 17: Proposed Solution Summary

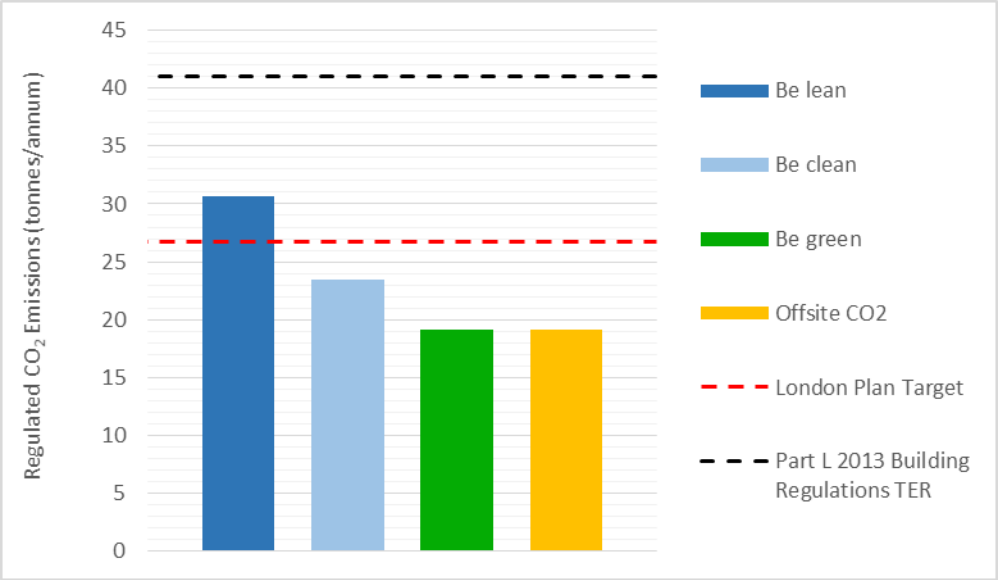


Figure 15: 'Lean, clean and green' Summary New Commercial Areas

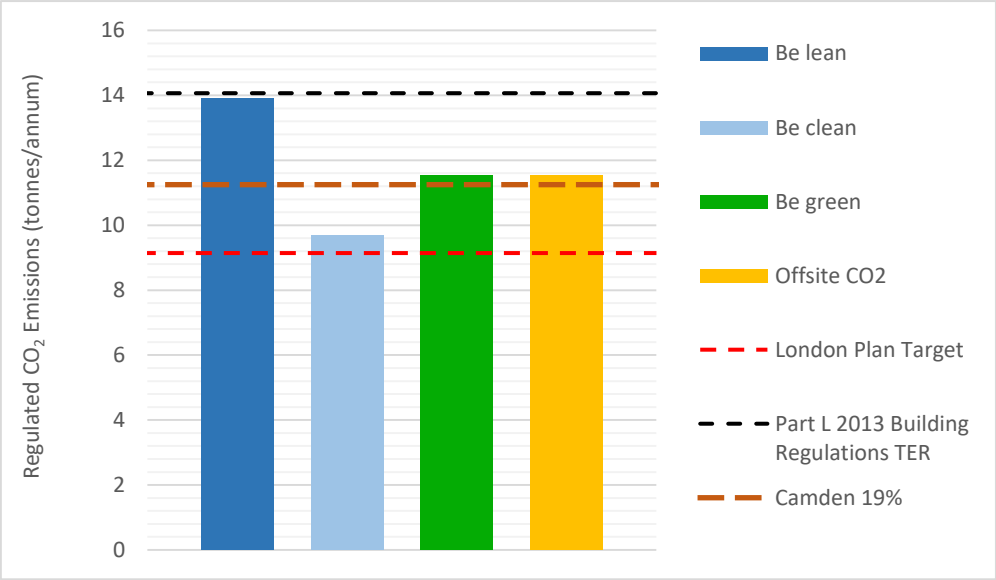
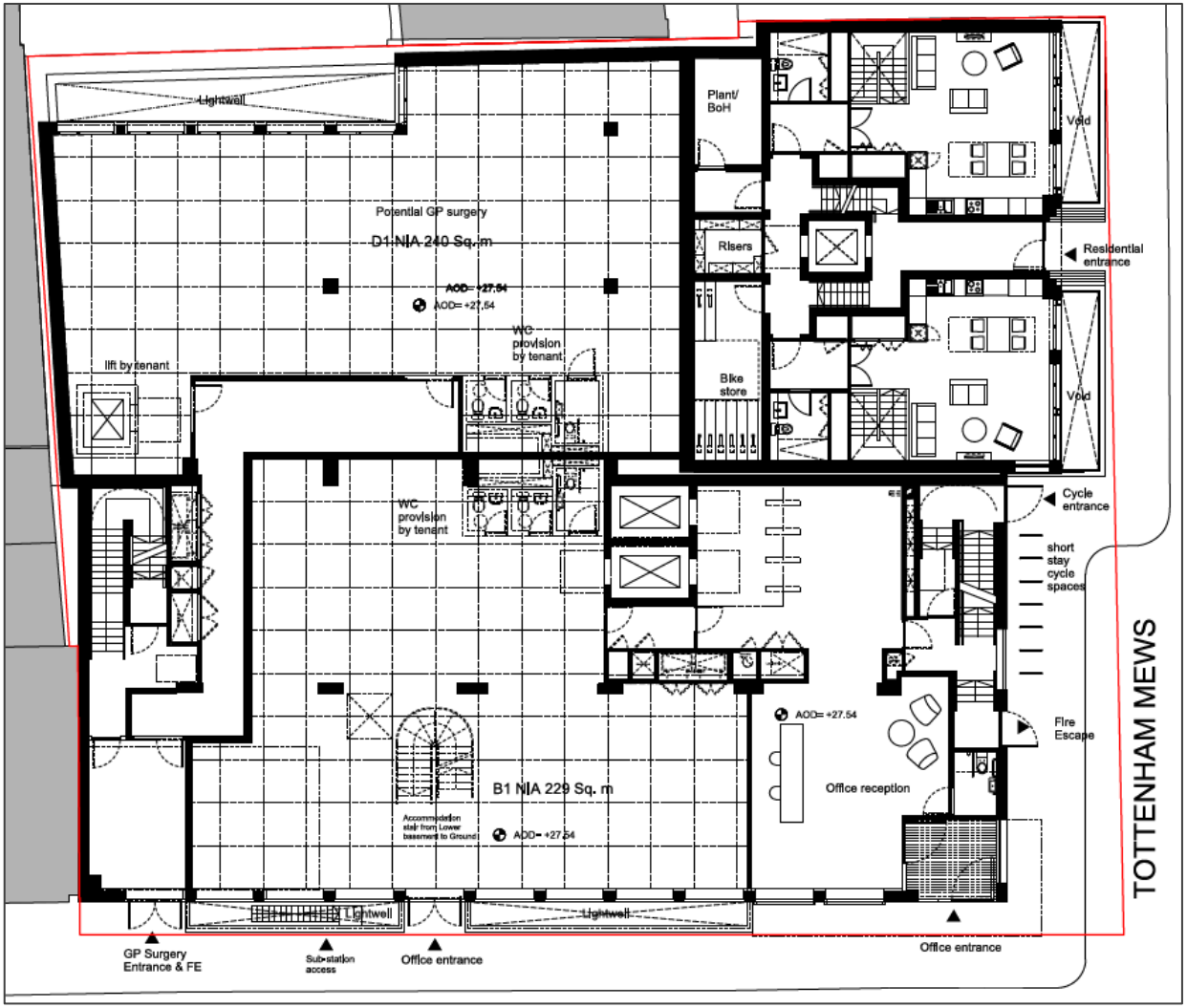


Figure 16: 'Lean, clean and green' Summary Residential Units

6.0.5 Through this approach the Proposed Development has robustly shown compliance with all relevant planning policy:

- Camden Local Plan (2017)
- London Plan (including FALP 2015)

7.0 Appendix A: Proposed Development Ground Floor Plan



8.0 Appendix B: Part G Water Calculator

Building Regulations 2010 Part G	Arthur Stanley, Residential				
		Capacity / flow rate	Use factor	Fixed use (litres/ person/ day)	Litres/ person/ day
WC (single flush)	Flush volume (litres)	0.00	4.42	0.00	0.00
WC (dual flush)	Flush volume (litres)	4.00	1.46	0.00	5.84
	Part flush volume (litres)	2.60	2.96	0.00	7.70
WCs (multiple fittings)	Average flush volume (litres)	0.00	4.42	0.00	0.00
Taps (excluding kitchen / utility)	Flow rate (litres/minute)	4.00	1.58	1.58	7.90
Bath (where shower also present)	Capacity to overflow (litres)	160.00	0.11	0.00	17.60
Shower (where bath also present)	Flow rate (litres/minute)	0.00	4.37	0.00	0.00
Bath only	Capacity to overflow (litres)	0.00	0.50	0.00	0.00
Shower only	Flow rate (litres/minute)	6.00	5.60	0.00	33.60
Kitchen/utility room sink taps	Flow rate (litres/minute)	5.00	0.44	10.36	12.56
Washing machine	Litres/kg dry load	5.50	2.10	0.00	11.55
Dishwasher	Litres/place setting	1.25	3.60	0.00	4.50
Waste disposal unit	Litres/use	0.00	3.08	0.00	0.00
Water softener	Litres/person/day	0.00	1.00	0.00	0.00
				Total calculated use	101.25
				Contribution from greywater (litres/person/day)	0.00
				Contribution from rainwater (litres/person/day)	0.00
				Normalisation factor	0.91
				Total water consumption	92.13
				External water use	5.00
				Total water consumption	97.13

9.0 Appendix C: BRUKL Outputs & SAP Summary Reports

New Commercial BRUKL Document

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Arthur Stanley House Office Compliance — As built

Date: Fri Jun 30 20:04:46 2017

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.7

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.7

BRUKL compliance check version: v5.3.a.0

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	19
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	19
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	8.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	06000000:Surf[1]
Floor	0.25	0.15	0.15	LB000000:Surf[0]
Roof	0.25	0.15	0.15	06000000:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.13	1.13	0600000C:Surf[0]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Existing Commercial BRUKL Document

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Arthur Stanley House Office Compliance As built

Date: Wed Jul 12 15:25:47 2017

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.7

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.7

BRUKL compliance check version: v5.3.a.0

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	15.7
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	15.7
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	9.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	LB00000F:Surf[2]
Floor	0.25	0.15	0.15	LB000001:Surf[0]
Roof	0.25	0.15	0.15	LB000005:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.13	1.13	0L000001:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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	5

Residential SAP Multiple Compliance Sheet

Buildings Regulations Compliance for Multiple Dwellings

This report checks compliance against criterion 1 of the Building Regulations where there are multiple dwellings in the same building. Where a building contains more than one dwelling (such as in a terrace of houses or in a block of flats), compliance with the Building Regulations is achieved if:

a) EITHER every individual dwelling has a DER/DFEE that is no greater than its corresponding TER/TFEE

b) OR the average DER/DFEE is no greater than the average TER/TFEE.

The average DER, TER, DFEE and TFEE are all calculated in the same way, using the floor-area-weighted average of all the individual DERs, TERs, DFEEs and TFEEs. Block averaging is permitted only across multiple dwelling in a single building, NOT across multiple buildings on a site.

