MMC Investments Limited

2-6 Queens Road
Teddington
Richmond upon Thames
TW11

Sustainability and Energy Statement
(Incl. Code for Sustainable Homes)

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ASHP	Air Source Heat Pump
CHP	Combined Heat & Power
CO_2	Carbon Dioxide – usually measured in $kgCO_2/yr$
CS	Core Strategy
CSH	Code for Sustainable Homes
DC	District Council
DPD	Development Plan Document
FGHR	Flue Gas Heat Recovery
GSHP	Ground Source Heat Pump
HP	Heat Pump
kg	Kilograms
kWh	kilo-Watt-hour – kW is peak load, kWh/yr is annual figure
No.	Number of items
Offset	Use of this fuel/technology offsets an amount of energy/CO2 generated off-site – e.g. the use of PV does not reduce electrical use, but offsets it through on-site generation
PV	Photovoltaic
PV-T	Photovoltaic-Thermal (Brand Name)
SCC	Sustainable Construction Checklist
SWH	Solar Water Heating
TFA	Total Floor Area (Internal)
The Agent	The party who requested the scope of works
The Client	The party who is developing the property (generally the invoicee)
The Proposed Development	The new build/refurbishment on which the planning application is based

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1.0 Executive Summary

1.0.1 This Sustainability and Energy Statement has been undertaken by SRE for the Proposed Development at 2-6 Queens Road, Teddington, Richmond upon Thames (Proposed Development) in order to meet the requirements of the London Borough of Richmond upon Thames planning policies, Sustainable Construction Checklist and wider London Plan Policies.

1.0.2 The Proposed Development will meet all of the relevant Sustainable Construction Checklist (SCC) policies in the provision of a resource efficient, sustainable residential development.

1.0.3 This statement assesses 'Best Practice', energy efficiency measures and renewable energy solutions for the Proposed Development, taking into consideration both the technical and the economic viability of the proposals in order to meet the 20% CO_2 emissions reduction target from on-site renewable energy technologies, and the wider 35% improvement over Building Regulations 2013 compliance as required by the London Plan – Sustainable Design and Construction SPG (April 2014) for the proposed new build units.

1.0.4 The units will achieve certification of 'Level 3' (score of 60.9%) under the Code for Sustainable Homes assessment.

1.0.5 Under the LBRUT SCC the new build units will achieve a 'C' rating (scoring 29).

1.0.6 The inclusion of energy efficiency measures has been discussed to minimise on-site energy use compared to a building regulation compliant design, including high efficiency gas heating system, very good insulation levels, high specification glazing and energy efficient lighting and appliances.

1.0.7 The Proposed Development will achieve a 46% improvement in Dwelling Emission rate over Building Regulations 2013. This complies with the 35% improvement target of the London Plan.

1.0.8 The assessment of viable on-site renewable energy generation in relation to the design, site location and orientation concludes that the installation of Photovoltaics will offset 20.6% of the predicted total CO_2 emissions of the site, based on the predicted energy baseline.

1.0.9 In addition, this report assesses the Proposed Development in relation to wider Sustainability requirements for the area, relating to both local and regional planning policy.

1.0.10 The Proposed Development goes as far as is practical in meeting all of the relevant requirements set out within the London Borough of Richmond, Sustainable Construction Checklist, and consequently meets all planning requirements (for sustainability) related to the site.

2.0 Introduction

2.0.1 The Sustainability and Energy Statement has been prepared by SRE to accompany the planning application for the Proposed Development at 2-6 Queens Road, Teddington, Richmond upon Thames (the Proposed Development) for MMC Investments Limited (the Client).

2.0.2 The Statement provides a prediction of the Proposed Development's energy baseline over that of a Building Regulation compliant design through 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.

2.0.3 The statement includes the London Borough of Richmond (LBRUT) Sustainable Construction Checklist (SCC) and details how the Proposed Development responds to, and meets the relevant requirements as part of an overall sustainability assessment.

2.1 The Proposed Development

2.1.1 The Proposed Development comprises a second and third floor extension, and alterations to elevations of the existing office building on the ground and first floor below.

Figure 1: Proposed Development

2.1.2 Full details of the Proposed Development can be found in the supporting drawings (See Appendix A for proposed Floor Plan).

3.0 Sustainability Approach

3.0.1 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."

3.0.2 This 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.

Sustainability Guidelines and Policy

3.0.3 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)
    - Core Strategy – Adopted April 2009
    - Development Management DPD (Publication Version) – Adopted December 2011
- London Borough of Richmond upon Thames' Supplementary Planning Guidance (August 2011) – Sustainable Construction Checklist

3.0.4 The LBRUT LDF states that development in the Borough will create a sustainable future through:

Core Strategy Policy CP1 - Sustainable Development:

1.A - 'The policy seeks to maximise the effective use of resources including land, water and energy, and assist in reducing any long term adverse environmental impacts of development. Development will be required to conform to the Sustainable Construction checklist, including the requirement to meet the Code for Sustainable Homes level 3 (for new homes), EcoHomes "Excellent" (for conversions) or BREEAM "Excellent" (for other types of development)…'

Core Strategy Policy CP2 Reducing Carbon Emissions

2.B – 'The Council will require the evaluation, development and use of decentralised energy in appropriate development.'

