Outline Energy Statement

Aspect Property Services Ltd

FOR THE SITE AT:
8a-10a High Street
Teddington
TW11 8EW

SRE

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This Outline Sustainability and Energy Statement has been undertaken by SRE for the revised residential development at 8a-10a High Street, Richmond (Proposed Development) for Aspect Property Services Ltd (the Client) in order to meet the energy requirements of the London Borough of Richmond upon Thames (LBRuT). The report has been based on drawings supplied by the Architect, along with research carried out by SRE from various sources.

This statement assesses 'Best Practice', energy efficiency measures and renewable energy solutions for the Proposed Development, taking into consideration both the technical and economic viability to deliver a Building Regulations Part L1B compliant design, in line with the LBRuT requirements.

SAP calculations have been carried out on sample residential units, which confirms the energy strategy consisting of a high fabric efficiency resulting in low u-values, with highly efficient gas boilers to meet Building Regulations 2013 Part L1B.

The Proposed Development has been assessed against the LBRuT Sustainable Construction Checklist (SCC) and aims to comply with this in all possible areas. Overall, the scheme achieves a score of 39 (C rating) which is the maximum score that the existing site and building can achieve.

The Proposed Development has been assessed against the BREEAM Domestic Refurbishment 2014 scheme and achieves a 'Excellent' rating in line with Local Policy Requirements.

The Proposed Development will meet all relevant policies and requirements set out within the LBRuT Local Plan and the London Plan, the result of which is the provision of a resource efficient, sustainable development.

Proposed Energy System Summary

The inclusion of energy efficiency measures has been analysed in order to minimise on-site energy use compared to a Building Regulation compliant design, including the following:

- Highly efficient gas boilers to provide space heating and domestic hot water;
- Time and temperature control;
- Natural ventilation
- High levels of insulation and low u-values for new elements;
- Achieves an internal water usage limited to ≤110L/person/day (including an allowance of ≤5L/person/day for external water consumption);
- 100% low energy lighting (CFL or LED)

Table 1 and Figure 1 demonstrate the Proposed Development has achieved a 5.2% improvement in CO_2 emissions over the Building Regulations Part L1B baseline. As the scheme is not considered to be a major development in the context of both the London Plan and the LBRuT Sustainable Construction Checklist, no contribution to the Carbon Offset fund is required.

London Plan Energy Summary

Unit Type	Residential
Energy Baseline (tonnesCO_2/ yr)	5.75
Be Lean (tonnesCO_2/ yr)	5.45
Be Clean (tonnesCO_2/ yr)	*5.45*
Be Green (tonnesCO_2/ yr)	*5.45*
Total % savings over Baseline	5.22%

Table 1: Summary of CO_2 emissions reductions based on GLA Energy Hierarchy

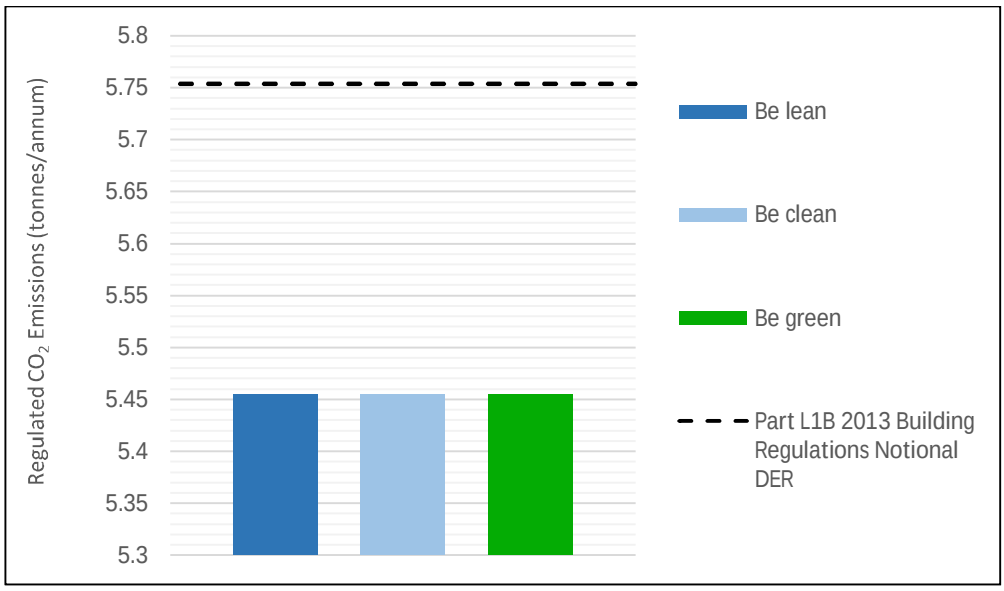


Figure 1: Graph showing GLA compliance

Introduction

1.0 Introduction

1.0.1 The Outline Energy Statement has been prepared by SRE for the revised proposals for a residential development at 8a-10a High Street, Richmond (the Proposed Development) for LG de Freitas on behalf of Aspect Property Services 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 new build dwelling.

1.0.3 The Statement includes the LBRuT Sustainable Construction Checklist (SCC) within Appendix B.

1.1 The Proposed Development

1.1.1 The Proposed Development consists of the conversion of the two existing residential dwellings and 8-10 High Street, to provide 5 flats above the existing retail units on the ground floor. As the building is a conversion of the existing residential building it must be assessed under Building Regulations Part L1B.

Figure 2: Proposed Front and Rear Elevations

1.1.2 The proposed new dwellings will have a TFA of ~272m^2. Full details of the Proposed Development can be found in the supporting drawings (See Appendix A for proposed Floor Plans).

Applicable Policy & Standards

2.0 Applicable Policy & Standards

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 statement. However, the focus is on successfully meeting the requirements of planning policy and guidance, with the aim of the Proposed Development's sustainability approach to:

- minimise the Proposed Development's overall environmental impact during construction and operation
- develop housing suitable for local needs
- integrate with other local residential neighbourhoods

2.1 Planning Policies

2.1.1 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.

Key Policies

- London Borough of Richmond upon Thames' Local Development Framework (LBRuT LDF)
- London Borough of Richmond upon Thames Core Strategy – Adopted April 2009
- London Borough of Richmond upon Thames Development Management Plan (Publication Version) – Adopted December 2011
- London Borough of Richmond upon Thames' Supplementary Planning Guidance (August 2011) – Sustainable Construction Checklist
- Mayor of London, The London Plan - Spatial Development Strategy for Greater London – July 2011 (with March 2016 Amendment)

Supporting Policies

- National Planning Policy Framework (Mar 2012)
- Mayor of London Sustainable Design and Construction SPG – April 2014

2.2 Local planning Policy (London Borough of Richmond upon Thames)

2.2.1 Following the implementation of the Deregulation Act 2015, and a subsequent Ministerial Statement on the issue of construction and the assessment of environmental performance, the ability of Local Planning Authorities to implement additional requirements for CO_2 reduction from buildings outside of London has been significantly curtailed. Currently Local Authorities can ask for up to – but no more than – a 19% improvement over Building Regulations (Part L) compliance except in Greater London. Currently, Richmond Borough Council require a 35% improvement over Building Regulations 2013 compliance, in line with the London Plan.