The formula used is as follows (using the TER as an example):

$$\{(TER_1 \times Floor\ area_1) + (TER_2 \times Floor\ area_2) + \ldots + (TER_i \times Floor\ area_i)\} \div \{Floor\ area_1 + Floor\ area_2 + \ldots + Floor\ area_i\}$$

Assessor name	Mr Malcolm Maclean	Assessor number	4643
		Created	14/07/2017

Results

URN	Version	Address	Floor Area (m^2)	DER	TER	DFEE	TFEE
GBDC-ARTH-1583-09	4	09 Tottenham Mews	101.30	11.27	24.31	80.1	94.0
GBDC-ARTH-1583-08	4	08 Tottenham Mews	76.19	12.53	19.04	51.4	60.4
GBDC-ARTH-1583-07	4	07 Tottenham Mews	78.81	13.51	19.33	58.7	62.5
GBDC-ARTH-1583-05	4	05 Tottenham Mews	34.77	17.09	24.82	65.2	66.1
GBDC-ARTH-1583-04	4	04 Tottenham Mews	34.02	16.99	24.07	63.7	61.3
GBDC-ARTH-1583-03	4	03 Tottenham Mews	51.14	14.09	21.13	56.0	60.4
GBDC-ARTH-1583-02	4	02 Tottenham Mews	104.80	16.58	22.86	71.1	85.3
GBDC-ARTH-1583-01	4	01 Tottenham Mews	106.00	15.20	22.54	62.1	84.1
GBDC-ARTH-1583-06	4	06 Tottenham Mews	51.14	13.96	21.11	55.2	60.7

Multiple dwelling DER = 14.29

Multiple dwelling TER = 22.04

CO_2 Compliance = PASS

Overall Compliance = PASS

Multiple dwelling DFEE = 64.0

Multiple dwelling TFEE = 74.4

FEE Compliance = PASS

Plan Assessor version 6.3.4

SAP version 9.92

Home Quality Mark Pre-Assessment

1921 Mortimer Investments Limited

FOR THE SITE AT:
Arthur Stanley House
Tottenham Street
London Borough of Camden

SRE

Current Issue:

Author	Revision	Version	Date
Iain Turrell	C	1	20.07.2017

Revision Log:

V	Rev	Date	Changes	Issued
1	-	05.07.2017	Internal Draft	-
1	A	07.07.2017	For Issue	IT
1	B	11.07.2017	Revised for Issue	IT
1	C	20.07.2017	Ammended for Issue	CP

Distribution of Copies:

V	Rev	Date	Issued to	H	E
1	A	07.07.2017	1921 Mortimer Investments Limited & Green Building Design Consultants		✓
1	B	11.07.2017	1921 Mortimer Investments Limited & Green Building Design Consultants		✓
1	C	20.07.2017	1921 Mortimer Investments Limited & Green Building Design Consultants		✓

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Home Quality Mark: Background

The BRE Home Quality Mark (HQM) is a new standard to benchmark new domestic dwellings in order to allow the purchaser to identify the living costs, health and wellbeing and environmental impact of their new home.

The standard benchmarks the properties against a variety of financial, wellbeing, environmental and social issues, giving an overview of the whole home performance and its impact on the occupier in a way that other standards in the industry are presently unable to do.

The standard produces an overall rating of up to 5 stars giving a picture of the homes quality, with 5 stars being an outstanding home. The Indicators (below) focus on specific aspects of interest to home occupiers in three key areas, including;

Living Cost

Providing an indication of the overall costs of living in the home. This takes account of;

- Energy costs
- Durability of materials
- Maintenance
- Performance of the home in extreme weather
- Access to transport and amenities

This indicator could influence mortgages, insurance and financing for development.

Health and Wellbeing

Provides an indication of how the home will impact the occupier's health and wellbeing. This takes account of;

- Quality of living space (air, temperature, light and noise)
- Local amenity

Environmental Footprint

Provides an indication to how the home will impact the environment in its construction and use. This takes account of;

- Local and global emissions in use
- Impact of the homes construction

The 35 assessment issues that define HQM are categorised into three sections:

Our Surroundings: Includes issues that address the ability of homes to work with current and future surroundings.

My Home: Includes issues that address the provision of living spaces that are comfortable, healthy, cost effective, and have reduced environmental impacts.

Knowledge Sharing: Includes issues that address the processes that enhance understanding and co-operation between the designer, constructor, client and householder.

Each assessment issue has a number of 'credits' available and this number reflects the issues importance relative to other issues in the scheme. The HQM assessor awards the appropriate number of credits where it is demonstrated that the new home meets the issue criteria. The sum of these credits determines the star rating and performance against each of the HQM indicators.

Within some issues, there are two routes to certification, 'Foundation' and 'Comprehensive'. Whilst less credits are available within the Foundation route this often

requires a less rigorous assessment process. Where the Foundation route is used, this is stated within the issue header banner and the number of credits available shown in light blue for your information. For example, where 30 credits are available through the Comprehensive route, but only 15 are available via the Foundation route, this would be shown as '30, **15**' within the issue banner at the start of each issue detail.

Scoring within the HQM is undertaken based weighted totals of each issue which then informs the 3 indicators of Living Cost, Health and Wellbeing, and Environmental Footprint.

To achieve an overall rating of a required star level, the scheme must meet the minimum benchmarks for total credits scored as follows:

	1 Star	2 Star	3 Star	4 Star	5 Star
Minimum Total credits	150	225	275	375	400
Percentage	30	45	55	75	80

In addition, there is a minimum required weighted score to be achieved within each of the indicators to attain the overall Home Quality Mark rating. These are as follows:

		Indicators				
	Indicator bands	**1**	**2**	**3**	**4**	**5**
	Living Costs	81	121	148	202	215
	Health & Wellbeing	82	123	150	205	219
	Environmental Footprint	121	182	222	303	323
	Percentage	30	45	55	75	80

Where the minimum requirements within one of the indicators is not met for a specific HQM Level, the overall score must be reduced to that of the lowest rating within the indicators.

Home Quality Mark Pre-Assessment Estimate for the site at:

Arthur Stanley House, Tottenham Street, Fitzrovia, London Borough of Camden

This Home Quality Mark Pre-Assessment Estimate has been prepared by SRE for 1921 Mortimer Investments Limited (the Client) and the Design Team as part of the Planning requirements for the 9 no. proposed residential units at the Arthur Stanley House development, Tottenham Street, Fitzrovia, London Borough of Camden. The estimate has been based on details supplied by Allford Hall Morgan Morris (The Architect), a desktop study and certain credits have been assessed on best practice.

This Pre-Assessment outlines the Proposed Development's assumed specification to meet the required Home Quality Mark (HQM) Level and outlines assumptions made in order to achieve this level. Should this route be taken, all aspects – where assumed – will need to be adopted on site, and the relevant evidence provided to ensure compliance.

The Proposed Development at Arthur Stanley House consists of 9 no. residential units, over a total of 6 floors, including a two level basement, the lower of which is for plant and storage only.

At present it has been assumed that the scheme will achieve a 3 star rating under the HQM methodology, meeting all minimum target in relation to this level

HQM 3 Star Rating Overview:

Totals

Section

	Available	Achieved
Our Surroundings	144	88
My Home	276	144
Knowledge Sharing	80	60
OVERALL TOTAL	500	292

Overall Rating Achieved: *** HOME QUALITY MARK

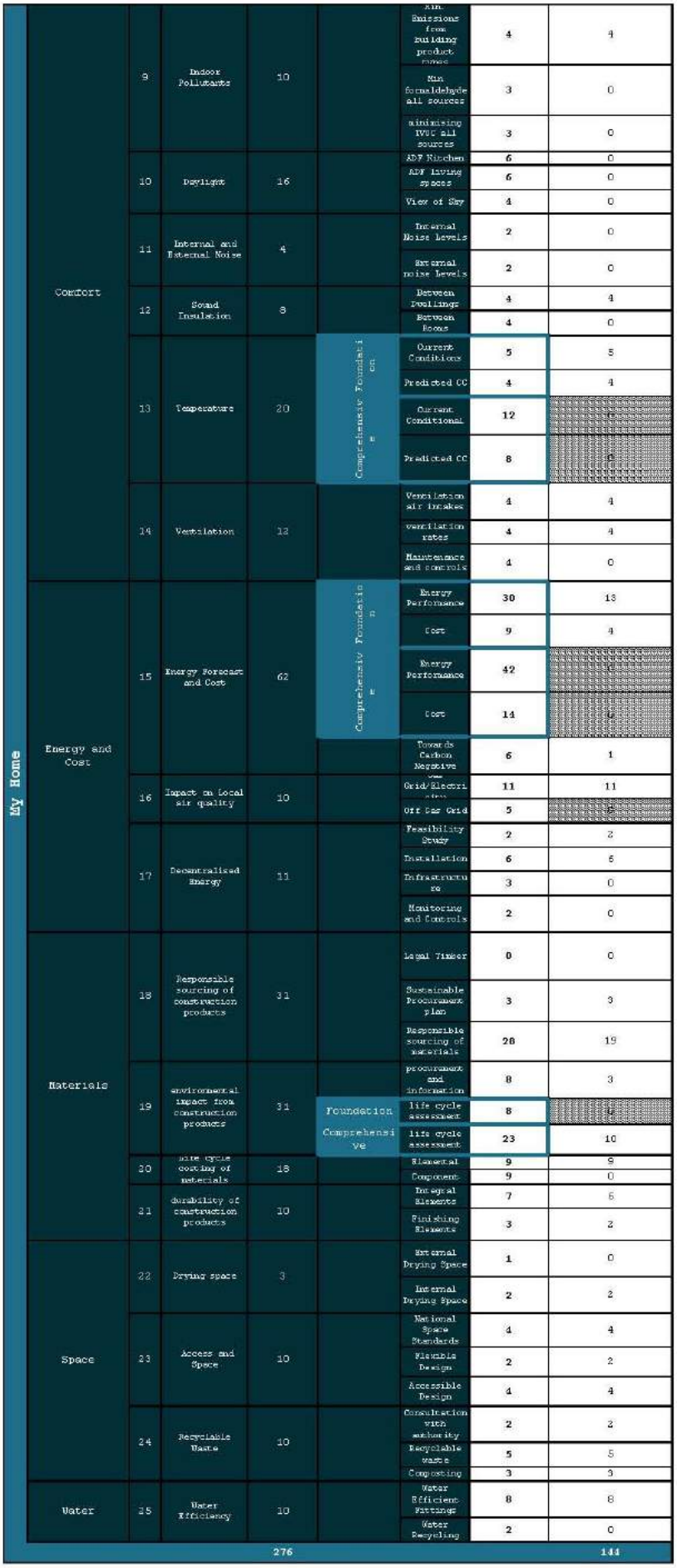
Indicators

	Achieved	Rating
Living Cost	166.5	***
Health and Wellbeing	154.8	***
Environmental Footprint	237.8	***

Detailed Summary Score Sheet

HOME QUALITY MARK

Section	Catergories	Issue Number	Issues	Credits Available	Assessment route (where applicable)	Criteria	Credit Breakdown	Arthur Stanley House - Indicative
Our Surroundings	Transport and Movement	1	Accessible Public Transport	16		Public Transport Index	16	16
		2	Alternative Sustainable Transport	15		Cycle Storage	6	3
						Cycle Networks	3	3
						Electric Car Charging	4	0
						Car Clubs	2	2
		3	Local Amenities	19		Key Local Amenities	12	12
						Beneficial Amenities	7	7
	Outdoors	4	Ecology	30		Prev. Developed Land	6	6
						Appointing an expert	2	2
						early appointment	2	2
					Foundation	Survey (Fdtn)	2	0
						Ecological Value (Fdtn)	4	0
						Biodiversity Records (Fdtn)	1	0
					Comprehensive	Ecological Survey (Comp)	3	0
						Ecological Value (Comp)	10	0
						Invasive or diseased (Comp)	2	0
						Communal Areas (Comp)	3	0
						Biodiversity records (Comp)	2	0
		5	Recreational Space	20		Public Rec. Space	4	4
						Private Space	6	0
						Communal Space	2	0
						Management Strategy	3	0
						Growing Space	2	0
						Expert Input	1	0
						Initial Planting	2	0
	Safety and Resilience	6	Flood Risk	18			18	18
		7	Managing the Impact of Rainfall	16	Foundation	Managing rate and Volume (Fdtn)	3	3
					Comprehensive	Peak Rate Run Off (Comp)	5	0
						Volume Run Off (Comp)	7	0
						Water Quality (Comp)	2	0
						Maint. & Operation (Comp)	2	0
		8	Security	10		Suit. Qual. Security Specialist	0	0
						Security Features	10	10
				144				88