2.C – 'The Council will increase the use of renewable energy by requiring all new development to achieve a reduction in carbon dioxide emissions of 20% from on-site renewable energy generation unless it can be demonstrated that such provision is not feasible, and by promoting its use in existing development.'

Development Management DPD (Publication Version) - Policy DM SD 1:

"All developments in terms of materials, design, landscaping and standard of construction and operation should include measures capable of mitigating and adapting to climate change to meet future needs."

"…New buildings should be flexible to respond to future social, technological and economic needs by conforming to the Borough's Sustainable Construction Checklist.

New homes will be required to meet or exceed requirements of the Code for Sustainable Homes Level 3.

They also must achieve a minimum 25 per cent reduction in Carbon Dioxide emissions over Building Regulations (2010) in line with best practice from 2010 to 2013, 40 per cent improvement from 2013 to 2016, and 'zero carbon' standards from 2016."

The 40% improvement over Building Regulations has been revised in the recently released the London Plan – Sustainable Design and Construction SPG (April 2014) which takes account of the introduction of Building Regulations 2013 Part L1A, and requires an updated **35%** improvement target to account for the changes in calculations between Building Regulations 2010 and 2013.

Development Management DPD (Publication Version) - Policy DM SD 2:

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

(a) 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 development, and

(b) Developments of 1 dwelling unit or more, or 100sqm of non-residential floorspace 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.

(c) 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.

(d) All new development will be required to connect to existing or planned decentralised energy networks where one exists."

Supporting Policies

- National Planning Policy Framework (Mar 2012)
- Mayor of London, The London Plan - Spatial Development Strategy for Greater London – July 2011

4.0 Sustainable Construction Checklist

4.0.1 The LBRUT SCC is 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 100m² or more floor area, including extensions over 100m².

4.0.2 The LBRUT SCC is split into 6 sections covering the following topics:

1. Energy Use and Pollution
2. Transport
3. Biodiversity
4. Flooding and Drainage
5. Improving Resource Efficiency
6. Design Standards and Accessibility

4.0.3 The development achieves a score for each section based upon a variety of factors. The final score signifies the development rating under the SCC and the level of compliance with planning policies relating to sustainability and climate change.

Score for new construction	Score for extensions or conversions	Rating	Significance
80 or more	*70 or more*	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
71-79	*61-69*	*A*	Makes a major contribution towards achieving sustainable development in Richmond
51-70	*41-60*	*B*	Helps to significantly improve the Borough's stock of sustainable developments
36-50	*26-40*	*C*	Minimal effort to increase sustainability beyond general compliance
35 or less	*25 or less*	*FAIL*	Does not comply with planning policies on sustainability and climate change

Table 1: Sustainable Construction Checklist Scores & Ratings

4.0.4 The final score achieved by the Proposed Development under the LBRUT SCC is 29 (C-Rated). As such the site achieves compliance requirements for an extension. A higher score is not considered feasible, however according to the SCC checklist the site is classified as a 'sustainable development'.

4.0.5 The following sections detail how the building has complied with the LBRUT SCC requirements, where feasible and has gone 'as far as is practical'.

4.0.6 The full LBRUT Sustainable Construction Checklist is included in Appendix B.

4.1 Minimum Policy Compliance

Environmental Rating – Code for Sustainable Homes

4.1.1 The Code for Sustainable Homes Pre-Assessment Estimate shows that the site is predicted to meet the requirements for certification to Code Level 3.

4.1.2 The Code for Sustainable Homes is a nationally recognised standard used to assess the environmental performance of homes and aims to acknowledge improved environmental performance in house design.

4.1.3 The scheme considers both broad environmental concerns (e.g. climate change, resource use) as well as site specific issues (e.g. energy use, ecology etc), and these issues are balanced against the desire for high quality of life and a safe and healthy internal environment. The issues assessed are arranged into nine key categories:

• Energy	• Surface Water Run-Off	• Health & Wellbeing
• Water	• Waste	• Management
• Materials	• Pollution	• Ecology & Land-Use

Table 2: CSH Categories

4.1.4 SRE are a Code for Sustainable Homes accredited assessor organisation.

4.1.5 A summary of the key measures that are to be implemented and the final credit score is provided in the full Pre-Assessment.