2.2.2 With the absence of methodologies such as BREEAM and the Code for Sustainable Homes there is no longer a national policy driver in place for the provision of overall sustainability requirements within new dwellings. However, where policy exists which highlights areas required to be met (that may have also been required under the CSH or BREEAM) these policies can be enforced in full by the Planning Authority.

2.2.3 Other planning policy documents, such as the London Borough of Richmond upon Thames – Development Management Plan, are also fully applicable to this site.

2.3 Key Planning Policies – LBRuT Local Plan

Carbon Dioxide Emissions and Zero Carbon Standards- Major residential schemes:

From October 2016 zero carbon standards apply to all new major residential development (10 or more housing units) in line with London Plan policy 5.2. This means that at least 35% of regulated CO_2 emission reductions (against a Building Regulations Part L (2013) baseline) must be achieved on-site, with the remaining emissions, up to 100%, to be offset through a contribution to the Council's Carbon Offset fund.

The price of carbon is £60/tonne over 30 years in line with the MALP viability evidence. Further detail can be found in the Cabinet Member Decision.

Smaller residential and major non-residential schemes:

Smaller residential schemes (below 10 units) and major non-residential schemes must achieve a 35% reduction in CO_2 emissions (regulated) against a Building Regulations Part L (2013) baseline. If this is not technically feasible and therefore cannot be achieved using on-site measures then applicants will need to demonstrate and justify this as part of a planning application. A cash in lieu contribution to the Council's Carbon Offset fund will be sought in cases where it is not technically feasible.

Sustainable Construction Checklist

The Sustainable Construction Checklist Supplementary Planning describes the key principles of sustainable design and construction which we expect all applicants to follow. It forms a mandatory part of the planning application for the following classes of development:

- All new residential development providing 1 or more new dwellings, including conversions and extensions that create one or more new dwellings
- All new non-residential development providing 100m^2 or more floor area, including extensions over 100m^2.

Water efficiency standards in new homes

The Council has adopted the national Building Regulations 'higher standard' for water consumption of 110 litres per person per day (including an allowance of 5 litres or less per person per day for external water consumption). All new residential developments including conversions, reversions, change of use and extensions that create one or more new dwellings must meet this target.

London Borough of Richmond upon Thames – Development Management Plan (2011)

Policy DM SD 2: Renewable Energy and Decentralised Energy Networks

"New development will be required to conform with the Sustainable Construction Checklist SPD and:

- *Maximise opportunities for the micro-generation of renewable energy. Some form of low carbon renewable and/or de-centralised energy will be expected in all new development, and*
- *Developments of 1 dwelling unit or more, or 100sqm of non-residential floor space or more will be required to reduce their total carbon dioxide emissions by following a hierarchy that first requires an efficient design to minimise the amount of energy used, secondly, by using low carbon technologies and finally, where feasible and viable, including a contribution from renewable sources.*
- *Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged where there is no over-riding adverse local impact.*
- *All new development will be required to connect to existing or planned decentralized energy networks where one exists. In all major developments and large Proposals Sites identified in the (forthcoming) Site Allocations DPD, provision should be made for future connection to a local energy network should one become available."*

London Plan 2016

2.3.1 The Outline Energy Statement primarily aims to address the requirements of the London Plan Policy 5.2.

Policy 5.2. Minimising Carbon Dioxide Emissions

a. As discussed above in Section 2.8 of the London Borough of Richmond upon Thames Sustainable Design and Construction Checklist, Development Proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:
   - Be Lean: use less energy
   - Be Clean: supply energy efficiently
   - Be Green: use renewable energy

b. The Mayor will work with Boroughs and developers to ensure that major developments 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

Table 2: London Plan CO_2 emissions reduction requirements

2.4 Supporting Policies – The London Plan Draft: 2018.

Whilst the 2016 London Plan is still the extant planning policy enforceable on the site this report has been written with the new, Draft 2018 London Plan in mind, of which the following policies are or note:

Policy SI2 Minimising greenhouse gas emissions

A. Major development should be net zero-carbon. This means reducing carbon dioxide greenhouse gas emissions from in construction and operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

1) Be Lean: use less energy and manage demand during construction and operation.
2) Be Clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
3) Be Green: maximise opportunities for renewable energy by generate producing, storing and using renewable energy on-site.
4) Be Seen: monitor, verify and report on energy performance.

B. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should aim to achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1) through a cash in lieu contribution to the borough's carbon offset fund, or
2) off-site provided that an alternative proposal is identified and delivery is certain. 117 Building Regulations 2013. If these are updated, the policy threshold will be reviewed *https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approveddocument-l*

D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

Da. Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

Db. Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Policy SI4 Managing heat risk

A. Development proposals should minimise internal heat gain and the adverse impacts of the urban heat island through design, layout, orientation, and materials and the incorporation of green infrastructure.

B. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green roofs and walls infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

Policy SI5 Water Infrastructure

A. In order to minimise the use of mains water, water supplies and resources should be protected and conserved in a sustainable manner.

B. Development Plans should promote improvements to water supply infrastructure to ensure security of supply. This should be done in a timely, efficient and sustainable manner taking energy consumption into account.

C. Development proposals should:

1) minimise the use of mains water in line with the Optional Requirement of the Building Regulations (residential development), achieving mains water consumption of 105 litres or less per head per day (excluding allowance of up to five litres for external water consumption)
2) achieve at least the BREEAM excellent standard for the 'Wat 01' water category or equivalent (commercial development)
3) incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future-proofing.

2.5 National Technical Standards

2.5.1 The National Standards are the legal requirement within the UK Construction industry and primarily the result of the Deregulation Act 2015 seeking to streamline construction compliance issues into one overall compliance requirement under the Building Regulations.

2.5.2 Therefore, it is assumed that the Proposed Development will adopt these where it is deemed appropriate and applicable.

Energy and CO_2 Emissions (Part L)

2.5.3 Part L of the Building Regulations was introduced in April 2002 and is part of the drive to lower carbon dioxide emissions of new and refurbished buildings. This section of the Regulations focuses on both commercial and residential buildings and utilises building modelling software to compare the Proposed Building to a notional compliance model – of which the proposed design should improve upon.

2.5.4 The Proposed Development will aim to exceed current Building Regulations by utilising a fabric first approach in line with the best practice energy strategy of: energy efficiency; clean energy and; low/zero carbon technologies. Calculations have been undertaken using the outline information provided, within the SAP modelling software with results shown in Section 4 onwards.