My Home	Comfort	9	Indoor Pollutants	10		Min. Emissions from building product zones	4	4
						Min formaldehyde all sources	3	0
						minimising TVOC all sources	3	0
		10	Daylight	16		ADF Kitchen	6	0
						ADF living spaces	6	0
						View of Sky	4	0
		11	Internal and External Noise	4		Internal Noise Levels	2	0
						External noise levels	2	0
		12	Sound Insulation	8		Between Dwellings	4	4
						Between Rooms	4	0
		13	Temperature	20	Comprehensive Foundation	Current Conditions	5	5
						Predicted CC	4	4
						Current Conditional	12	[illegible]
						Predicted CC	8	[illegible]
		14	Ventilation	12		Ventilation air intakes	4	4
						ventilation rates	4	4
						Maintenance and controls	4	0
	Energy and Cost	15	Energy Forecast and Cost	62	Comprehensive Foundation	Energy Performance	30	13
						Cost	9	4
						Energy Performance	42	[illegible]
						Cost	14	[illegible]
						Towards Carbon Negative	6	1
		16	Impact on Local air quality	10		Grid/Electricity	11	11
						Off Gas Grid	5	[illegible]
		17	Decentralised Energy	11		Feasibility Study	2	2
						Installation	6	6
						Infrastructure	3	0
						Monitoring and Controls	2	0
	Materials	18	Responsible sourcing of construction products	31		Legal Timber	0	0
						Sustainable Procurement plan	3	3
						Responsible sourcing of materials	20	19
		19	environmental impact from construction products	31		procurement and information	8	3
					Foundation	life cycle assessment	8	[illegible]
					Comprehensive	life cycle assessment	23	10
		20	life cycle costing of materials	18		Elemental	9	9
						Component-	9	0
		21	durability of construction products	10		Integral Elements	7	5
						Finishing Elements	3	2
	Space	22	Drying space	3		External Drying Space	1	0
						Internal Drying Space	2	2
		23	Access and Space	10		National Space Standards	4	4
						Flexible Design	2	2
						Accessible Design	4	4
		24	Recyclable Waste	10		Consultation with authority	2	2
						Recyclable waste	5	5
						Composting	3	3
	Water	25	Water Efficiency	10		Water Efficient Fittings	8	8
						Water Recycling	2	0
				276				144

Knowledge Sharing								
	Home Delivery	26	Comissioning and Performance	10		Strategy	0	0
						Building Services and Control	5	5
						Fabric	5	5
		27	Quality Improvement	10		Collaborative working	2	2
						[illegible]	5	5
						Feedback previous projects	3	2
		28	Considerate Construction	4		Compliance	2	0
						Exceeds	4	4
		29	Construction Energy Use	5		Checklist	2	2
						Monitoring and Reporting	2	2
						Detailed Monitoring and Reporting	1	1
		30	Construction Water Use	5		Checklist	2	2
						Monitoring and Reporting	2	2
						Detailed Monitoring and Reporting	1	1
		31	Site Waste	15		Procurement - waste min.	1	1
						Resource Efficiency	8	8
						Div. Cons. Waste from landfill	4	4
						Div. Demo. Waste from Landfill	2	0
	User Experience	32	Aftercare (Mandatory)	10		Basic (Mandatory)	0	0
						4-6 week visit	3	0
						Remote Support	3	3
						On-Site support	4	3
		33	Home Information	5		Home Information	5	5
		34	Smart Homes	7		Connectivity	1	1
						Basic Starter Solutions	2	2
						Advanced Starter Solutions	3	0
						Alerts and Controls	1	0
	Future Learning	35	Post Occupancy Evaluation	9	Foundation	Basic POE	3	0
						Enhanced POE	4	0
					Comprehensive	Basic POE	3	0
						Enhanced POE	5	0
				80				60

Totals

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Overall Rating Achieved: *** HOME QUALITY MARK

Indicators	Achieved	Rating
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Environmental Footprint	237.8	***

Our Surroundings: Transport and Movement

Issue	Credits Available	Credits Achieved
01: Accessible Public Transport	16	16

To recognise and encourage developments with good proximity to public transport networks, in turn promoting ease of access for occupants.

Criteria 1: PTAL Score: 16 Credits

Investigations by SRE show that the PTAL score for the site is 55.73, allowing maximum credits to be awarded within this section.

Issue	Credits Available	Credits Achieved
02: Alternative Sustainable Transport Options	15	8

To promote alternative sustainable transport options and the associated facilities to reduce dependency on traditional fuelled cars.

Criteria 1: Cycle Storage: 3 Credits

In order to gain credits within this section, cycle storage must be provided in line with the following table:

Dwelling size	3 credits	6 credits
Studios or 1 bedroom	1 cycle space for every two homes is provided (where the assessment is only covering one home then one cycle space is required)	1 cycle space per home
2 and 3 bedrooms	1 cycle space per home	2 cycle spaces per home
4 bedrooms and above	2 cycle spaces per home	4 cycle spaces per home

To comply with the criteria for 6 credits, a total of 14 cycle storage spaces will be needed. Drawings currently show storage space allocated for 14 no. cycles (7 no. shown on floor plan, with a double height racks illustrated on sections). Therefore, 6 credits can be awarded here.

Criteria 2: Cycle Networks: 3 Credits

Investigations show that the site is not located adjacent to a designated cycle route, however Tottenham Street is a 20mph zone and therefore qualifies as a mixed traffic route in accordance with HQM guidance. Therefore 3 credits can be awarded.

Criteria 3: Electric Car Charging: 0 Credits

No electrical car charging points are proposed, and therefore no credits can be awarded.

Criteria 4: Car Pool/Club: 2 Credits

Investigations show that the site is located close to a ‘Zip Car’ Pool Car on Charlotte Street, therefore this site qualifies for the 2 credits within this section. Information must be provided within the Home Information Booklet (see Issue 33 below) in order to comply with this issue.

Issue	Credits Available	Credits Achieved
03: Local Amenities	19	19

To ensure occupants have access to a range of key amenities in the local area and to reduce dependency on private transport

Criteria 1: Key Local Amenities: 12 Credits.

As the site is located within central London it has been assumed that at least 3 of the following are located within 650m safe walking distance (permanent, lit and with suitable pedestrian crossing points) of the site:

- Administrative point: bank, bank, post office or cash point
- Health services: GP, health centre, pharmacy
- Small scale retail services: grocers, butchers, corner shops etc.

Criteria 2: Beneficial local amenities: 7 Credits.

It has also been assumed that the site is located within 30 mins travel (via safe walking route or public transport) of the following:

- Purpose built recreation or leisure facility
- Primary or early education facility or school
- Large scale retail (restaurants, cinemas, clothes shops etc.)
- One or more community facility eg. library, community hall etc.

Our Surroundings: Outdoors

Issue	Credits Available	Credits Achieved
04: Ecology **Foundation Assessment Route**	30 **7**	10

To identify land use and ecology on site in order to ensure that ecological value is maintained, protected and enhanced, while ant risks to the ecological value are eliminated or managed effectively throughout the development and into occupation.

Criteria 1: Previously Developed Land: 6 Credits

Full credits can be awarded here due to the site being entirely on predeveloped land.

Criteria 2: Appointing an Expert: 2 Credits

Russell Mansfield BSc (Hons) MSc of The Ecology Consultancy was appointed to undertake a preliminary Ecology Report. Two credits have been awarded.

Criteria 3: Early Appointment: 2 Credits

The report undertaken was carried out pre-planning and before any on-site works begun. Two credits have been awarded.

Criteria 4: Survey: 0 Credits

Credits will be confirmed at a later stage by the SQE.

Criteria 5: Maintaining and Enhancing Ecology: 0 Credits

Credits will be confirmed at a later stage by the SQE.

Issue	Credits Available	Credits Achieved
05: Recreational Space	20	4

To provide occupants access to outdoor recreational space, promoting community cohesion, activity and wellbeing.

Criteria 1: Public Recreational Space: 4 Credits.

The site is within 1000m walking distance of Park Square West, and Regents Park. The Park is accessible via safe walking routes with crossing points and pavements, with the park being greater than 1 Hectare in size, allowing 4 credits to be awarded here.

Criteria 2: Private open Space: 0 Credit

The following requirements need to be met in order to gain credits within this section.

Number of bedrooms per home	1 credit	3 credits	6 credits
Up to two	Balcony or roof terrace 5m² (minimum depth of 1.5m)	50m²	70m²
Three to four	1m² per additional bedroom	10m² per additional bedroom	20m² per additional bedroom
Five and above		5m² per additional bedroom	10m² per additional bedroom

Initial measurements from the drawings provided show that all units have a balcony provided, however not all are >5**m²** to allow credits to be achieved. Therefore, at this stage, credits have not been awarded.

Criteria 3: Communal External Space: 0 Credits

There is no communal external space, and therefore credits here cannot be awarded.

Criteria 4: Management Strategy: 0 Credits

It has been assumed that an appropriate management and maintenance strategy for the site will be drawn up and implemented on the site for the communal areas prior to practical completion. Therefore, allowing 3 credits within this section.

Criteria 5: Growing Space: 0 Credits

At this stage it is assumed that a growing space will not be provided within the proposed development.

Criteria 6: Expert Advice: 0 Credits

Due to a growing space not being provided, credits within this section are not achievable.

Criteria 7: Initial Planting: 0 Credits

Due to a growing space not being provided, credits within this section are not achievable.

Our Surroundings: Safety and Resilience

Issue	Credits Available	Credits Achieved
06: Flood Risk	18	18

To promote housing development in low flood risk areas, or where located in areas of high or medium flood risk, encourage measures to minimise the impact of flooding.

Criteria 1: Site of Low Flood Risk: 18 Credits

It has been assumed, based on initial investigations by SRE, that the site is located in an area which is of low flood risk from all sources *in accordance with current best practice national planning guidance.* **A Flood Risk Assessment (Meeting NPPF guidelines) must be undertaken in order to allow credits to be awarded here – this has been assumed.**

Issue	Credits Available	Credits Achieved
07: Managing the impact of Rainfall **Foundation Assessment Route**	16 **3**	3

To Encourage the management of rainfall from new developments to help reduce the risk of flooding, as well as the impact on the local environment and that downstream of the site.

Criteria 1: Home Information: pre-requisite (0 Credits)

It is a pre-requisite that details on the management of rainfall is included within the information passed to the occupant in order to gain credits here. See issue 33: Home Information below for full details.

Criteria 2: Change in impermeable Area: 3 Credits

It has been assumed that the run off from the site will be managed in a way which will mean that there will be no increase in the impermeable area of the site, resulting in equal - or less - surface water run-off from the site. Calculations or drawings will be needed to comply, however 3 credits have been awarded initially.