Code for Sustainable Homes – Addendum 2014

4.1.6 Following the release of the 2014 Addendum to the Code for Sustainable Homes, new standards were released for a number of different sections. For the Energy section of the CSH a new set of standards were released to correspond with the recently released SAP 2012 software.

4.1.7 However, at this stage a number of issues and bugs remain unresolved within the SAP software and as such to ensure that the developments are meeting the required Code for Sustainable Homes standard and to ensure compliance with all planning policies relating to CSH energy credits, SAP 2009 will be used to determine CSH Level 4 compliance. SAP 2012 will still be used to show compliance with the London Plan – Sustainable Design and Construction SPG (35% regulated CO_2 improvement over 2013 Building Regulations).

Energy Assessment

4.1.8 The Proposed Development's predicted energy use, suitable energy efficiency measures, renewable and low carbon energy technology and associated CO_2 emissions reductions are assessed in detail in Section 5.

4.2 Energy Use and Pollution

Need for Cooling

4.2.1 The flats will incorporate passive vents and openable windows, ensuring adequate levels of background ventilation will be maintained in accordance with Part F.

4.2.2 Good levels of insulation will help reduce heat exiting and entering the building.

4.2.3 Thermal mass in the outer leaf of a building can reduce any potential risk of overheating in the summer months by absorbing solar radiation and allowing it to dissipate without being transmitted into the building itself.

4.2.4 There will be good solar gain via large windows, especially on south facing elevations and this will be controlled via blinds. Overheating will also be avoided by including some obscure glazing with a lower glazing transmission factor.

Heat Generation

4.2.5 Heating systems and the energy hierarchy are assessed in detail in Section 5.

Pollution: Air, Noise and Light

4.2.6 Construction site impacts will be monitored as standard practice in line with best practice. This includes:

- Adopt best practice in terms of air (dust) pollution from site activities

This will include items such as:

- The use of dust sheets to limit the amount of dust being moved around.
- All electric saws, routers and planers used on site must be fitted with an extract system to minimise dust being released in to the air.
- Any machine cutting of bricks/ blocks on site will have facilities to control the dust by using water.
- All skips will be covered to reduce the dust being blown around the site.

4.2.7 It is unlikely that there will be any increase in noise levels to the surrounding area - except for associated construction traffic. Plant equipment will not increase noise levels to neighbouring dwellings and the surroundings as the units will be situated internally.

4.2.8 The proposed residential use is compatible with adjacent land uses. Therefore, noise at street level and neighbouring buildings is unlikely to change and thus the sound scape of the street will stay broadly the same.

4.2.9 Sound insulation for all party walls and floors will improve on Building Regulations standards by a minimum of 5dB in line with Code for Sustainable Homes requirements to ensure the provision of acceptable sound insulation standards and so minimise the likelihood of noise complaints.

4.2.10 Light pollution will be minimised through the careful specification and positioning of any external lighting required by the Proposed Development, ensuring that no lighting negatively impacts the surrounding residential units.

4.2.11 As part of the Code for Sustainable Homes assessment, external lighting will be controlled through daylight and PIR sensors and will consist of dedicated energy efficient fittings.

4.3 Transport

4.3.1 The design has 14 No. car parking spaces for the residents of the properties (1 No. spaces per flat) and >1 No. cycle spaces per flat which will encourage residents to use a sustainable means of transport.

4.3.2 Additionally, given the good level and frequency of public transport and the proximity of local car clubs there are plenty of alternatives to using the private car for travel.

4.4 Biodiversity

Minimising the threat to biodiversity

4.4.1 As the Proposed Development consists of a second and third floor extension above an existing office building - the footprint of the building will remain the same.

4.4.2 This aspect is considered as part of the Code for Sustainable Homes Pre-Assessment Estimate and through this the Proposed Development will ensure any ecological value of the site is maintained and, where possible, enhanced.

4.4.3 To meet the requirements of the Sustainable Construction Checklist, a number of measures are required: additional native and wildlife friendly planting to peripheral areas, and bird and bat boxes will also be installed to improve the biodiversity of the site.

4.5 Flooding and Drainage

Reducing and mitigating the risks of flooding and other impacts of climate change

4.5.1 The EA flood risk map shows the development is in Flood Zone 1 (Figure 3), and is therefore at low risk of flooding (1 in 1000 chance of flooding per year).

4.5.2 As the Proposed Development consists of the proposed second floor extension of an existing building, the footprint of the building will remain the same. No significant new paving is required as part of the development however, where appropriate, porous paving will be specified in order to reduce surface water runoff and to meet the requirements within the LBRUT sustainability checklist.