Access (Part M)

2.5.5 Part M of the Building Regulations is designed to allow adequate access to dwellings for people with disabilities for a building of this type. This includes provision for level access, suitable turning circles, access routes, door opening widths and the heights of switches and controls. Parking space widths, room layouts and ramped access gradients are also considered under Part M.

2.5.6 As part of the compliance measures, the Proposed Development will meet all of the requirements within Approved Document M where these are mandatory and applicable.

Water (Part G)

2.5.7 Unless a specific water usage requirement is stipulated by planning policy, n order to meet the requirements of the Building Regulations 2010 Part G, the Proposed Development is required to meet the performance standard of no greater than 125 litres per person per day.

2.5.8 Final calculations based on specific sanitary ware and Client requirements will need to be undertaken to confirm the water use for the Proposed Development.

Security (Part Q)

2.5.9 Part Q of the Building Regulations addresses the physical security of a dwelling, in order to resist attempts to gain entry by opportunist burglars.

2.5.10 The following sections are highlighted within Approved Document Q:

- Doors: All ground floor, basement and easily accessible doors are to have mechanical fixings back to the building fabric in accordance with the manufacturer's instructions. For lightweight construction a resilient layer (timber or metal) of >9mm thick is needed for the full height of the door, and 600mm either side of the door set.

- Windows: All ground floor, basement and other easily accessible windows (inc. easily accessible roof lights) should be made to a design which can demonstrate compliance with British Standards Publication PAS24:2012, or Secured by Design Standards. All frames should be mechanically fixed to the building structure in line with the manufacturer's installation instructions.

Waste (Part H)

2.5.11 Part H of the Building Regulations addresses the need for adequate solid waste storage. This is to ensure that sufficient space is provided for waste storage that is accessible, and does not prejudice health and wellbeing of residents, the general public or waste collection operatives.

Nationally Described Space Standards

2.5.12 As part of the Nationally Described Space Standards, the following minimum areas will be required to be met:

Table 1 - Minimum gross internal floor areas and storage (m^2)

Number of bedrooms(b)	Number of bed spaces (persons)	1 storey dwellings	2 storey dwellings	3 storey dwellings	Built-in storage
1b	1p	39 (37)[2]			1.0
	2p	50	58		1.5
2b	3p	61	70		2.0
	4p	70	79		
3b	4p	74	84	90	2.5
	5p	86	93	99	
	6p	95	102	108	
4b	5p	90	97	103	3.0
	6p	99	106	112	
	7p	108	115	121	
	8p	117	124	130	
5b	6p	103	110	116	3.5
	7p	112	119	125	
	8p	121	128	134	
6b	7p	116	123	129	4.0
	8p	125	132	138	

Figure 3: Nationally Described Space Standards – Space and Storage Requirements (Table 1)

2.6 Applicability to Proposed Development

2.6.1 The Proposed Development is assessed under Building Regulations Part L1B (extension to existing/change of use) and therefore is not required to meet the London Plan target of a 35% improvement over Building Regulations.

2.6.2 Consequently, the Proposed Development is also not required to meet the 35% reduction in carbon emissions for new residential buildings, as set out in the LBRuT Local Plan.

2.6.3 The Proposed Development will demonstrate compliance with Building Regulations Part L1B only.

2.6.4 The Proposed Development is also exempt from the London Plan Policy 5.2 requirements for a 20% CO_2 offset from renewable sources, due to this only being applicable to 'major developments' – those of which are of 10 dwellings or greater.

2.6.5 The Proposed Development will be assessed under BREEAM Domestic Refurbishment and will achieve a BREEAM "Excellent" rating. The details of the BREEAM DR assessment are provided within the supporting BREEAM DR Pre-Assessment Document.

2.6.6 The Proposed Development will comply with the LBRuT Sustainable Construction Checklist, achieving a score of 39 (C rating).

Energy Assessment

4.0 Energy Assessment

4.0.1 The energy section of the report will focus on the Planning Policy requirements for the Proposed Development to meet or exceed the target emission rate for Building Regulations 2013 Part L compliance in line with the LBRuT requirements.

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 In line with the London Plan, the energy reduction strategy will follow the energy hierarchy 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. CHP, District Heating and Communal Boilers; and
- 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 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)	0.519
Electricity (offset)	-0.519
Gas (mains)	0.216
Heating Oil	0.298
Wood Pellets	0.039
Woodchip	0.016

Table 3: CO_2 Conversion Factors

4.1.5 Carbon Dioxide (CO_2) is the main greenhouse gas[1] that is deemed responsible for anthropogenic climate change[2]. 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.

[1] Joint Science Academies' Statement, 2005: Global response to climate change

[2] 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.*

4.1.6 It is therefore prudent to reduce energy demand as far as practical through the use of a 'fabric first' approach, before seeking to address energy supply, and renewable energy options for the site.

4.1.7 The following sections of the report focus on the analysis of the energy options for the site in line with the methodology outlined above.

4.2 Baseline Energy Prediction

4.2.1 SAP 2012 modelling has been undertaken in order to gain an average sample development figure for the energy use and CO_2 emissions for the dwellings proposed on site. This has then been extrapolated to produce the anticipated energy demand and associated CO_2 emissions within the development.

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 or existing U-values and heating specifications as per the Building Regulations 2013 Part L1B.

4.2.3 Energy modelling for the Proposed Development has been undertaken based on SAP 2012, which has been used to generate the energy baseline. The baseline energy prediction has been calculated using notional efficiency gas boilers providing heating via radiators, and notional U-Values for all thermal elements in line with Part L benchmarks.

4.2.4 The baseline energy prediction will provide an indication of the energy and CO_2 target emissions criteria that the Proposed Development will need to achieve in order to achieve Building Regulations 2013 Part L compliance.

Unit Type	Baseline Target Emission Rate (Notional DER) ($kgCO_2/m^2/yr$)	Baseline CO_2 emissions (tCO_2/yr)
Average sample units	28.26	5.75

Table 4: Building Regulations 2013 Part L Energy Baseline

4.3 Energy Conservation Measures (Be Lean)

4.3.1 A number of energy conservation measures will be incorporated by the Client to reduce the overall energy load for the Proposed Development. This in-line with both the Policies detailed in Section 2.0 as well as general national 'Best Practice' guidance for delivering energy efficient buildings.

Passive Solar Design

4.3.2 There are openings/glazing on the Proposed Development which are to be orientated in northeast/southwest facing directions. This could allow for some solar gain potential but should limit excessive heating as a result. Further, excessive heat gain during summer period can be controlled through appropriate glass (Low E) or internal blinds if required. Initial SAP calculations show that there is a potential risk of overheating in the summer months which can be removed via purge ventilation. Therefore, most windows should be made openable. This means that security restrictors will need to be fitted on the ground floor glazing.