Issue	Credits Available	Credits Achieved
08: Security	10	10

To promote the design of developments where people feel safe and secure, and where crime and the fear of crime does not undermine quality of life or community cohesion.

Criteria 1: Suitable Qualified Security Specialist: Pre-Requisite (0 Credits)

In order to allow credits to be awarded within this section the advice of a Suitable Qualified Security Specialist (SSQS) will be sought for the site and a Security Needs Assessment undertaken to show what measures will be needed on site.

This assessment must be undertaken during, or prior to RIBA stage 2 (Concept Design). Where this is undertaken later, written confirmation will need to be provided to confirm that the assessment (and measures recommended) were not restricted or impaired as a result of the later involvement, and all measures that would/could have been recommended can still be implemented.

Criteria 2: Security Features: 10 Credits

It has been assumed that the above will be provided and that all recommendations will be implemented on the site in order to show compliance with the SSQS Report.

This can also be complied with by achieving full Secured by Design Certification (assumed at this stage).

My Home: Comfort

Issue	Credits Available	Credits Achieved
09: Indoor pollutants	10	4

To maximise occupant comfort and minimise detrimental impacts on health arising from indoor air pollutants emitted from the building.

Criteria 1: Minimising Emissions from Building Product Types: 4 Credits

It has been assumed that all building product types will meet the emissions limits, testing requirements and additional requirements within the following table. All products meeting or exceeding these requirements allows 4 credits to be awarded.

Building Product type (see CN02)	Emission limits			Testing requirement (see CN01 and CN08)	Additional requirements
	Formaldehyde	Total volatile organic compounds (TVOCs)	*Category 1A and 1B* carcinogens		
Interior paints & varnishes	0.06 mg/m³	1.0 mg/m³	0.001 mg/m³	BS EN 16402[15] or BS EN ISO 16000-9 [16] or PD CEN 16516[17] or CDPH Standard Method v1.1[18]	Paints used in wet areas (e.g. bathrooms, kitchens, utility rooms) should protect against mould growth (see).
Wood-based products	0.06 mg/m³ (Non-MDF) 0.08 mg/m³ (MDF)	1.0 mg/m³	0.001 mg/m³	BS EN ISO 16000-9 [19] or PD CEN 16516[20] or CDPH Standard Method v1.1[21] or BS EN 717-1[22] (formaldehyde emissions only)	N/A
Flooring materials	0.06 mg/m³	1.0 mg/m³	0.001 mg/m³	BS EN ISO 16000-9 [23] or PD CEN 16516[24] or CDPH Standard Method v1.1[25]	N/A
Ceiling, wall and insulation materials	0.06 mg/m³	1.0 mg/m³	0.001 mg/m³	BS EN ISO 16000-9 [26] or PD CEN 16516 [27] or CDPH Standard Method v1.1 [28]	N/A
Interior adhesives & sealants	0.06 mg/m³	1.0 mg/m³	0.001 mg/m³	BS EN 13999 (Parts 1-4) [29] or BS EN ISO 16000-9 [30] or PD CEN 16516 [31] or CDPH Standard Method v1.1 [32]	N/A

Criteria 2: Minimising airborne formaldehyde from all sources: 0 Credits

It has been assumed that the post construction air testing for formaldehyde will not be undertaken and therefore credits cannot be awarded.

Criteria 3: Minimising total volatile organic compounds (TVOCs) from all sources: 0 Credits

It has been assumed that the post construction air testing for TVOCs will not be undertaken and therefore credits cannot be awarded.

Issue	Credits Available	Credits Achieved
10: Daylighting	16	0

To promote good daylighting, thereby improving the occupants' quality of life and reducing the amount of energy used to light the home.

Criteria 1: Average Daylight Factor for Kitchen Spaces: 0 Credits

It has been assumed at present that the average daylight factor for all kitchen spaces will be less than the 2% required to gain credits within this section. This will be required to be confirmed by independent daylight calculations or via calculations undertaken by SRE as part of the Design Stage Assessment process. Final floor plans and elevations will be needed to confirm.

Criteria 2: Average Daylight Factor for Living Spaces: 2 Credits

It has been assumed that the average daylight factor for living spaces (Living Rooms, Dining Rooms and Studies) will NOT be greater than 1.5%, and therefore further credits cannot be awarded.

Criteria 3: View of Sky: 0 Credits

Not all kitchens, living, dining and study areas will have >80% of their working plane with a direct view of sky. Therefore, further credits are not achievable here.

Issue	Credits Available	Credits Achieved
11: Internal and External Noise	4	0

To reduce noise disturbance to occupants in internal and external areas of dwellings by promoting low levels of sound from external noise sources and building services.

Criteria 1: Suitably Qualified Acoustician: Pre-Requisite (0 Credits)

It has been assumed that a Suitably Qualified Acoustician will not be appointed to measure the internal and external noise levels within habitable spaces and external functional spaces post completion. Therefore, no credits can be awarded within this section.

Criteria 2: Internal noise levels: 0 Credits

To gain credits within this section, internal noise levels will need to be measured to show (or a report provided demonstrating) that the following noise levels are met for internal spaces:

Time of day	Habitable rooms $L_{Aeq,T}$	Non-habitable rooms $L_{Aeq,T}$
Day (07:00 – 23:00)	35dB	35dB
Night (23:00 – 07:00)	30dB Bedrooms only)	35dB

This has NOT been assumed to be achieved at present.

Criteria 3: External noise levels: 0 Credits

An External Noise Survey has not been undertaken by a Suitably Qualified Acoustician and therefore additional credits cannot be awarded.

Time of day	Credits	Requirements $L_{Aeq,T}$
Day (07:00 – 23:00)	1	55dB
Day (07:00 – 23:00)	2	50dB

Issue	Credits Available	Credits Achieved
12: Sound Insulation	8	4

To reduce noise disturbances by promoting good levels of sound insulation between neighbouring homes and different rooms within the home.

Criteria 1: Sound insulation between dwellings: 4 Credits

It has been assumed that post completion sound testing will be undertaken in order to demonstrate compliance with this issue. It has been assumed that the site will achieve the following as a minimum for sound testing of separating walls and floors:

- Airborne sound testing between separating walls and floors:
  - **Minimum** value: 53dB
- Impact Sound Testing between separating floors only:
  - **Maximum** value: 54dB

Criteria 2: Sound insulation between rooms: 0 Credits

It has been assumed at this stage that sound testing for internal walls between habitable rooms of the same dwelling will not be undertaken, and therefore credits have not been awarded.

Issue	Credits Available	Credits Achieved
13: Temperature **Foundation Assessment Route**	20 **9**	9

To evaluate a home's risk of high uncontrollable temperatures early in the design for both current and projected future climate scenarios.

Criteria 1: Home Information: Pre-requisite (0 Credits)

It has been assumed that information on the dwellings temperature controls will be provided as part of the Home Information provide on occupation. See Issue 33 below for details.

Criteria 2: Current Conditions Temperature Analysis (5 Credits)

It has been assumed that the internal temperature of each dwelling will be assessed using current weather data within the HQM high temperature tool, and the threshold temperature will be <22^{o}C.

Criteria 3: Projected Conditions Temperature Analysis (4 Credits)

It has been assumed that the internal temperature of each dwelling will be assessed using Projected weather data within the HQM high temperature tool, and the threshold temperature will remain <22^{o}C.

Criteria 2 and 3 above are to be confirmed by SRE at Design Stage Assessment, as and when required.

Issue	Credits Available	Credits Achieved
14: Ventilation	12	4

To encourage the specification of adequate and appropriate ventilation systems, and provision of any associated operational support to reduce the risk of pollutant and moisture build up indoors that can negatively impact occupant health.

Criteria 1: Home Information: Pre-requisite (0 Credits)

It has been assumed that information on the dwellings ventilation controls will be provided as part of the Home Information provide on occupation. See Issue 33 below for details.

Criteria 2: Ventilation air intakes: 4 Credits

It has been assumed that the homes ventilation intakes will be positioned in a manner that will avoid the intake of pollution in accordance with CIBSE TM21.

Criteria 3: Ventilation Rates: 4 Credits

Criteria 1 and 2 must be achieved.

In order to gain credits here, internal sound testing (or an appropriate report) must be undertaken to demonstrate excessive ambient noise is not apparent within the dwelling (see section 11 above). However, should credits within this section be required the following (in addition to Criteria 2 of section 11 above) must be achieved:

It has been assumed that 'System 4' ventilation will be installed to all units (continuous background extract ventilation), therefore the system must have the capacity to achieve:

a. The applicable minimum ventilation rate during continuous operation.
b. A boost air flow rate of at least 25% greater than the Applicable minimum ventilation rate.

The minimum ventilation rate must be equal to or greater than the larger outcome of the ventilation rate calculations, as outlined below:

Minimum ventilation rate: according to dwelling floor area:

$$MVR = 0.6 \times TFS$$

Where:

MVR = Minimum Ventilation Rate (l/s)
TFS = Total m² of Floor Space of all habitable rooms

Minimum ventilation rate: according to number of bedrooms:

Number of bedrooms	Assumed maximum occupancy	Minimum ventilation rate (l/s)
1	2	13
2	4	21
3	6	29
4+	8 + 2 additional occupants per additional bedroom	37 + 8l/s per additional bedroom

Criteria 4: Operation and Controls: 0 Credits

Criteria 1, 2, and 3 must be achieved to gain credits within this section. To gain credits here, the maintenance of any part of the ventilation system should be possible to be undertaken by the occupant. For continuous ventilation, the rate of this ventilation should be readily controllable by the occupant to allow the background ventilation rate to be changed to varying conditions *without* entering boost mode. Credits have not been assumed within this section.

My Home: Energy and Cost

Issue	Credits Available	Credits Achieved
15: Energy Forecast and cost **Foundation Assessment Route**	62 **30**	19

To improve energy performance and reduce costs associated with the running of the home and encourage increased rigour in calculating these.

Criteria 1: Home Information: Pre-requisite (0 Credits)

It has been assumed that information relating to energy efficiency will be provided as part of the Home Information provide on occupation. See Issue 33 below for details.

Criteria 2: Energy Performance: 13 Credits

The Home Energy Performance Ratio (HEPR) will need to be calculated in order to confirm credits within this section for all units. Indicative SAPs have been undertaken and 13 credits awarded based on this indicative modelling. Final SAP calculations, and HQM modelling will be needed to confirm the overall energy approach, and credits awarded within this section.

Criteria 3: Towards Carbon Negative: 1 Credits

The energy strategy shows that PV is to be installed on the roofing structure. At present, it has been assumed that an average of >10% of the buildings unregulated operational energy consumption will be offset by the PV, allowing 1 further credits to be awarded. As above, final SAP calculations, and HQM modelling will be needed to confirm

Criteria 4: Cost: 4 Credits

The Cost Output Benchmark for the dwellings is calculated via the SAP assessments. Indicative models show that the Cost Output Benchmark for the site will be 0.4, allowing 4 credits to be awarded. As above, Final SAP calculations, and HQM modelling will be needed to confirm.

Issue	Credits Available	Credits Achieved
16: Decentralised Energy	10	8

To maximise the cost and carbon saving benefits of generation from Low and Zero Carbon Technologies (LZCTs) by encouraging best practice when selecting and installing these systems, or alternatively provide the infrastructure for these systems to be retrofitted in a cost effective and efficient way.

Criteria 1: Home Information: Pre-requisite (0 Credits)

It has been assumed that information will be provided to the resident, outlining the Low/Zero Carbon Technologies installed on the property, and the retrofit options available to the householder will be provided within the Home Information (see Issue 33 below).