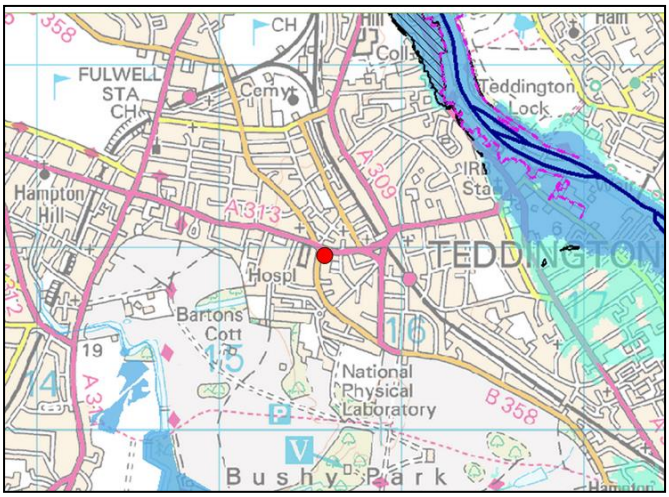

Figure 2: EA Flood Risk Map

4.6 Improving Resource Efficiency

Reduce waste generated and amount disposed of by landfill

4.6.1 A Site Waste Management Plan (SWMP) will be established before construction work commences on site to monitor, report and set targets for the level of waste being re-used and recycled. This process will also be applicable for assessment as part of the Code for Sustainable Homes assessment. A compliant SWMP will include the following provisions:

- A target benchmark for resource efficiency
- Procedures and commitments for minimising non-hazardous construction waste in line with the benchmark and best practice
- Specify waste minimising actions relating to at least 3 key waste groups

- Procedures for minimising hazardous waste
- Procedures for sorting, reusing and recycling construction and demolition waste
- Procedures for measuring the amount of construction and demolition waste

4.6.2 Appropriate monthly monitoring and waste targets will be set by the main contractor to minimise waste during the construction process – this is assessed under the Waste section of the Code for Sustainable Homes.

4.6.3 Wherever practicable, construction waste will be recycled/re-used in accordance with a suitable guide such as the DTI Construction Industry Key Performance Indicator (KPI) and in accordance with the waste hierarchy (see Figure 3).

4.6.4 Food waste collection will be provided for all flats, thus complying with the LBRUT Sustainability Checklist.

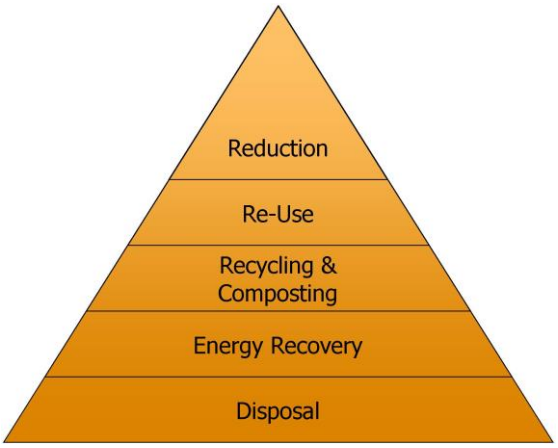

Figure 3: Waste Hierarchy

Contaminated land

4.6.5 Environment Agency data indicates that the site is not contaminated and there are no reported pollution incidences in the immediate surrounding area, other than waste from the local hospital which does not pose a risk to tenants.

Reducing levels of water waste

4.6.6 The aim of incorporating internal water conservation measures is to reduce overall water usage to a maximum of 105 litres/person/day, which exceeds the requirements of a Code Level 3 development.

4.6.7 The residential unit within the Proposed Development will be fitted with modern, efficient, low water use fittings, appliances (washing machines and dishwashers) and equipment to minimise water usage. In order for all units to have a water use of less than 105/litres/person/day, the below specification shows how this can be achieved:

- 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 8 litres/min)
- Dual Flush WC's (4/2.6 Litre)

- Bath: maximum 200 litre
- Space only for Washing Machine
- Space only for Dishwasher
- No water softeners are to be installed

4.6.8 The site has limited scope for Grey Water Recycling. There is limited space to accommodate underground tanks or Grey Water Recycling equipment in or adjacent to the building.

4.6.9 At this stage, evidence that capacity exists in the public sewerage and water supply network has not been obtained, but will be investigated as required at the design stage – the existing site features an existing commercial building so issues are not expected.

4.7 Design Standards

4.7.1 The architect will consult a Police Architectural Liaison Officer (ALO) or Crime prevention design advisor (CPDA) and incorporate their recommendations into the design to ensure Secured by Design Section 2 compliance will be achieved.

4.7.2 The Proposed Development will meet all the requirements set out in the London Plan Residential Design Standards SPD for internal space and layout.

5.0 Energy Assessment

Energy Approach

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

5.0.2 The approach adopts the following standard energy strategy (in-line with The London Plan Energy Hierarchy and 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.

5.0.3 The design has sought to greatly enhance the building envelope specification to minimise the overall energy demand and implementing good passive solar design where practicable.