Insulation and Air Tightness

4.3.3 All elements will incorporate high performance insulation in the building envelope (walls, roofs and windows) to ensure that the space heating load will be reduced over that of a Building Regulations (Part L1A) compliant design.

Element	Proposed U-Values
Pitched roof (joists)	0.13
Pitched roof (rafters)	0.2
Flat roof	0.3
Existing Wall	0.25
Sheltered Wall	0.34
First Floor (over retail)	0.18
Dormer Walls	0.29
Windows	1.6
External door	1.8

Table 5: Proposed U-Values

4.3.4 Air tightness has been estimated as achieving the default rate of <15m^3/hr/m^2 and will be tested as part of Building Regulation compliance and to inform final As-Built SAP calculations at post-construction stage. Window glazing specification (g-value) will be confirmed post-planning once final specifications and M&E details have been selected.

Thermal Bridging

4.3.5 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 building through conduction.

4.3.6 Through careful selection of materials and construction techniques, it is possible to reduce the level of thermal bridging apparent within the walls. This decreases heat loss and increases the Fabric Energy Efficiency (FEE) of the building - assessed under Building Regulations 2013.

4.3.7 The default y value has been used for the SAP calculations, therefore the thermal bridges within the Proposed Development are not assessed but must meet the appropriate standards to be signed off by Building Control.

Energy Efficient Lighting and Appliances

4.3.8 The Proposed Development will make use of low energy lighting in-line with Building Regulation requirements.

4.3.9 Although appropriate appliances are expected to be fitted as part of the Proposed Development, advice will be provided to the occupants as part of the Home User Guide detailing the benefits of energy efficient appliances. Based on the BRE calculation methodology these measures will reduce electrical demand by ~10% - although it is not possible to calculate any reductions at this stage or through the Standard Assessment Procedure (SAP).

4.3.10 The Proposed Development as a whole 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.

Insulation

4.3.11 The resistivity of the insulating materials used within the building fabric and services will have a significant effect on the energy consumption of the Proposed Development. Any new elements will be insulated with high performance materials. The external walls should be drylined internally

High Efficiency Heating & Ventilation

4.3.12 In the baseline predicted energy calculations the space heating and hot water supply for the units will consist of a high efficiency gas system boiler. The use of a high efficiency gas boiler (efficiency greater than 89%) could deliver greater energy savings, as well as reduced CO_2 and NO_x emissions.

4.3.13 The Proposed Development will be naturally ventilated.

Influence Energy Behaviour

4.3.14 The Proposed Development will be provided with a Home User Guide which will detail how to effectively use all the appliances and fittings installed and thereby help 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.

4.3.15 It is recommended that the Proposed Development will be supplied with a Smart Meter (where available from the utility supplier) and associated internal energy display. This will further improve energy efficiency by allowing the occupants to manage their energy use more effectively.

Energy Conservation Measures (Be Lean): Summary

4.3.16 Taking into account the above energy efficiency measures, the following results can be achieved:

	Energy Baseline (tonnesCO_2/yr)	'Be Lean' (tonnesCO_2/yr)	% improvement
Average sample units	5.75	5.45	5.22

Table 6: 'Be Lean' DER/TER comparison

4.3.17 As shown in Table 6 above, the Proposed Development achieves a 5.2% improvement over Building Regulations 2013 Part L1B Requirements through the application of the 'Be Lean' (Energy Conservation Measures) strategy.

4.4 Energy Supply (Be Clean)

4.4.1 In accordance with the LBRuT Development Management Plan, following the implementation of efficient design measures, the feasibility of installing low carbon technologies should be evaluated.

4.4.2 Table 7 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	N	-	Allows a mix of fuel sources to be utilised. Reduces space required in individual unit for boilers and cylinders.	Lack of local District Heating networks nearby at present. CO_2 offset not always delivered
Combined Heat & Power	N	-	Electrical generation alongside heat production.	Lack of internal space for a CHP boiler and very low heat/DHW demand.
Communal gas fired boiler system	N	-	Low NO_x emissions. Responsive system.	Low CO_2 offset.

Table 7: Summary of 'Clean' Energy Provision

4.4.3 The existing building contains numerous dwellings, each with individual gas fired boilers to provide space heating and domestic hot water. It is therefore not feasible or possible to connect the Proposed Development to any existing district or communal heating and cooling system.

4.4.4 It is also not possible to efficiently utilise a micro-CHP unit given the very small size and low heating and hot water demand of the Proposed Development.

4.5 Renewable Energy Assessment (Be Green)

4.5.1 The use of renewable energy *is not a requirement of the Proposed Development through the LBRuT SCC or the London Plan*. This proposal will therefore not plan to integrate any renewable energy systems into the Proposed Development, however the application of renewables has been discussed below on line with Energy Statement guidance from LBRuT, and best practice.

Viable Technologies

4.5.2 Table 8 summarises the various renewable energy solutions that have been deemed as potentially viable for the Proposed Development.

Technology	Technically Feasible	Regulated CO_2 offset	Benefits	Weaknesses
Air Source Heat Pumps	N	-	Provides space heating and a proportion of domestic hot water independent of gas.	Low overall CO_2 offset. Potential system noise.
Ground Source Heat Pumps	N	-	Provides space heating and domestic hot water independent of gas.	Large area required for loop installation.
Photovoltaics	N	N	High CO_2 offset and proven technology.	Higher capital cost than other solar technologies. Lack of roof space available
Solar Water Heating	N	-	Efficient and integrates with a domestic heat pump or boiler.	Lower CO_2 offset as replacing gas supply. Would require thermal store which uses up limited space.

Table 8: Viable technologies

Air Source Heat Pumps

4.5.3 As with all Heat Pump systems, ASHP systems consume electricity to operate - the Coefficient of Performance of the system is the ratio of electrical energy consumed, to heat energy emitted. This is affected by a number of factors, including system design, outside air temperatures (solar irradiation) and patterns of use.

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.

4.5.5 If Air Source Heat Pumps were proposed, it would have to be located on the ground floor or on an area of flat roof. As the Proposed Development has no suitable accessible balcony or roof space, the use of this technology is not feasible.

Ground Source Heat Pump

4.5.6 The use of a Ground Source Heat Pump (GSHP) 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) and a backup immersion boiler to maximise the GSHP system performance for DHW provision.

4.5.7 However, the Proposed Development is above the existing non-residential, commercial development and there is no access for ground loops or piles.

Photovoltaics

4.5.8 The installation of Photovoltaics (PV) could theoretically be used to offset electrical demand within the Proposed Development. The PV array would be connected into the electrical system via an inverter.