Criteria 2: Feasibility Study: 2 Credits

An independent assessment has been prepared by SRE (who is an appropriately qualified professional (AQP) organisation). This has established the most feasible recognised local (on-site or near-site) low or zero carbon (LZC) energy source(s) for the building/development, as well as any suitable infrastructure for future retrofit. This allows 2 credits to be awarded here.

The feasibility study should cover as a minimum:

a. Energy generated from LZCT per year.
b. Carbon dioxide savings from LZCTs per year.
c. Life cycle cost of the potential specification, accounting for payback.

d. Local planning criteria, including land use and noise.
e. Feasibility of exporting heat/electricity from the system.
f. Take into account any available green tariffs (Feed-In Tariff and Renewable Heat Incentive) and other grants.
g. All technologies appropriate to the site and energy demand of the development.
h. Reasons for excluding other technologies.
i. Where appropriate to the building type, connecting the proposed building to an existing local community CHP system or source of waste heat or power OR specifying a building/site CHP system or source of waste heat or power with the potential to export excess heat or power via a local community energy scheme.

Criteria 3: Installation: 6 Credits

It has been assumed that the technologies outlined within the feasibility study (above) will be installed in line with the findings of the report, gaining 6 credits here.

Criteria 4: Infrastructure: 0 Credits

Credits can only be awarded here where infrastructure is put in place for the retrofit of technologies that are not viable at this stage. It has been assumed that some technologies will be viable on the site and therefore no credits have been awarded here.

Criteria 5: Monitors and Controls: 0 Credits

It has been assumed that the monitoring of LZCT technologies will not be provided within each dwelling therefore credits are not awarded here.

Issue	Credits Available	Credits Achieved
17: Impact on Local Air Quality	11	11

To promote the use of heating and hot water generating appliances with minimal impact on local air quality.

Criteria 1: Impact on Local Air Quality: 11 Credits

At present, a Combined Heat and Power (CHP) unit is proposed for the site. This will be a communal system within the plant room, with heat exchange units connecting the communal main to the dwelling.

It has been assumed that the CHP installed will have a NOx emissions rate of <40mg/kWh. This is to be confirmed by the product manufacturer, and should be confirmed prior to purchase and specification.

My Home: Materials

Issue	Credits Available	Credits Achieved
18: Responsible Sourcing of Construction Products	31	19

To improve environmental, economic and social sustainability of construction products by recognising and encouraging the selection of products with responsible sourcing certification.

Criteria 1: Legally Sourced Timber: Pre-requisite (0 Credits)

All timber and timber based products for the site will be legally harvested and legally traded in accordance with Central Point of Expertise on Timber (CPET)

Criteria 2: Product Procurement Policy: 3 Credits

It has been assumed that by the end of RIBA Stage 2 the client/developer has a documented policy and procedure that sets out procurement requirements for all suppliers and trades to adhere to relating to the responsible sourcing of construction products. The policy must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.

The policy and procedure must encourage the specification of products with responsible sourcing certification over similar products without certification.

Criteria 3: Responsible Sourcing of Construction Products: 19 Credits

It has been assumed that as much as possible of the construction materials on the site will be sourced responsibly in line with HQM guidance. At present it has been assumed that a minimum of ~50% of the construction materials will be responsibly sourced, allowing 19 credits to be achieved.

Examples of responsible sourcing could be as follows:

- FSC/PEFC timber
- Environmental Management System of manufacturer and supplier (ISO14001, BES6001 etc.)

Issue	Credits Available	Credits Achieved
19: Environmental Impact from Construction Products	31	13
Comprehensive Route Assessment	**31**	

To improve environmental, economic and social sustainability of construction products by recognising and encouraging the selection of products with responsible sourcing certification.

Criteria 1: Product Procurement Policy and Product Environmental Information: 3 Credits

It has been assumed that by the end of RIBA Stage 2 the client/developer has a documented policy and procedure that sets out procurement requirements for all suppliers and trades to adhere to relating to the environmental impact of construction products. The policy must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.

The policy must encourage the specification of products with Environmental Product Declarations (EPD) over those that do not have EPDs.

3 credits are awarded for the implementation of this policy.

It has been assumed that environmental product declarations will be sought for building

construction materials and products, therefore further credits cannot be awarded here.

Criteria 2: Lifecycle Impact Assessment: 10 Credits

It has been assumed that a Building Lifecycle Impact assessment will be carried out by an IMPACT compliant tool in order to assess the impact of the development throughout its lifetime. A full schedule of materials will be needed to determine the score here however, at present med/low credits have been assumed.

Issue	Credits Available	Credits Achieved
20: Lifecycle Costing of Materials	31	9

To encourage economic sustainability by recognising and encouraging the use and sharing of life cycle costing analysis to reduce maintenance and operational costs.

Criteria 1: Homeowners Lifecycle Cost report: 9 Credits

It has been assumed that at the end of process stage 2/RIBA Stage 2, a life cycle cost (LCC) analysis (to PD 156865:2008)1 is produced by a suitably qualified cost consultant at a level of detail suitable to inform the homeowner of key maintenance and operational costs. The scope is as defined in the Methodology section below. It is kept updated up to the end of process stage 4/RIBA stage 4.

The homeowner's LCC report, based on the most up-to-date LCC analysis, will be made available to potential homeowners prior to a commitment to purchase. The report includes a summary which requires no expert knowledge to understand and, as a minimum, includes:

a. Costs (current prices) broken down according to the items listed below, reported at intervals of 1 year, up to year 60.
b. A summary highlighting the most significant findings of the LCC analysis including significant planned maintenance, as determined by the cost consultant.

A final version of the homeowner's LCC report must be included within the 'Home Information' (see issue 33 Home Information). It must be updated based on the final LCC analysis at the end of process stage 4/RIBA stage 4.

The LCC shall include the following items from PD 156865:20083, Table 3.1 'UK LCC data structure and definitions'. Items not applicable to the dwelling may be denoted 'n/a' in the LCC analysis and report.

- 2.0 Maintenance costs
- 2.1 Major replacement costs
- 2.4 Minor replacement, repairs and maintenance costs
- 2.5 Unscheduled replacement, repairs and maintenance costs
- 2.6 Grounds maintenance
- 3.0 Operation costs
- 3.1 Cleaning costs*
- 3.2 Utilities costs
- 3.3 Administrative costs*
- 3.4 Overhead costs*

*If outside the control of the homeowner/occupant, for example, when included in a service charge.

Criteria 2: Component Level Lifecycle Cost Optimisation: 0 Credits

It has been assumed that a component level lifecycle cost optimisation report will not be provided and therefore credits cannot be gained here.

Issue	Credits Available	Credits Achieved
21: Durability of Construction	10	8

To recognise and encourage adequate protection of exposed elements of the building and landscape, therefore minimising the frequency of replacement and achieving product optimisation.

Criteria 1: Integral Elements: 4 Credits

It has been assumed that as many as practical of the integral elements of the dwellings will be designed - and materials selected - to minimise degradation by natural or human factors.

Criteria 2: Surface Elements: 1 Credits

It has been assumed that as many as practical of the surface elements of the dwellings will be designed - and materials selected - to minimise degradation by natural or human factors.

Criteria 1&2: Within this section, the following elements are assessed:

Applicable building elements	
Integral elements	**Surface elements**
Substructure:	**External finishes:**
– foundations	– cladding
– lowest floor	– render
– basement and retaining walls	**Internal finishes:**
Superstructure:	– floor coverings and finishes
– external finishes	– wall finishes
– external fixings	– skirting boards
– external walls	– architraves
– external openings	– trimmings
– stairs	– hinges and handles
– roof	– sockets and switches
– roof drainage	– towel rails and radiators
– upper floors and balconies	**Built-in fittings:**
– internal walls	– sanitary fittings
Services:	– built-in wardrobes, cupboards and stores
– piped supply systems (within ownership boundary)	
External works:	
– boundary fences (within ownership boundary)	
– hard standing, paving, car parking (within ownership boundary)	

It will have to be demonstrated that each of the listed elements have been either selected or modified to reduce the risk of degradation. It has been assumed that 8 credits will be achieved here.

My Home: Space

Issue	Credits Available	Credits Achieved
22: Drying Space	3	2

To provide sufficient and convenient drying space that does not negatively impact on the air quality, and subsequently the health of the occupants, while simultaneously reducing the need for mechanical drying.

Criteria 1: Adequate External Drying Space: 0 Credits

It has been assumed at this stage that an external drying space will not be provided, and instead an internal drying space will be installed within each dwelling as per the details below (Criteria 2)

Criteria 2: Adequate Internal Drying Space: 2 Credits

An internal drying space will be provided within each dwelling in order to reduce the use of tumble drying. This will be in a heated and ventilated space (eg. Bathroom) with ventilation installed with min. extract rate of 30l/s and controlled in accordance with Building Regulations Requirements (Part F). Note: rooms with continuous extract (or whole house ventilation) also comply.

The drying line will be of the following minimum length:

- 1-2 bedroom units: minimum 4m total line length
- 3+ bedroom units: minimum 2m per bedroom

Issue	Credits Available	Credits Achieved
23: Access and Space	10	10

To provide sufficient and effective internal space that is accessible to all and supports the function of the home.

Criteria 1: Nationally Prescribed Standards: 4 Credits

It has been assumed that all units within the development will meet the Nationally Described Space Standards as outlined within the Technical Housing Standards.

Criteria 2: Flexible Design: 2 Credits

It has also been assumed that the internal functional space within the homes will offer flexible design options that meet every day needs and long term demands.

Some examples of 'Flexible Design' could be as follows:

a. All internal functional spaces have at least one non-load bearing wall, making them relatively easy to adapt or expand, for example creating an open plan kitchen and living space.
b. The option to change room functionality easily within a dwelling while maintaining compliance with the nationally described space standard (for example changing a study into a bedroom).
c. Services such as radiators and electrics have been situated in areas which enable any applicable modifications to take place (such as those listed above).
d. Alternatively, if it is felt the project provides a different example (to those listed) which successfully meets the principles set out above, then please contact BRE Global to discuss this.

Criteria 3: Flexible Design: 4 Credits

It has also been assumed that the internal and external spaces associated with the home meet the optional requirements of either the Building Regulations Approved Document Part M - Access to and use of buildings, Category 2 – Accessible and adaptable dwellings OR Category 3 – Wheelchair user dwellings.

Issue	Credits Available	Credits Achieved
24: Recyclable Waste	10	10

To provide sufficient recyclable waste storage and disposal options to support the reduction of waste to landfill.

Criteria 1: Consultation with the Waste Collection Authority: 2 Credits

It has been assumed that the Waste Collection Authority will be consulted to determine the waste collection patterns, identifying the:

a. number of recyclable streams (including composting).
b. type and size of waste collection containers.
c. (e.g. dedicated wheelie bins, boxes, communal bins etc.).

The results of the consultation will be implemented on site, ensuring sufficient volumes of general and recyclable waste storage are made available within the communal stores.

Criteria 2: Recyclable Waste: 5 Credits

It has been assumed that a dedicated internal space, with fixed units to store recyclable waste, is provided within each dwelling. The number of internal recyclable waste facilities should reflect the number of recyclable waste streams collected by the waste collection authority.

The combined capacity of internal recyclable waste facilities should be a minimum of:

a. 30 litres for homes with 1-2 bedrooms.
b. 40 litres for homes with 3 or more bedrooms.

Criteria 2: Composting: 3 Credits

It has also been assumed that food waste storage will be provided both within the communal store. In order to comply with this issue, each dwelling must also be provided with an internal compostable waste storage bin of minimum 10 litres in capacity.