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

Fuel Source	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
Wood Chip	0.016

Table 3: CO_2 Conversion Factors

5.0.5 Carbon Dioxide (CO_2) is the main greenhouse gas[1] that is deemed responsible for anthropogenic climate change. Although by mass it does not have as high radiative forcing effect as other gases (namely CH4 – 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.

5.0.6 It is also equally important in an era of ever increasing total energy consumption to increase energy efficiency in order to minimise dependency on, and conserve existing supplies of fossil oil and gas, which are estimated to be at, or close to, their peak of supply[2]. After this peak, production and therefore availability is expected to steadily decline resulting in a constant increase in fuel cost.

5.1 Energy Conservation Measures (be lean)

5.1.1 The overall energy strategy for the Proposed Development, as highlighted in paragraph 5.0.2, will be to use less energy, use clean energy and use renewable energy and to, where possible, design an energy conscious building to positively influence the overall predicted energy demand.

5.1.2 A number of energy conservation measures will be incorporated by the Client to reduce the overall energy load for the Proposed Development. This is in-line with both the Policies listed above in Paragraph 3.0.3 onwards as well as general national 'Best Practice' guidance for delivering energy efficient buildings.

Passive Solar Design

5.1.3 The proposed apartments have glazing on its east and west aspects and therefore passive solar gains are likely to be modest. However, overheating will be reduced by the use of blinds and the opening of windows in summer months.

Insulation and Air Tightness

5.1.4 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-Value
Flat Roof	0.15
External Walls	0.18
Party Walls (incl. corridors and stairs which will be heated)	0
Sheltered walls	0.15 - 0.2
Windows	1.4

Table 4: Proposed U-Values for the new build flat units

[1] Joint Science Academies' statement, 2005: Global response to climate change
[2] More information, references and peer-reviewed articles at http://www.peakoil.net & http://www.odac-info.org

5.1.5 Air tightness has been estimated as achieving a rate of <4m^3/hr/m^2 and all units will be tested as part of Building Regulation compliance and to inform final As-Built SAP.

Thermal Bridging

5.1.6 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 building through conduction.

5.1.7 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 2010.

5.1.8 Accredited Construction Details are proposed for use within the development, however for achieving enhanced levels, psi (Ψ) values will need to be calculated for the specific materials junctions by a suitably qualified person.

5.1.9 Through attention to detail around materials junctions (e.g. floor edges) and the use of building materials such as cobalt wall ties, the level of thermal bridging can be reduced for new building elements.

Energy Efficient Lighting and Appliances

5.1.10 The Proposed Development will make use of low energy lighting in-line with BRE methodology and in excess of Building Regulation requirements. As such this has been included within SAP modelling (100% low energy bulbs assumed throughout the building).

5.1.11 Although appropriate appliances are not expected to be fitted: 'A' or 'A+' white goods will need to be installed if proposed, advice will also be provided as part of the Home User Guide detailing the benefits of energy efficient appliances.

5.1.12 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.

5.1.13 The building 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 dedicated 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.

Passive Ventilation

5.1.14 The new build unit will utilise passive vents to comply with the LBRUT Sustainability Checklist. These ventilation systems do not require electrically powered fans and as such the electrical load will be reduced.

5.1.15 This system will ensure that the building ventilation is adequate and managed, whilst minimising heat loss – reducing heating loads.

High Efficiency Gas Condensing Boiler

5.1.16 In the Predicted Energy Baseline each unit has been specified with a high efficiency gas combination boiler system to provide all the space heating and hot water supply. The use of a high efficiency gas boiler could deliver greater CO_2 savings, as well as reduced NOx emissions (target ≤40mg/kWh to support the CSH and BREEAM assessments).

Flue Gas Heat Recovery System

5.1.17 Flue Gas Heat Recovery systems (FGHR) are designed to recover heat from the condensate and flue gases discharged from a combination boiler. They pre-warm the cold water supply to the boiler, thereby increasing the boiler's efficiency and ability to provide hot water supply to a number of fittings simultaneously without loss of temperature or flow rate.

5.1.18 The result is the boiler can save up to 30% energy demand compared to a standard high efficiency gas boiler. FGHR is not currently being proposed for use within the Proposed Development.

Influence Energy Behaviour

5.1.19 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 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.

5.1.20 An energy meter will also be provided so the occupants can monitor the amount of energy used within the dwelling – energy meters can log the electricity usage of a building, provide cost breakdowns and indicate if excessive energy is being used at any point. These systems allow the end user to take control of their energy use, allowing them to cut their costs and CO_2 emissions.

5.1.21 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.

5.2 Baseline Energy Prediction

5.2.1 The following energy baseline for the new build residential flat has been calculated taking into consideration the positive impact of the energy efficiency measures listed above.