4.5.9 However, there is limited roof space on which a PV array could be mounted, to produce a peak output which would make the system either financially viable or of noticeable benefit to the building occupants. PV is therefore not considered as a viable solution for the site.

4.5.10 As shown in Figure 4, the only elevation which could be used for PV is not suitable due to the location of a dormer. The area above the dormer could perhaps allow for 1 or two PV panels laid horizontally, which would have little benefit to the 5 flats and would struggle to payback its lifecycle cost.

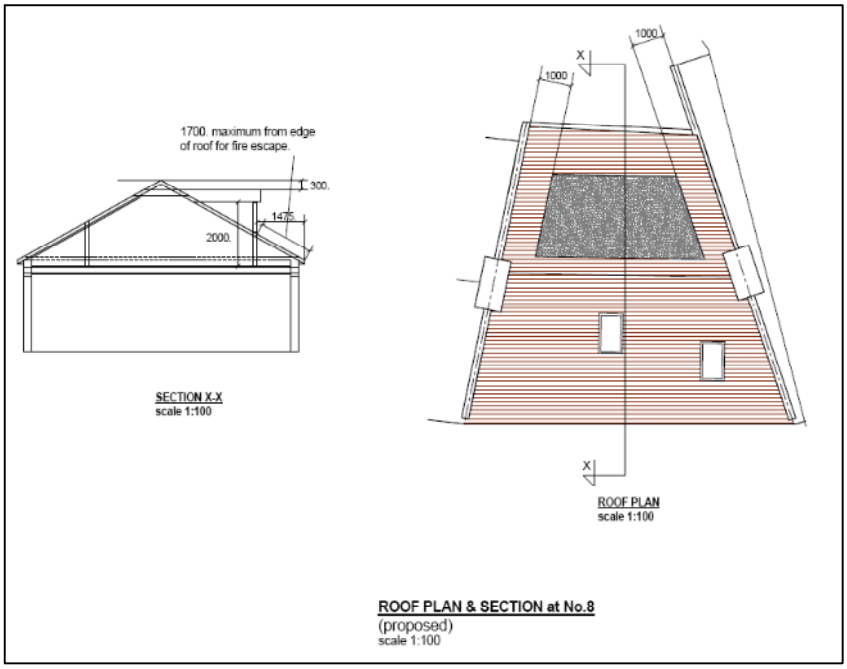


Figure 4: Roof area available for PV

Solar Water Heating

4.5.11 As with PV, the same argument can be put forth for solar water heating, as there is not a viable amount of roof space of viable orientation for an installation to have a beneficial output of solar water heating.

Unviable Technologies

4.5.12 Table 9 summarises the renewable energy solutions that have been deemed as unviable for the Proposed Development.

Technology	Technically Feasible	Regulated CO_2 offset	Benefits	Weaknesses
Biomass Boiler	N	-	Low CO_2 emissions.	Fuel storage space, cost and security of supply. High NO_x emissions. Air quality implications.
Wind Turbines	N	-	Strong visual impact.	Poor output for turbine of a size likely to be accepted by planning authority.

Table 9: Unviable technologies

Biomass Boiler

4.5.13 The use of a biomass boiler system to supply hot water and space heating has been deemed unpractical due to the Proposed Development being located in a Smoke Control Area and fuel storage.

Wind Power

4.5.14 Due to the location and nature of the site, it is not likely to lend itself to the use of wind turbines. Urban areas typically have very turbulent airflow and therefore are not ideally suited to wind energy generation. Also, the visual impact on the site would not be desirable within this densely populated area.

4.6 Energy Summary

4.6.1 Using a highly efficient gas-fired boiler, the following solution enables the Proposed Development to satisfy the requirements of Building Regulations Part L1B 2013, and therefore the relevant planning criteria.

4.6.2 The proposed solution uses a gas-based strategy to fulfil all the space and DHW demands. This uses a Worcester Greenstar 18i System boiler as an example and is fitted with time and temperature zone control, underfloor heating on the ground floor with radiators on the upper floors.

4.6.3 This solution enables the Proposed Development to achieve a 5.2% improvement over building regulations.

Baseline ($tonnesCO_2/yr$)	'Be Lean' ($tonnesCO_2/yr$)	Improvement %
5.75	5.45	5.22

Table 10: Summary of CO_2 emissions reductions based on GLA Energy Hierarchy

Summary

5.0 Summary

5.0.1 This Outline Sustainability and Energy Statement has been undertaken by SRE for the Proposed Development at 8a-10a High Street, Richmond (Proposed Development) for Aspect Property Services Ltd (the Client).

5.0.2 The Proposed Development will deliver energy efficiency measures throughout the scheme and will satisfy the London Borough of Richmond planning criteria.

5.0.3 The scheme achieves BREEAM for Domestic Refurbishment 'Excellent' Rating showing robust levels of sustainable design and consideration for this type of site, and the work proposed. Further securing a productive future for a building of local interest.

5.0.4 Overall, the Proposed Development will provide sustainable dwellings, which responds positively to the relevant sustainability planning policies and deliver the following measures:

- Highly efficient gas boiler to provide space heating and domestic hot water;
- Time and temperature control;
- Natural ventilation throughout with extract provided to kitchens and wet rooms;
- High levels of insulation and low u-values for new elements;
- Achieves an internal water usage limited to ≤110L/person/day (including an allowance of ≤5L/person/day for external water consumption);
- 100% low energy lighting (CFL or LED);
- BREEAM 'Excellent' Rating, with all mandatory aspects of BREEAM 'Excellent' achieved.

Baseline ($tonnesCO_2/yr$)	'Be Lean' ($tonnesCO_2/yr$)	'Be Clean' ($tonnesCO_2/yr$)	'Be Green' ($tonnesCO_2/yr$)	Improvement %
5.75	5.45	*5.45*	*5.45*	5.22