Issue	Credits Available	Credits Achieved
25: Water	10	8

To reduce the consumption of mains water in the home through efficient fixtures and fittings and water recycling systems.

Criteria 1: Water Efficient Fittings: 8 Credits

It has been assumed that all dwellings will achieve a measured water use of <100 litres/person/day in accordance with the Water Efficiency Calculator for New Dwellings. An example specification to meet this requirement is as follows:

- W/Cs: 4/2 litres dual flush (maximum 3 litres effective flushing volume)
- Showers: <6 litres/minute
- Baths: Max. 170 litres
- Basin taps <5 litres/minute
- Kitchen taps: <6 litres/minute
- Dishwashers: <1.25 litres/place setting
- Washing Machines: < 8.17 litres/kilogram of dry load

Criteria 2: Water Recycling: 0 Credits

It has been assumed that water recycling will not be implemented on site and therefore no further credits can be awarded within this section.

Knowledge Sharing: Home Delivery

Issue	Credits Available	Credits Achieved
26: Commissioning and Performance	10	10

To ensure that homes and the systems within them are performing as designed.

Criteria 1: Commissioning and Testing Strategy: Pre-requisite (0 Credits)

It has been assumed that there is a schedule of commissioning and testing that identifies and includes a suitable timescale for commissioning of all building services and control systems and testing building fabric, in line with appropriate commissioning best practice guidance.

The principal contractor accounts for the commissioning and testing programme, responsibilities and criteria within their budget and main programme of works, allowing for the required time to complete all commissioning and testing activities prior to handover.

Criteria 2: Commissioning building services and control systems: 5 Credits

It has been assumed that an appropriate project team member will be appointed to conduct and manage commissioning activities.

Where applicable, the building systems listed below are commissioned in line with the appropriate commissioning best practice guidance:

a. Hot Water
b. Heating
c. Ventilation
d. Comfort Settings
e. Low and Zero Carbon Technologies

For buildings with complex building services and systems (e.g. communal systems with a centralised plant), a specialist commissioning manager must be appointed to conduct and manage commissioning activities

Criteria 3: Testing Building Fabric: 5 Credits

It has been assumed that air leakage testing will be undertaken on ALL RESIDENTIAL UNITS in order to gain 5 additional credits within this section.

Airtightness testing must be carried out by professionals with membership of ATTMA (Air Tightness Testing and Measurement Association) attained at organisational level maintaining UKAS accreditation (as airtightness testing laboratories to ISO 17025).

Issue	Credits Available	Credits Achieved
27: Quality Improvement	10	9

To encourage procedures that improve the overall quality of the home and reduce the ‘performance gap’.

Criteria 1: Collaborative Working: 2 Credits

It has been assumed that prior to completion of the Concept Design (RIBA Stage 2), the project delivery stakeholders have:

a. Met to identify and define their roles, responsibilities and contributions for each of the key phases of project delivery, ensuring the following are formally agreed:
    i. HQM performance targets.

ii. End user requirements (where known).
iii. Aims of the design and design strategy.
iv. Particular installation and construction requirements/limitations.
v. Maintainability and adaptability of the proposals.
vi. Feedback and lessons learnt from previous projects applied to the strategy (where applicable, see Feedback from previous projects criteria).
vii. Requirements for the production of project and end user documentation.
viii. Requirements for commissioning, testing, aftercare support and post occupancy evaluations (where pursued, see respective issues).

b. Outlined the general and specific risks to the project, relating to typical sources of poor performance including the following (where applicable): junctions (between elements, openings, balconies and complex features), cold bridging, cavity trays and correct usage of materials specified.
c. Established a set of actions for managing risks of poor performance (as per item 'b' above), by adapting design or introducing procedures to ensure appropriate site operatives are aware of how to manage these risks during construction and handover.

A written performance strategy has been produced that summarises the considerations above, including: specific targets, roles, responsibilities and the required actions for carrying out the agreements in section a above and the measures in section c above.

Relevant aspects of the performance strategy and key considerations (as listed above) are disseminated to site operatives in a way that is specific to particular roles and responsibilities (e.g. via toolbox talks, briefings, meetings, BIM, graphic examples of good workmanship on site etc.). The performance strategy and key considerations are also freely accessible to site operatives.

Criteria 2: Quality Control: 5 Credits

It has also been assumed that the following will be undertaken on site:

An appropriately qualified professional has been appointed during the feasibility stage (stage 1), preparation and brief stage, as defined by the RIBA plan of work 2013 or equivalent) to:

a. Facilitate the stakeholder collaboration process outlined in criteria 1 above
b. Contribute to and/or provide approval for the performance strategy listed above.
c. Appropriately disseminate the performance strategy to site operatives specified above
d. Liaise between project delivery stakeholders during key phases and assist site operatives during construction and handover, to ensure the performance strategy is applied in practice
e. Monitor design and construction quality throughout the key phases of the development, in line with the performance strategy targets
f. Ensure adjustments, remedial works or mitigation measures (as listed within Criteria 1, Section C above) are carried out where monitoring indicates that the performance strategy targets or any key considerations are not being met.
    i. Mitigation measures
g. Formally report progress of the performance strategy targets to the project delivery stakeholders prior to preparation and brief stage, completion of design stage and completion of post-construction stage (as a minimum)

h. Attend key design team meetings during the Concept Design, Developed Design and Technical Design stages, as defined by the RIBA Plan of Work 2013.

Criteria 3: Feedback from previous projects: 2 Credits

Where it has been demonstrated that lessons learnt from previous developments, within two years prior to the assessed dwellings design completion, have been incorporated into the design of the dwelling being assessed then a further 2 credits can be awarded here. This has been assumed to be achieved.

Acceptable examples of feedback sources include: post occupancy evaluation, pilot sites, research projects, warranty claims, aftercare support, consumer feedback and seasonal commissioning activities.

Issue	Credits Available	Credits Achieved
28: Considerate Construction	4	4

To promote the environmentally and socially considerate, and accountable management of construction sites.

Criteria 1: Considerate Construction: 4 Credits

It has been assumed that the main contractor will be signed up to the Considerate Constructors Scheme and will achieve a score of min. 35 with min. 7 in each section. This will allow 4 credits to be gained within this issue.

Issue	Credits Available	Credits Achieved
29: Construction Energy Use	5	5

To reduce the amount of energy consumed during the construction process and associated emissions.

Criteria 1: Contractors Energy Efficiency Checklist: 2 Credits

The contractor's energy efficiency checklist will be completed with a full record of decisions actions or justifications for all points listed within the table below.

In cases where the contractor has not been appointed at the time of design stage assessment and there is no suitable individual to undertake the completion of the checklist, the client should appoint an individual to assume responsibility for ensuring inclusion of the requirements of this criterion before the credit can be awarded.

Stage	Energy efficiency action (see Definitions for further detail on where to find more information about what each title entails)	Record of decisions/actions taken
Pre-construction phase	Plan the energy requirements of the project	To be completed by contractor For example, at design stage - established monitoring at a weekly frequency For example, at post construction – monitoring was carried out on the first working day of the week throughout the project. Not applicable is not valid for this point
	Procure low CO_2 site accommodation	To be completed by contractor For example, obtain EPC rating of C or higher for site accommodation
	Specify energy efficient plant	To be completed by contractor
	Secure early, high capacity, electricity grid connection	To be completed by contractor
	Co-ordinate monitoring with phasing programme of work and set the intervals at which the reporting will be taken at.	To be completed by contractor The action against this point will determine eligibility for cnt03

Construction phase	Deploy the right size generators (if generators are needed)	To be completed by contractor
	Manage energy in a site office efficiently	To be completed by contractor
	Consider energy saving measures	To be completed by contractor
	Consider installing intelligent and efficient temporary electrics	To be completed by contractor
	Consider techniques which avoid forced drying of wet trades	To be completed by contractor
	Monitor and manage energy use	To be completed by contractor The action against this point will determine eligibility for crit02 - crit03
	*Other *energy efficiency actions* can be added to this checklist	

Criteria 2: Energy Monitoring and Reporting: 2 Credits

It has been assumed that the main contractor will target, monitor and record data on the principal contractors' and subcontractors' energy consumption as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation.

Criteria 3: Advanced Energy Monitoring and Reporting: 1 Credits

It has been assumed that the reporting of energy use on site (as per Criteria 1 above) will be undertaken at weekly (or more frequent) intervals, and therefore a further credit can be awarded.

Issue	Credits Available	Credits Achieved
30: Construction Water Use	15	5

To encourage the efficient use of water and to conserve resources.

Criteria 1: Contractors Water Consumption Checklist: 2 Credits

The contractor's water efficiency checklist will be completed with a full record of decisions actions or justifications for all points listed within the table below.

In cases where the contractor has not been appointed at the time of design stage assessment and there is no suitable individual to undertake the completion of the checklist, the client should appoint an individual to assume responsibility for ensuring inclusion of the requirements of this criterion before the credit can be awarded.

Please note that the completion of this checklist does not apply at the post construction stage. In order to award this credit at the post construction stage, the requirement must be followed up as soon as it becomes available and included in the Post Construction Evidence, and must be completed before site construction activity commences.

Water efficiency action	Record of decisions/actions taken
Consider installing trigger guns to hoses.	To be completed by contractor.
Consider the use of efficient dust suppression techniques (general and road) such as fan misting systems.	To be completed by contractor.
Consider waste efficient wheel washing e.g. drive on systems.	To be completed by contractor.
For washing out/cleaning – consider efficient systems such as high pressure (low flow) washers.	To be completed by contractor.
For site accommodation, consider the use of water efficient fittings for urinals, toilets and taps.	To be completed by contractor.
Consider installing a rainwater harvesting system.	To be completed by contractor.
*Other water efficiency actions can be added to this checklist.	To be completed by contractor.

Criteria 2: Water Consumption Monitoring and Reporting: 2 Credits

It has been assumed that the main contractor will target, monitor and record data on the principal contractors' and subcontractors' water consumption as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation.

Criteria 3: Advanced Water Monitoring and Reporting: 1 Credits

It has been assumed that the reporting of water consumption on site (as per Criteria 1 above) will be undertaken at weekly (or more frequent) intervals, and therefore a further credit can be awarded.

Issue	Credits Available	Credits Achieved
31: Site Waste	15	13

To promote resource efficiency and minimise environmental impact through effective management, reducing construction waste and diverting waste away from landfill.

Criteria 1: Product Procurement Policy: Credit 1

It has been assumed that by the end of RIBA stage 2 (or equivalent), the Client/Developer has a documented policy and procedure that sets out procurement requirements for all suppliers and trades to adhere to relating to opportunities for minimising construction waste on-site.

The documented policy and procedure must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.

The documented policy and procedure must encourage the specification of products which can help to minimise waste arising (for example, consider materials that can be reused once the dwelling has been deconstructed, consider recycling/takeback arrangements and packaging recycling/minimisation).

This may be prepared and adopted at an organisational level or be site/project specific. It is recommended (but not a requirement) that the documented policy follows the principles of BS 8900-1:20132 Managing sustainable development of organizations – Guide; BS 8903:20103 Principles and framework for procuring sustainably – Guide and/or BS 88954 Designing for Material Efficiency in Buildings Part 1 and 2. This policy may form a part of a broader Sustainable Procurement Plan or be in the form of a standalone document.

Criteria 2: Construction Resource Efficiency: 8 Credits

It has been assumed that a resource management plan (RMP) will be developed covering the non-hazardous waste related to on-site construction and where applicable, dedicated off-site manufacture or fabrication (including demolition and excavation waste) generated.