5.2.2 SAP 2012 and Building Regulations 2013 have been used to generate the energy baseline. The unregulated 'Appliances and Cooking' load is drawn from BRE Methodology.

5.2.3 The energy baseline is based on SAP modelling undertaken on a number of sample flat units, which has then been extrapolated across the site. This should give a good indication of the energy strategy required to meet the LBRUT policy requirements.

Unit Type	*Electrical Demand (kWh/yr)*	*Fossil Heating & Hot Water (kWh/yr)*	*Appliances & Cooking (kWh/yr)*	Baseline Energy (kWh/yr)	Baseline CO_2 emissions ($kgCO_2/yr$)
Flats	4,339	48,969	23,169	76,477	27,084

Table 5: Baseline Energy Prediction

5.2.4 The baseline energy prediction has been calculated using a high efficiency gas combination boiler providing heating via radiators.

5.2.5 The predicted energy baseline for the Proposed Development results in a predicted CO_2 emission of 27,084 kg CO_2/yr. Therefore the aspirational target of 20% CO_2 offset would require a minimum of 5,417 kg CO_2/yr offset via on-site renewable energy.

5.3 Incentive Schemes

5.3.1 Annual savings can be achieved for the low carbon and renewable energy technologies outlined in the report via the Feed-In-Tariff (FIT) and Renewable Heat Incentive (RHI) schemes.

5.3.2 The schemes aim to provide financial support to individuals, communities and businesses to encourage them to implement renewable/low carbon technologies. An elevated rate is paid for all energy generated on-site by renewable or low carbon means.

5.4 Energy Supply (be clean)

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

Combined Heat and Power

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

5.4.3 However, provisionally, the use of a CHP system to supply hot water and space heating has been deemed unfeasible due to the complications in design of providing adequate space internally or externally for a centralised plant room owing to the compact design of the apartments.

The use of Heat Pump Technology

5.4.4 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 can be achieved on average.

5.4.5 Heat pumps will only deliver low grade heat (~50°C) efficiently, and therefore HP systems are generally 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.

5.4.6 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.

5.4.7 HP technologies also raise the issue of potential noise pollution and would require the implementation of a centralised heating system to make it practical, thus the use of a HP has not been deemed technically feasible for the site. The need for a ground loop for GSHP would require a large amount of excavation external space which is deemed impractical for this site.

Communal Heating System

5.4.8 An individual system performs better than a communal system due to the standing losses and distribution losses associated with a communal heating system.

5.4.9 Due to the site constraints (both in terms of building design and site surroundings) the use of communal power has been discounted. The use of individual high efficiency gas boilers however has been specified, and this meets the London Plan requirement to 'be clean'.

5.5 Renewable Energy Assessment (be green)

5.5.1 Based on the Energy Assessment and the subsequent Predicted Improved Energy Baseline in Table 5, a total of 5,417 kg CO_2/yr would be required to be offset through on-site renewable energy sources to meet the aspirations outlined in the LBRUT Core Strategy (CS) for a 20% reduction/offset in the predicted CO_2 emissions through the use of on-site renewables for the new build flat unit.

5.5.2 Table 6 below summarises the various renewable energy solutions that have been assessed for the Proposed Development.

Technology	Technically Feasible	CO_2 Offset ($kgCO_2/yr$)	Benefits	Weakness
Photovoltaics	✓	5,569 (20.6%)	High CO_2 offset and proven technology	Higher capital cost than other solar technologies
Solar Water Heating	✓	-	Efficient and integrates with a domestic heat pump	Lower CO_2 offset as replacing gas supply
Ground Source Heat Pumps	×	×	Provides space heating and a proportion of domestic hot water dependant of gas	Low CO_2 offset, ground conditions dependant, borehole drilling costs.
Air Source Heat Pumps	✓	×	Provides space heating and a proportion of domestic hot water dependant of gas	Low overall CO_2 offset. Potential system noise. Large external collector required.
Biomass	×	×	Provides secondary heating with low CO_2 emissions	Fuel storage space & fuel cost, regular supply of fuel
Wind Turbines	×	×	Strong visual positive impact	Poor local wind resource and potentially intrusive