Table 11: Proposed Solution Summary

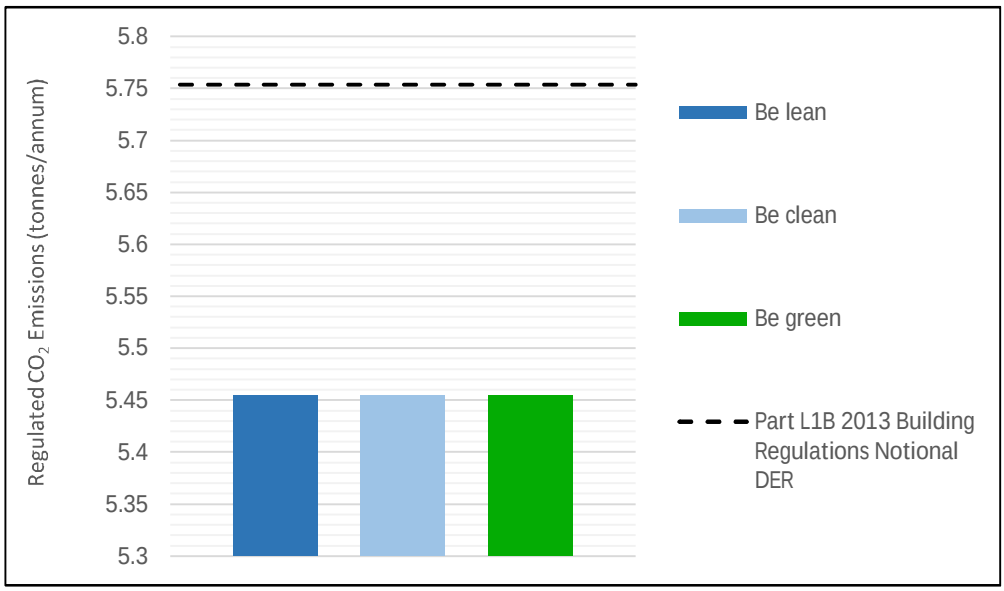
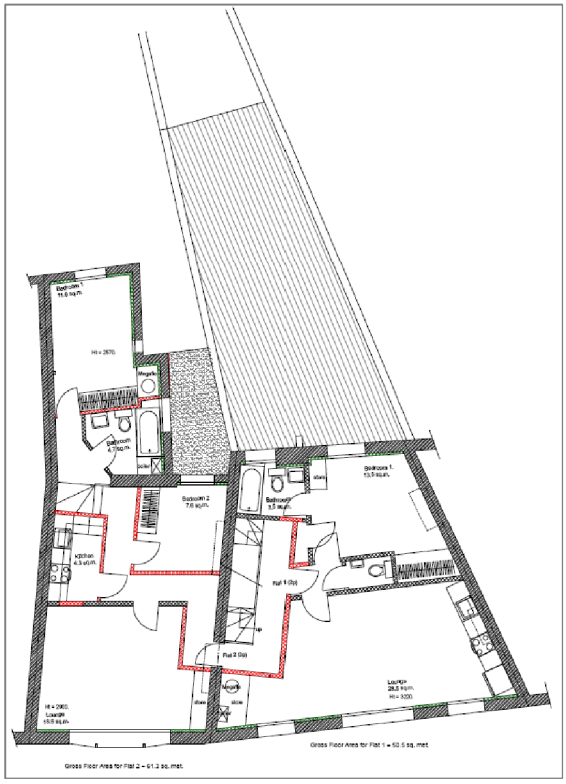
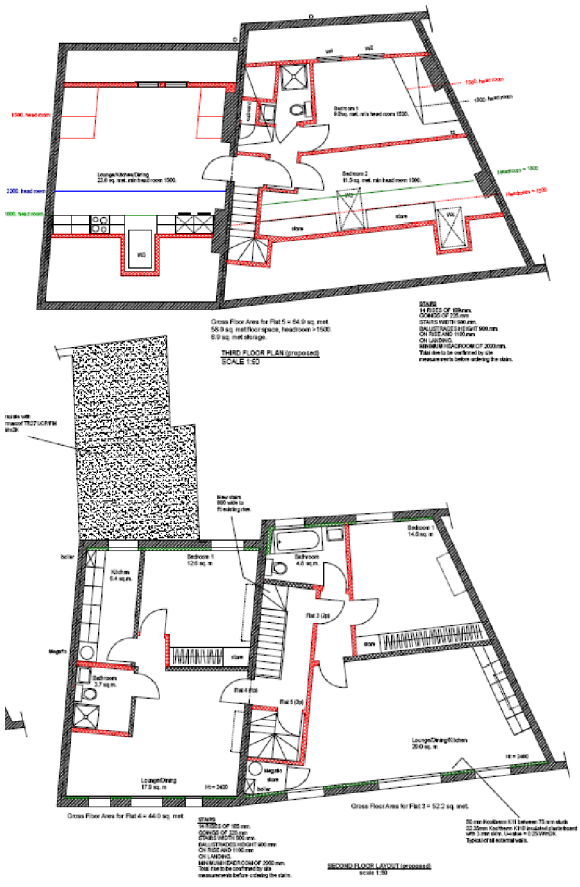


Figure 5: Graph showing GLA compliance

Appendices

Appendix A – Proposed Site Plan





Appendix B – Sustainability Checklist

LBRUT Sustainable Construction Checklist - January 2016

This document forms part of the Sustainable Construction Checklist SPD. This document **must** be filled out as part of the planning application for the following developments: all residential development providing **one or more new residential units (including conversions leading to one or more new units)**, and all other forms of development providing **100sqm or more of non-residential floor space**. Developments including new non-residential development of less than 100sqm floor space, extensions less than 100sqm, and other conversions are strongly encouraged to comply with this checklist. Where further information is requested, please either fill in the relevant section, or refer to the document where this information may be found in detail, e.g. Flood Risk Assessment or similar. **Further guidance** on completing the Checklist may be found in the Justification and Guidance section of this SPD.

Property Name (if relevant):	8a-10a High Street	Application No. (if known):	
Address (include. postcode)	8a-10a High Street, Teddington, TW11 8EW		
Completed by:	SRE Ltd		
For Non-Residential		*For Residential*	
Size of development (m2)		Number of dwellings	5

1 MINIMUM COMPLIANCE (RESIDENTIAL AND NON-RESIDENTIAL)

Energy Assessment

Has an energy assessment been submitted that demonstrates the expected energy and carbon dioxide emissions saving from energy efficiency and renewable energy measures, including the feasibility of CHP/CCHP and community heating systems? If yes, please tick.	Yes	

Carbon Dioxide emissions reduction

What is the carbon dioxide emissions reduction against a Building Regulations Part L (2013) baseline		
Policy DM SD 1 and London Plan Policy 5.2 (2015) require a 35% reduction in CO_2 emissions beyond Building Regulations 2013.		
Percentage of **total** site CO2 emissions saved through renewable energy installation?		