It has been assumed that the RMP will demonstrate that the waste will be less that the following:

M^3 per $100m^2$	Tonnes per 100m
<3.5	<1.9

Criteria 2: Diversion of Construction Waste from Landfill: 4 Credits

It has been assumed that the following targets will be met for the diversion of waste from landfill:

Type of Waste	Percentage diverted from landfill (by volume)	Percentage diverted from landfill (by tonnage)
Construction	85%	90%
Demolition	85%	95%

Criteria 3: Diversion of Excavation Waste from Landfill: 0 Credits

It has been assumed that <95% of excavation and demolition waste will be diverted from landfill, and therefore no credits have been awarded within this section.

Knowledge Sharing: User Experience

Issue	Credits Available	Credits Achieved
32: Aftercare	10	5

To provide aftercare support during early occupancy of the home, in addition to the provision of construction warranties, to help occupants resolve any early problems and manage their home in the most efficient and comfortable way.

Criteria 1: Building Warranty **(MANDATORY)**

The dwellings will covered by a building warranty, from a warranty provider who is a member of and fully complies with "The Consumer Code for Home Builders" (www.consumercodeforhomebuilders.com) or is recognised by the Trading Standards Institute.

The above is a mandatory requirement of Home Quality Mark Certification.

Criteria 2: Basic Aftercare Support: Pre-requisite (0 Credits)

Home information is provided relating to the aftercare support that is available to the occupant – see section 33 below for more details.

Where a commitment has been made to provide occupants with an initial visit to show them around their home on the first day of occupation and the following information is communicated:

a. Verbal confirmation of aftercare commitments detailed in the aftercare part of the Home Information issue above
b. Introduction to the home information and quick start guide (as above)

Criteria 3: 4-6 Week Visit: 0 Credits

It has been assumed that an aftercare visit to the properties will not be organised with the residents, and therefore credits have not been awarded.

Criteria 4: Remote Support: 2 Credits

It has however been assumed that remote aftercare for the residents will be provided for the first 3 years year of occupation, allowing 3 credits to be awarded.

The support will be provided through one of the following:

a. Helplines (e.g. troubleshooting service)
b. Interactive communication links (e.g. online portal)
c. Customer service
d. Mobile app based support.

Criteria 5: On-Site Support: 3 Credits

It has been assumed that on-site support will be provided for the first year of occupation allowing 3 credits to be awarded (4 credits can be awarded for 3 years on-site support). On-site support can be provided via the following:

a. Call-out service
b. On-going maintenance and management arrangements
c. Periodic walkabouts
d. Resident on-site attendance.

Note: On-site support does not need to consist of an individual or service located on-site at all times but this support must be available on request

Issue	Credits Available	Credits Achieved
33: Home Information	5	5

To provide occupants with useful, accessible information that helps them to get the most out of their home and engage with their local environment and community.

Criteria 1: Core Home Information: 2 Credits

It has been assumed that home information will be provided to occupants of all dwellings from the first day of moving in and meets the following:

a. Available in an accessible format
b. Available in both a hard and soft copy on request
c. Written using plain English that is jargon free (e.g. Plain English campaign) and;
d. Includes the following content:
    i. Operational and maintenance information for all dwelling systems within the dwelling or building (where appropriate)
    ii. Includes contact details for local emergency services (e.g. local police station, hospitals, fire brigades etc.) and for the person or company responsible for any queries regarding the dwelling (e.g. this may include landlords, warranty providers, management companies, housing associations etc.).
    iii. A quick start guide where all home information is briefly summarised and can be used to direct readers to the section of home information they need where further information is needed (e.g. a simple index or ‘crib’ sheet)
    iv. Key health and safety information and emergency procedures specific to the dwelling
    v. Contains the assessed dwelling’s HQM scorecard issued by BRE.

The systems within the dwelling covered by the Core Home Information may be as follows:

a. Preparatory systems
b. Wall and barrier systems
c. Roof, floor and paving systems
d. Damp-proofing, waterproofing and plaster finishing systems
e. Signage, fittings, furnishings and equipment (FF&E) and general finishing systems
f. Flora and fauna systems (e.g. living roof systems)
g. Disposal systems (e.g. SuDS)
h. Piped supply systems
i. Heating, cooling and refrigeration systems
j. Ventilation and air conditioning systems
k. Electrical systems
l. Communications, security, safety, control and protection systems.

Criteria 2: Issue Specific Home Information: 3 Credits

Additional Credits have been assumed within this section, and further information within the Home User Information pack will include issue specific information in line with the following tables:

Issue	Relevant part of the issue (title)	Information required (where relevant credits from issues in column 1 are pursued) regarding:
02 Alternative Sustainable Transport Options	Electrical charging points	1. a. The location of the charging point. b. How to operate and maintain the system. c. An overview of the reasons for the use of electic charging points (e.g. environmental and economic savings).
	Car clubs	2. a. The location and distance to the nearest car club b. Contact details for those responsible for running the car club c. An overview of the reasons for the use of car clubs (e.g. environmental and economic savings).
05 Recreational Space	Initial planting	3. a. Maintenance requirements relating to the growing space provided. b. Access restrictions (e.g. allotments closed after daylight hours). c. Information regarding the types of produce that have been planted and information on those that would grow well in the soil conditions.
06 Flood Risk	Medium or high risk	4. a. Information regarding the flood resilience measures in place within the site boundary. b. Operation and maintenance guidance of the flood resilience measures in place (where they are not passive features).
07 Managing the Impact of Rainfall	All	5. a. Information regarding any specific drainage systems or strategies and how they should best be operated and maintained (if required). b. Where the home user is not responsible for operation or maintenance then this information should be passed onto the person or body responsible for maintenance. c. An overview of the reasons for their use (e.g. environmental and economic savings) and restrictions on making alterations. d. Emergency contact information must also be provided for the company or persons responsible for managing the drainage systems or strategies installed.

08 Security	All	6. a. Information regarding security features in the home and how to use them b. A summary of the Security Needs Assessment (SNA) and the recommendations implemented where criteria 1, 2 and 3 of the security issue have been met.
13 Temperature	All	7. a. Detail of all temperature control measures in the home b. Instructions for the occupier on how to control the temperature of their home c. Details of any maintenance required for any temperature control measures.
14 Ventilation	All	8. a. Information regarding the designed ventilation system and its design intent. b. Operational information on all ventilation systems including the location of any associated monitors and controls and how these should be used, including any automatic or manual control functions and guidance relating to how systems should be operated during summer and winter. c. Information regarding any required maintenance (including actions and frequency).
15 Energy Forecast and Cost	All	9. a. Details of all parts of the energy strategy for the home b. Details of any energy performance targets/levels incorporated into the homes design (i.e. PassivHaus, HQM, low bills etc.) c. Instructions for the occupier on how to operate their home efficiently d. General information for the EU energy labelling scheme.
16 Decentralised Energy	All	10. a. Operation and maintenance guidance for low and zero carbon technologies (LZCT) systems and infrastructure installed, including simple guidance of how to check their LZCT systems are performing correctly and what to do when they are not. b. Any support that is available from the designer or installer or manufacturer during occupancy (e.g. warranties in place or MCS services where applicable). c. The design intent of each LZCT installed. d. How systems can be expanded or adapted in the future (where options are available). e. Advice of ways that occupants can adjust their patterns of energy use to optimise the use of energy from LZCTs.
20 Life Cycle Costing of Construction Products	All	11. a. A simple outline of the cost appraisal showing the specific maintenance and living costs associated with the building fabric. b. Include any specific manufacturer advice that can help the homeowner understand how to care for and get the most out of the products. c. An outline of what may be required if maintenance will be needed on a product that has been specified. d. A year-on-year projected expenditure in a graphic form or the raw data that could feed into a graphic form. The format of this data should at least include the year, the element or component and the expected cost. e. A copy of the final version of the homeowner's report (in accordance with crit03 of Life Cycle Costing of Construction Products, issue 02.03.03).
23 Access and Space	Flexible space	12. a. Information regarding any functional flexibility that has been designed into the spaces within the home and any opportunity to expand spaces.
32 Aftercare	All	13. a. A summary of all types of aftercare support available to the occupants, including how long the support is available for and how they can use it. b. Information relating to any specific visits that will be available to the occupants including approximate timescales and what they will cover. This includes any demonstrations carried out as part of basic aftercare support or the 4-6 week visit, where pursued c. Contact details for the company and the persons responsible for carrying out aftercare support.
	4 – 6 week visit	14. a. Written confirmation of the 4 – 6 week visit available to them, including what this involves and how they can arrange a date for this visit.
34 Smart Homes	All	15. a. Information regarding the options for retro-fit available (e.g. smart meters, heat meters etc.).
	Starter solutions and/or Controls	16. a. How to operate and maintain devices installed b. How to interpret information from devices installed c. Contact details to help where devices malfunction where available (examples include: warranty provider, manufacturers, maintenance management plan providers etc.).

Note: Issue specific information does not need to be provided where the relevant credits have not been pursued within these issues. E.g. where the 'alternative sustainable transport options' issue has not been pursued, the information relating to this issue that is specified in the above table, does not need to be provided, for the purposes of meeting part 2 of this issue.

Issue	Credits Available	Credits Achieved
34: Smart Homes	7	3

To help occupants live in their home in the most cost effective, healthy and environmentally friendly way by ensuring good levels of digital connectivity.

Criteria 1: Connectivity: 1 Credit

It has been assumed that good indoor signal is available to the dwelling for at least two of the following:

- 3G or 4G
- Broadband
- Digital Television

Criteria 2: Basic Starter Controls: 2 Credits

It has been assumed that Sensors/transmitters will be installed to each dwelling that:

a. Monitor the dwelling's electricity and primary heating fuel consumption
b. Monitor internal temperature levels in the main living room as a minimum, and are either:
    a. Self-charging (e.g. fixed to incoming mains
    b. supply/supplies); Or
    c. Have a 2-year battery life (as a minimum) and are capable of alerting occupants when battery life is low.

The installed sensors/transmitters will be wirelessly linked with an accessible device that displays information to occupants (e.g. visual display unit or smart phone optimised app or website), at no additional cost. This device must be able to:

a. Display current and cumulative electricity consumption, primary heating fuel consumption and internal temperature levels (over a weekly, monthly and yearly basis),
b. Have cost factors inputted into the device/s for electricity and primary heating fuel consumption so that current cost (in pounds and pence) and account balance information can be displayed.

For the purposes of meeting the starter solutions criteria, devices must be installed that link with a web or mobile interface that meet the WCAG2.0 (ISO/IEC 40500) accessibility standards (http://www.w3.org/; http://www.iso.org/).

Installation of a mains isolation switch to allow for secondary meter installation or other 3rd party devices by the homeowner to ensure that systems are not restricted to a single manufacturer.

Home information on the devices, and how to use them will be provided in line with issue 33 – Home Information, above.

Criteria 2: Advanced Starter Controls: 0 Credits

It has been assumed that no further controls (other than those listed above) will be provided and therefore no further credits can be awarded.

Criteria 3: Controls: 0 Credits

It has been assumed that no further controls (other than those listed within Criteria 1 above) will be provided and therefore no further credits can be awarded.

Issue	Credits Available	Credits Achieved
35: Post Occupancy Evaluation	16	0

To ensure that a home is meeting its expected performance during occupation and to collect valuable information for both occupants and the building industry.

Criteria 1: Post Occupancy Evaluation: 0 Credits

It has been assumed that this stage that Post Occupancy Evaluation will not be undertaken with 18 months of site completion and therefore no further credits are awarded at present.