Table 6: Summary of Renewable Energy Assessment

Roof Layout

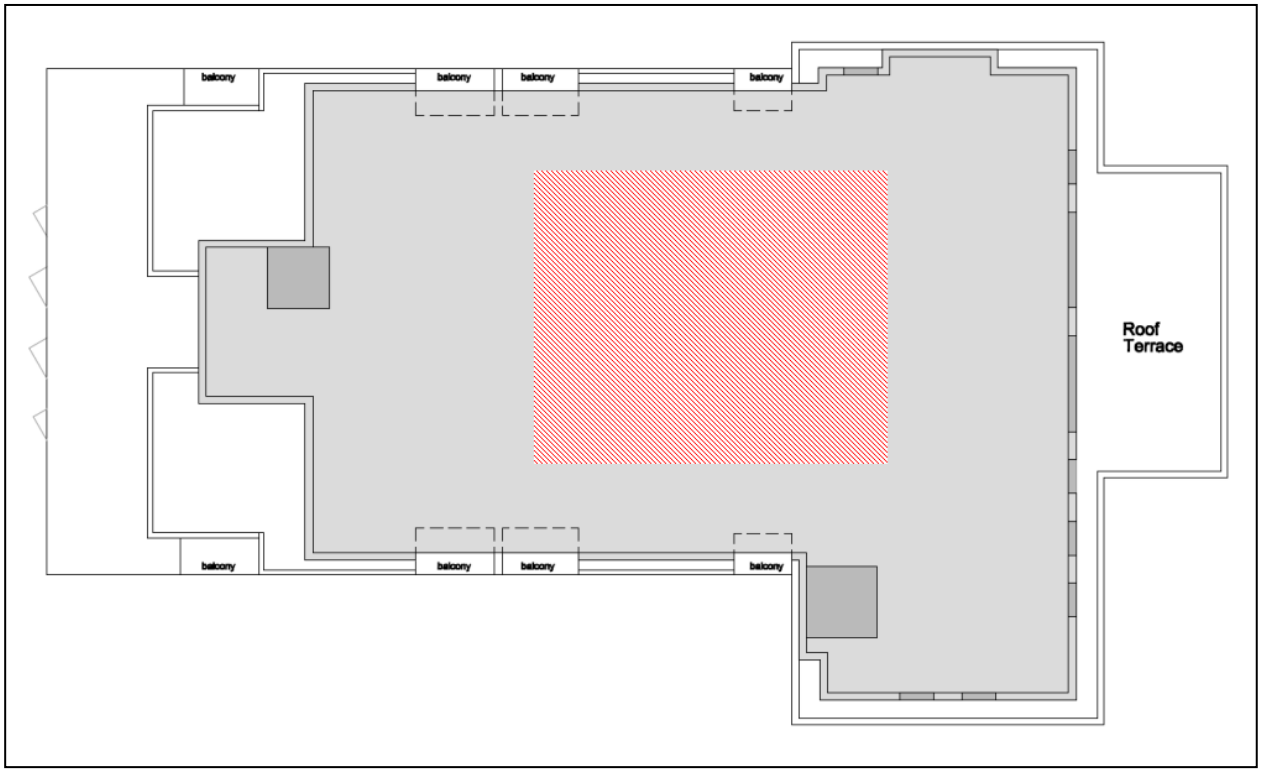

Figure 4: Indicative Roof Area for PV

5.5.3 The area highlighted which could be utilised for PV is indicative and a full design layout will be completed at Detailed Design Stage (post planning). The plans and aerial photography of the site indicate there is no shading risk across the proposed PV area.

5.6 Viable Energy Technologies

5.6.1 A number of renewable energy technologies are technically viable, although any potential design and structural issues would need to be clarified in relation to the finalised design.

• Photovoltaics	• Air Source Heat	• Biomass
• Solar Water Heating	• Ground Source Heat	• Wind Turbine

Table 7: Assessed Renewable Technologies

Photovoltaics

5.6.2 The installation of Photovoltaics (PV) will be used to offset electrical demand within the Proposed Development. The Photovoltaic array will be connected into the electrical system via an inverter.

5.6.3 The orientation and inclination of the PV array will affect the performance of the system. The flat roof area has been proposed as the main locations for the PV array as this will allow the most efficient pitch and orientation to be utilised.

5.6.4 To avoid the impact on performance and to ensure that the PV modules remain in warranty the array proposed on the flat roof section will be installed at a 30 degree pitch – with a southerly orientation to maximise performance of the array.

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

5.6.6 For the purposes of this study a 250W module will be used to inform the PV system size and output. Each panel covers an area of ~1.6m (1.65 x 0.95m) and has a peak output of 250W.

5.6.7 The required roof area will allow the following array to be installed:

Unit type	No. of Panels	Array Size (kWp)	Energy Generated (kWh/yr)	CO_2 Offset ($kgCO_2/yr$)	% Energy Offset	% CO_2 Offset	DER/TER % Improvement
Flats	50	12.50	10,730	5,569	14.0%	20.6%	46.0%

Table 8: PV - Predicted Performance – Module

5.6.8 The analysis in Table 8 indicates that the LBRUT requirement of a 46% DER/TER improvement can be achieved solely through the installation of PV. Additionally, an 20.6% CO_2 offset is achieved from total CO_2 emissions.

5.6.9 The PV array proposed is the best way of seeking to achieve the Richmond targets, with the most suitable roof space being utilised to maximise panel efficiency.