1A MINIMUM POLICY COMPLIANCE (NON-RESIDENTIAL AND DOMESTIC REFURBISHMENT)

Please check the Guidance Section of this SPD for the policy requirements

Environmental Rating of development:

Non-Residential new-build (100sqm or more)			
BREEAM Level	Please Select	Have you attached a pre-assessment to support this?	☐
Extensions and conversions for residential dwellings			
BREEAM Domestic Refurbishment	Excellent	Have you attached a pre-assessment to support this?	☑
Extensions and conversions for non-residential buildings			
BREEAM Level	Please Select	Have you attached a pre-assessment to support this?	☐

Score awarded for Environmental Rating:		**Subtotal**	8
BREEAM:	Good = *0*, Very Good = 4, Excellent = *8*, Outstanding = *16*		

1B MINIMUM POLICY COMPLIANCE (RESIDENTIAL)

Water Usage

Internal water usage limited to 105 litres person per day. (Excluding an allowance 5 litres per person per day for external water consumption). Calculations using the water efficiency calculator for new dwellings have been submitted.	☑ *1*	
	Subtotal	1

2. ENERGY USE AND POLLUTION

2.1 Need for Cooling — Score

a. How does the development incorporate cooling measures? Tick all that apply:

Energy efficient design incorporating specific heat demand to less than or equal to 15 kWh/sqm	☐ 6
Reduce heat entering a building through providing/improving insulation and living roofs and walls	☑ 2
Reduce heat entering a building through shading	☐ 3
Exposed thermal mass and high ceilings	☑ 4
Passive ventilation	☐ 3
Mechanical ventilation with heat recovery	☐ 1
Active cooling systems, i.e. Air Conditioning Unit	☐ 0

2.2 Heat Generation

b. How have the heating and cooling systems, with preference to the heating system hierarchy, been selected (defined in London Plan policy 5.6)? Tick all heating and cooling systems that will be used in the development:

Connection to existing heating or cooling networks powered by renewable energy	☐ 6
Connection to existing heating or cooling networks powered by gas or electricity	☐ 5
Site wide CHP network powered by renewable energy	☐ 4
Site wide CHP network powered by gas	☐ 3
Communal heating and cooling powered by renewable energy	☐ 2
Communal heating and cooling powered by gas or electricity	☐ 1
Individual heating and cooling	☑ 0

2.3 Pollution: Air, Noise and Light

a. Does the development plan to implement reduction strategies for dust emissions from construction sites? ☑ 2

b. Does the development plan include a biomass boiler? ☐ -

If yes, please refer to the biomass guidelines for the Borough of Richmond, please see guidance for supplementary information. If the proposed boiler is of a qualifying size, you may need to completed the information request form found on the Richmond website. ☐ -

c. Please tick only one option below

Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site?	☑ 3
Has the development taken care to not create any new noise generation/transmission issues in its intended operation?	☐ 1

d. Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity? ☑ 3

e. Have you attached a Lighting Pollution Report? ☐ -

Subtotal 14

Please give any additional relevant comments to the Energy Use and Pollution Section below

3. TRANSPORT

3.1 Provision for the safe efficient and sustainable movement of people and goods

a. Does your development provide opportunities for occupants to use innovative travel technologies?

Please explain:

b. Does your development include charging point(s) for electric cars? ☐ 2

c. **For major developments ONLY:** Has a Transport Assessment been produced for your development based on TfL's Best Practice Guidance?
If you have provided a Transport Assessment as part of your planning application, please tick here and move to Section 3 of this Checklist. ☐ 5

d. **For smaller developments ONLY:** Have you provided a Transport Statement? ☐ 5

e. Does your development provide cycle storage? (Standard space requirements are set out in the the Council's Parking Standards - DM DPD Appendix 4) ☑ 2
If so, for how many bicycles? 6
Is this shown on the site plans? ☑ -

f. Will the development create or improve links with local and wider transport networks? If yes, please provide details. ☐ 2

Subtotal 2

Please give any additional relevant comments to the Transport Section below

4 BIODIVERSITY

4.1 Minimising the threat to biodiversity from new buildings, lighting, hard surfacing and people

a. Does your development involve the loss of an ecological feature or habitat, including a loss of garden or other green space? (Indicate if yes) ☐ -2
If so, please state how much in sqm? _____ sqm

b. Does your development involve the removal of any tree(s)? (Indicate if yes) ☐ -
If so, has a tree report been provided in support of your application? (Indicate if yes) ☐ -

c. Does your development plan to add (and not remove) any tree(s) on site? (Indicate if yes) ☐ -

d. Please indicate which features and/or habitats that your development will incorporate to improve on site biodiversity:

Pond, reedbed or extensive native planting	6	☐	Area provided:	sqm
An extensive green roof	5	☐	Area provided:	sqm
An intensive green roof	4	☐	Area provided:	sqm
Garden space	4	☑	Area provided: 40	sqm
Additional native and/or wildlife friendly planting to peripheral areas	3	☐	Area provided:	sqm
Additional planting to peripheral areas	2	☑	Area provided: 7	sqm
A living wall	2	☐	Area provided:	sqm
Bat boxes	0.5	☑		
Bird boxes	0.5	☑		
Other	0.5	☐		

Subtotal 7

Please give any additional relevant comments to the Biodiversity Section below

5 FLOODING AND DRAINAGE

5.1 Mitigating the risks of flooding and other impacts of climate change in the borough

a. Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) ☐ -2
Have you submitted a Flood Risk Assessment? (Indicate if yes) ☐ -

b. Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick all that apply)

Store rainwater for later use	☐	5
Use of infiltration techniques such as porous surfacing materials to allow drainage on-site	☐	3
Attenuate rainwater in ponds or open water features	☐	4
Store rainwater in tanks for gradual release to a watercourse	☐	3
Discharge rainwater directly to watercourse	☐	2
Discharge rainwater to surface water drain	☑	1
Discharge rainwater to combined sewer	☐	0

c. Please give the change in area of permeable surfacing which will result from your development proposal: _____ sqm
Please provide details of the permeable surfacing below *please represent a loss in permeable area as a negative number*

Subtotal 1

Please give any additional relevant comments to the Flooding and Drainage Section below

6 IMPROVING RESOURCE EFFICIENCY

6.1 Reduce waste generated and amount disposed of by landfill though increasing level of re-use and recycling

a. Will demolition be required on your site prior to construction? *[Points will only be awarded if 10% or greater of demolition waste is reused/recycled]* ☐ 1

If so, what percentage of demolition waste will be reused in the new development? 0 %

What percentage of demolition waste will be recycled? _____ %

b. Does your site have any contaminated land? ☐ 1
Have you submitted an assessment of the site contamination? ☐ 2
Are plans in place to remediate the contamination? ☐ 2
Have you submitted a remediation plan? ☐ 1
Are plans in place to include composting on site? ☐ 1

6.2 Reducing levels of water waste

a. Will the following measures of water conservation be incorporated into the development? (Please tick all that apply):

Fitting of water efficient taps, shower heads etc	☑	1
Use of water efficient A or B rated appliances	☑	1
Rainwater harvesting for internal use	☐	4
Greywater systems	☐	4
Fit a water meter	☑	1

Subtotal 3

Please give any additional relevant comments to the Improving Resource Efficiency Section below