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SRE

BREEAM PRE-ASSESSMENT REVIEW
PLANNING STAGE (v3)

FOR

PROPOSED OFFICE CONVERSION AND EXTENSION WITH RESIDENTIAL UNITS

On behalf of

1921 Mortimer Investments Ltd

AT

ARTHUR STANLEY HOUSE, TOTTENHAM STREET, LONDON W1

INTRODUCTION

The development proposal includes the major refurbishment of an existing building and conversion to a commercial office use along with the construction of a new residential block. The option for a D1 use for a medical centre is also reviewed.

The development is located within the London Borough of Camden, close to the Westminster boundary.

PLANNING POLICY

Current LB Camden planning policy is noted to include a requirement to meet a BREEAM “excellent” rating. This requires a minimum score of 70% to be achieved along with a set of mandatory credits.

The policy also requires a minimum score to be achieved in three categories. This requires a minimum 60% of the credits to be achieved in the energy and water categories and a minimum 40% of the credits to be achieved in the materials category.

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BREEAM REVIEW

A pre-assessment exercise was carried out on the office scheme proposals. This was reviewed in a full design team workshop held on 02 May 2017 at which the client was also represented.

The principles of the BREEAM schemes were reviewed along with the BREEAM processes and scoring requirements.

The need for a separate BREEAM assessment was confirmed should the D1 medical centre proposal proceed. This would be reviewed under the BREEAM "Healthcare" scheme. This D1 space, if progressed, would be limited to a maximum floor area of 600m2 which is a small proportion of the overall scheme.

The office pre-assessment was reviewed with the design team and the pre-assessment updated to allow for team comments and client feedback.

The final pre-assessment schedule is attached – see sheets 1 to 4 inclusive.

The BREEAM score at this stage was confirmed to be 73.38%. The credits included under the water, energy and materials categories were confirmed to meet the minimum criteria required by LB Camden for each of these categories.

CONCLUSIONS

The planning stage scheme proposals are able to meet the planning policy requirements in respect of BREEAM.

Signed

Gavin Walker – Director
B.Eng C.Eng MICE. MIStructE. LCC. BREEAM AP.

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KEY
Mandatory Requirements
Time limitations

SUBJECT		CREDITS		Requirement	Comment
		AVAILABLE	TARGET		
MANAGEMENT (0.57)					
Man 01	Project brief and design	1	1	Stakeholder consultation - project delivery	To RIBA stage 2 - Including contractor
		1	1	Stakeholder consultation - third party	Existing community partnerships and networks, including feedback
		1	1	Accredited professional - design stage	
		1	1	Accredited professional - monitoring progress	
Man 02	Life cycle cost and service life planning	2	0	Elemental life cycle cost analysis	
		1	0	Component level life cycle cost analysis	
		1	1	Capital cost reporting	
Man 03	Responsible construction practices	1	1	Environmental management - EMS	
		1	1	Accredited professional - construction stage	
		2	1	CCS Scheme	35 minimum score with 7 per section required for 2nd credit
		2	1	Monitoring construction site impacts	Energy and water. Transportation monitoring required for 2nd credit
Man 04	Commissioning and handover	1	1	Commissioning / testing / responsibilities sch.	Schedule, appoint team member, allow budget and programme
		1	1	Commissioning building services	Specialist commissioning manager
		1	0	Testing and inspecting building fabric	Thermal survey and air test
		1	1	Handover	BUG and compliant training schedule
Man 05	Aftercare	1	1	Aftercare support	Meeting, FM training, one month support, help line and nominated individual, resources for 12 month monitoring of energy and water
		1	1	Seasonal commissioning	Including occupant interviews, recommissioning and update of O and Ms as required
		1	0	Post occupancy evaluation	By independent third party 12 months from PC. - by occupier ?
HEALTH AND WELLBEING (0.88)					
Hea 01	Visual comfort	1	1	Glare control	
		1	0	Daylighting	
		1	0	View out	95% of floor is within 7m of adequate opening (opening is 20% of wall area)
		1	1	internal and external lighting	light levels, zoning and controls
Hea 02	Indoor air quality	1	1	Indoor air quality plan	
		1	0	Ventilation	air intakes/exhausts, external pollution sources, filtration on HVAC, CO2 sensors
		1	0	VOC emission levels - products	
		1	0	VOC emission levels - post construction	compliant testing
		1	0	Potential for natural ventilation	Adequate cross flow with thermal comfort required to be demonstrated, with user control

Hea 03	Safe containment in Laboratories	n/a			
Hea 04	Thermal comfort	1	1	Thermal modelling	DSM software to CIBSE AM11, meets cibse guide A, and both PMV and PPD are reported
		1	1	Climate change adaptability	ditto
		1	1	Zoning and controls strategy	
Hea 05	Acoustic performance	1	1	Sound insulation	
		1	1	indoor ambient noise levels	
		1	1	reverberation times	
Hea 06	Safety and security	1	1	safe access	Cycle paths, footpaths, ped crossings, parking turning deliveries etc
		1	1	security of site and building	Specialist input during RIBA stage 2 and incorporated recommendations
ENERGY (0.65)					
Ene 01	Reduction of energy use and CO2 emissior	12	8	Energy Performance Ratio	compliant SBEM
Ene 02	Energy monitoring	1	1	All major systems sub metered and monitored	first submetering credit - 90% assigned to end use category identifiable to building user, energy monitoring and management system in place
		1	1	Submetering of high loads and tenants areas	management system or submeters to suit
Ene 03	External lighting	1	1	Energy efficient lighting	60 lumens per circuit watt - including signage, auto controls
Ene 04	Low carbon design	1	1	Passive design	RIBA stage 2 design analysis for passive opportunities, and meaningful (5%) reduction in energy demand achieved
		1	0	Free cooling	no active cooling or mech vent
		1	1	LZC feasibility study	By RIBA stage 2, technology employed and 5% demand met
Ene 05	Energy efficient cold storage	n/a			
Ene 06	Energy efficient transportation systems	3	3		Vertical transport analysis, energy demand assessed, lowest demand system employed, three specific features specified
Ene 07	Energy efficient laboratory systems	n/a			
Ene 08	Energy efficient equipment	2	2	Meaningful reduction in unregulated energy load	Tenant control - select appropriate equipment to meet ECA scheme or other compliant scheme criteria
Ene 09	Drying space	n/a			
TRANSPORT (1.0)					
Tra 01	Public transport accessibility	3	3		TRA 01 Calc required with full PT info
		1	0	Dedicated bus service	
Tra 02	Proximity to amenities	1	1		Assumed food outlet and post box and cash machine 500 m compliant
Tra 03	Cyclist facilities	1	1	Compliant spaces	1 per 10 staff -
		1	1	Compliant facilities	2 of 4 required
Tra 04	Maximum parking capacity	2	2		1 space per "6" building users max (AI assumed > 8)
Tra 05	Travel plan	1	1	Compliant travel plan provided	

WATER (0.78)					
Wat 01	Water consumption	1	1	12.5% reduction in consumption	One credit
		1	1	25% reduction in consumption	
		1	1	40% reduction in consumption	
		1	1	50% reduction in consumption	
		1	0	55% reduction in consumption	
Wat 02	Water monitoring	1	1	Meters and sub meters	criterion 1 only - water meter on mains supply to each building
Wat 03	Water leak detection	1	1	Leak detection system	
		1	1	Flow control devices to all WC facility areas	
Wat 04	Water efficient equipment	1	0	Demonstrate reduction in unregulated demand	irrigation and wash down - Low demand planting -
MATERIALS (1.04)					
Mat 01	Life Cycle Impacts	5	3	Measures external walls, windows, roof, upper floors, and floor finishes and coverings	
		2 left	0	ditto	
Mat 02	Hard landscaping and boundary protection	1	1	ext. hard landscaping and boundary protection	80 % required to meet A or A+
Mat 03	Responsible sourcing of materials	1	1	Sustainable procurement plan	criterion 1 only - legally harvested and traded timber for all timber and timber based products
		1	1	Achieve 18 % points score	
		1	1	Achieve 36 % points score	Full design stage assessment required
		1	0	Achieve 54 % points score	
Mat 04	Insulation	1	1	Embodied impact - insulation index	Ins Index greater than 2.5
Mat 05	Designing for durability and resiliance	1	1		Protecting vulnerable and exposed parts, and against material degredation (table 50)
Mat 06	Material efficiency	1	0	Identify and implement appropriate measures	Involving all parties, and at all stages
WASTE (0.94)					
Wst 01	Construction waste management	1	1	waste generation limited to 13.3 m3 / 100m2 floo	Construction waste only
		1	1	waste generation limited to 7.5 m3 / 100m2 floor	
		1	0	waste generation limited to 3.4 m3 / 100m2 floor	
		1	1	Diversion of resources from landfill	70 % by volume non demolition waste AND 80% by volume demolition waste (excludes excavations)
Wst 02	Recycled aggregates	1	0	25 % of all agg required to comply; frame, founds, pipe bedding, road surfaces, granular fill	Subject to contractor supply chain required within a 30 km radius of site
Wst 03	Operational waste	1	1	Compliant dedicated space	
Wst 04	Speculative floor and ceiling finishes	1	1		Tenant zone - show area only
Wst 05	Adaption to climate change	1	1	Appraisal of structure and fabric resiliance	RIBA Stage 2 - Hazard identification, risk estimation and management
Wst 06	Functional adaptability	1	1	Strategy study	

LAND USE AND ECOLOGY (1.0)					
LE 01	Site selection	1	1	Previously occupied land	
		1	0	Contaminated land	
LE 02	Ecological value of site and protection of ecological features	1	1	Ecological value of site	low value site
		1	1	Protection of ecological features	none assumed
LE 03	Minimising impact on existing site ecology	1	1	No negative change in ecological value	change in ecological value better than 0
		1	1	Minimal change in ecological value	One credit - change in ecological value better than -9
LE 04	Enhancing site ecology	1	1	Qualified ecologist report required	Appt by end of RIBA stage 1 - general recommendations implemented
		1	1	Increase in ecological value	min species increase of + 6
LE 05	Long term impact on biodiversity	1	1	Mandatory ecology criteria, landscape and habitat plan, and 2 additional criteria	
		1	1	4 additional criteria	
POLLUTION (0.77)					
Pol 01	Impact of refrigerants	1	0	1000 kgCO2 eq/kw cooling plus compliance requirements	Direct effect life cycle CO2 eq emissions assessment required
		1	0	100 kgCO2 eq/kw cooling (or GWP of all refridgerants is less than 10)	
		1	0	No refridgerants used in building	ie no mechanical cooling
Pol 02	NOx emissions	1	0	NOx emissions less than 100 mg/kWh	for htg and dhw demand
		1	0	NOx emissions less than 70 mg/kWh	
		1	0	NOx emissions less than 40 mg/kWh	
Pol 03	Surface water run off	1	1	Flood risk - FRA flood risk and resilience strategy	All flooding sources
		1	1	Flood risk - zone one	
		1	1	Surface water run off - peak run off limited to pre developed level (1 in 100 year)	
		1	1	Building flooding avoided on local drainage system failure	
		1	0	Minimising water course pollution	5mm discharge held on site - Pollution prevention systems in place
Pol 04	Reduction of night time light pollution	1	1	External lighting design including signage	signage to ILP tech report 5 - To ILP guidance notes with time control
Pol 05	Reduction of noise pollution	1	1	Noise impact assessment required	impact on neighbours
INNOVATION					
Inn 01	Innovations	10	0	Included within above	

MINIMUM SCORE REQUIRED	70
RECOMMENDED SCORE REQU	72.1

60% energy and water	Y / Y
40% materials	Y

PREDICTED SCORE (from above)	73.38