7	ACCESSIBILITY	
7.1	**Ensure flexible adaptable and long-term use of structures**	
a.	**If the development is residential,** will it meet the requirements of the nationally described space standard for internal space and layout?	☑ 1
	If the standards are not met, in the space below, please provide details of the functionality of the internal space and layout	
AND		
b.	**If the development is residential,** will it meet Building Regulation Requirement M4 (2) 'accessible and adaptable dwellings'?	☑ 2
	If this is not met, in the space below, please provide details of any accessibility measures included in the development.	
	For major residential developments, are 10% or more of the units in the development to Building Regulation Requirement M4 (3) 'wheelchair user dwellings'?	☐ 1
OR		
c.	**If the development is non-residential,** does it comply with requirements included in Richmond's Design for Maximum Access SPG	☐ 2
	Please provide details of the accessibility measures specified in the Maximum Access SPG that will be included in the development	
		Subtotal 3

Please give any additional relevant comments to the Design Standards and Accessibility Section below

LBRUT Sustainable Construction Checklist- Scoring Matrix for *New Construction* **(Non-Residential and domestic refurb)** ***TOTAL*** 39

Score	Rating	Significance
80 or more	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
71-79	*A*	Makes a major contribution towards achieving sustainable development in Richmond
51-70	*B*	Helps to significantly improve the Borough's stock of sustainable developments
36-50	*C*	Minimal effort to increase sustainability beyond general compliance
35 or less	*FAIL*	Does not comply with SPD Policy

LBRUT Sustainable Construction Checklist- Scoring Matrix for New Construction **Residential new-build**

Score	Rating	Significance
81 or more	*A++*	Project strives to achieve highest standard in energy efficient sustainable development
64-80	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
55-63	*A*	Makes a major contribution towards achieving sustainable development in Richmond
35-54	*B*	Helps to significantly improve the Borough's stock of sustainable developments
20-34	*C*	Minimal effort to increase sustainability beyond general compliance
19 or less	*FAIL*	Does not comply with SPD Policy

Authorisation:

I herewith declare that I have filled in this form to the best of my knowledge

Signature M Maclean Date 04.01.19

Appendix C – SAP Summary Spec Sheet

8-10 High Street, Teddington

SRE

Drawn LIB 2019

Option	Units	Existing Wall	Sheltered Wall	First Floor (over Retail)	Exposed Floor	Pitched Roof (Loft)	Pitched Roof (Rafters)	Flat Roof	Windows	Roof Lights	Exit Door	Boiler	Enhanced Duct Insulation	Number / Avoid Compromise	Secondary Heating	Hot Cylinder	Photovoltaics (PV)	Renewables (Area)	Mechanical Ventilation	Air Permeability	Proposed DER	No Sprod DER
Type	Plot No	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	Make	Y/N	Y/N	Y/N	(litres)	(kWp)	m²	Type			
FF Flat	1	0.25	0.34	0.18	-	-	0.2	-	1.6	-	1.8	Worcester Greenstar 18i System	-	-	N	170.00	-	-	Standard	Not tested	33.79	34.01
FF Flat	2	0.25	0.34	0.18	0.22	-	0.2	0.3	1.6	-	1.8	Worcester Greenstar 18i System	-	-	N	170.00	-	-	Standard	Not tested	25.57	28.5
SF Flat	3	0.25	0.34	-	-	0.13	0.2	-	1.6	-	1.8	Worcester Greenstar 18i System	-	-	N	170.00	-	-	Standard	Not tested	25.6	25.66
SF Flat	4	0.25	0.34	-	-	0.13	0.2	-	1.6	-	1.8	Worcester Greenstar 18i System	-	-	N	170.00	-	-	Standard	Not tested	22.45	24.27

Unless stated all U-Values taken from Architects drawings

Element	Proposed U Values	LIB Requirements	Description
Existing Wall SAP Wall Type 1	0.25	0.3	Existing walls, thermally upgraded (50mm Kooltherm K11 between timber studs with 32.5mm Kooltherm K118 plasterboard)
New Wall (Sheltered) SAP Wall Type 2	0.34	0.28	Timber Stud wall - fully filled with insulation batt (0.038 conductivity) and double plasterboarded
Sheltered to ceiling void SAP Wall Type 3	0.18	0.28	as above (but halved due to the pitch roof insulation being applied)
Party Wall SAP Wall Type 3	0.00	0.2	Solid brick work (existing)
Dormer Wall (Rank E Face) SAP Wall Type 4	0.29	0.28	tiles or lead, OSB ventilated cavity, Ply, 100mm Kingspan Kooltherm between timber studs, VCL, plasterboard
First Floor (over retail) SAP Floor Type 1	0.18	0.22	100mm insulation between floor joists, timber flooring (possible 6mm acoustic insulation overlayed - tbc?)
First floor (Exposed) SAP Floor Type 1	0.22	0.22	SRE Calculation: 37.5mm Kooltherm K118 on underside of floor joists, 100mm Insulation between floor joists, timber flooring (possible 6mm acoustic insulation overlayed - tbc?)
Pitch/Flat Roof (FF Upgrade) SAP Roof Type 1	0.20	0.16	110mm Kingspan Thermaroof TR27
Pitched Roof (SF Existing) SAP Roof Type 4	0.25	0.16	150mm Rafters with 75mm Kooltherm K7 between and 32.5mm Kooltherm K118 under
Flat Roof (Dormer) SAP Roof Type 2	0.25	0.16	Single ply membrane, ply, 75mm cavity, 75mm Kooltherm K7, 32.5mm Kooltherm K118
Pitched Roof (2F + Joists) SAP Roof Type 3	0.13	0.18	200mm rockwool (0.04 conductivity) between and over joists, with insulated pitch roof above (Type 4 above)
Windows	1.60	1.6	Alluminium double glazed windows assumed for all openings
Roof Lights (velux)	1.40	1.6	All roof lights and windows to be replaced
External Door (non-glazed)	1.80	1.8	All doors to be replaced
Construction Details (PSI values)	-	Non-standard Construction Details assumed - therefore psi-values not assessed	
Boiler	-	Gas Boiler - Worcester Greenstar 18i System ERP	
Controls	-	Time and Temperature Zone Control	
Heating Emitters	-	Underfloor heating on ground with radiators on upper floors	
HW Cylinder	-	Heatrae Sadia Megaflo 170DD all flats (1.2 standing loss)	
Secondary Heating	-	None	
Mechanical Ventilation	-	Standard extract	
Lighting	-	100% Low Energy Lighting - CFL or LED	
Renewables	-	TBC to address the Planning requirements	
Overheating	-	OVERHEATING RISK. Windows open half the time therefore security restrictors need to be fitted on ground floor glazing.	
Notes		All u-values must meet or go beyond the requirements detailed above where the element is either NEW or REFURBISHED. Elements which are left unchanged have no minimum requirements (eg. An uninsulated wall that does not have insulation added is exempt).	

Sign Off of details					On behalf of the contractor/client:			
	Name	M Maclean	Date	04.01.19		Name		Date
	Sign	(on behalf of SRE)				Sign		

We are SRE

Building for the Future

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