Solar Water Heating

5.6.10 The installation of Solar Water Heating (SWH) could be used to offset a proportion of the domestic hot water demand (DHW) within each flat, subject to the installation of an appropriate water cylinder (~200l) and space allowed within the design for the required insulated flow and return pipework.

5.6.11 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.

5.6.12 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 the tank at peak solar insolation.

5.6.13 The LBRUT CS aspiration for the offset of total predicted CO_2 emissions and the 35% Building Regulations improvement required cannot be achieved solely through the use of SWH.

5.6.14 SWH is not proposed at this stage because the roof areas are better used for PV, which can produce a greater CO_2 offset than SWH. Additionally, the use of SWH would require the installation of a hot water cylinder and replacement of combination boilers with system boilers. This would impact on space requirements within the flat and would also lead to increased energy losses and CO_2 emissions due to the associated standing losses from the use of a hot water cylinder.

Air Source Heat Pump

5.6.15 The use of an Air Source Heat Pump (ASHP) has the potential to supply the Proposed Development with the heating and hot water requirements, subject to the provision of under floor heating or oversized/low temperature radiators (air-to-water systems) to maximise the system performance.

5.6.16 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. This is affected by a number of factors, including system design, outside air temperatures (solar irradiation) and patterns of use. The use of electricity would limit the effectiveness of any installed PV panels as it has a higher CO_2 fuel factor than that of Gas which is currently proposed, as such the total CO_2 offset would be lower with an ASHP system.

5.6.17 As an ASHP features moving parts (an electrically driven fan) the external unit will make some noise – expected to be ~50dB.

5.6.18 An ASHP would also require the implementation of a centralised heating system to make it practical - due to the complexities of installing such a system, the space taken up by the piping and potential maintenance issues, the use of ASHP has not been deemed practical for the site.

5.7 Unviable Renewable Technologies

5.7.1 The following technologies are deemed unviable for the Proposed Development at this stage of development:

Ground Source Heat Pump

5.7.2 The use of a Ground Source Heat Pump has the potential to supply some/all of the units with their predicted space heating requirements, subject to the building thermal performance and the provision of under floor heating (wet system) to maximise the GSHP system performance.

5.7.3 However, due to the lack of a centralised heating system on the site and the limited external areas for the ground loop (including boreholes), GSHP has not been deemed technically feasible for the site.

Biomass

5.7.4 At present, LBRUT are not supporting biomass as a CO_2 reduction tool when used to achieve the 20% requirement – this is because of localised air quality issues in the borough. Biomass installations are still acceptable, but will not count towards the 20% CO_2 target.

5.7.5 Additionally, as Richmond falls within a Smoke Control Area, it would also need to be confirmed that the make and model of any boilers used on site are classified as exempt under the Clean Air Act.

Wind Power

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

5.7.7 The system performance will be reduced by the low, erratic wind speeds and air turbulence caused by the surrounding buildings and trees.

5.8 Renewable Energy Summary

5.8.1 SRE proposes the following renewable energy technology solution as technically viable for the Proposed Development in order to go as far as practicable in achieving the LBRUT CS aspiration of a 20% CO_2 offset/reduction through the use of on-site renewable technologies and the required 35% improvement in Dwelling Emission rate over Building Regulations 2010.

- The building envelope performance has been improved as far as is practical.
- Energy efficient heating, ventilation and lighting systems are used throughout.
- Passive Ventilation
- Final specification will be undertaken at detailed design stage.

Renewable Energy Technology Solution for the new build flat units – PV

Technology	Details	Energy Generated - (kWh/yr)	CO_2 Offset – ($kgCO_2/yr$)
Photovoltaics (Module)	Total of 12.50 kWp	10,730 14% (offset)	5,569 20.6%

Table 9: Proposed Renewable Energy Solution

6.0 Summary

6.0.1 The Proposed Development at 2-6 Queens Road, Teddington will comprise 14 No. new build flat units being constructed on top of an existing office building.

6.0.2 It will deliver energy efficiency measures throughout and, by the installation of Photovoltaics will achieve all LBruT energy requirements.

6.0.3 Through the inclusion of an energy conscious design and a high efficiency heating system ('clean'), energy efficiency measures ('lean') and renewable energy generation ('green'), the Proposed Development will achieve the 35% improvement in Dwelling Emission Rate (DER) over Building Regulations 2013, in-line with the requirements of the London Plan – Sustainable Design and Construction SPG (April 2014).

6.0.4 The following TER/DER figures are taken from the supporting SAP Building Regulations Compliance Checklist, which show the % improvement in Dwelling Emission rate over Building Regulations 2013.

Proposed Flats	$Kg/CO_2/m^2$
Average TER	19.75
Average DER with PV	10.73
Improvement	46%

Table 10: DER Improvement (Building Regulations 2013)

6.0.5 Overall, the Proposed Development will provide a modern, resource efficient, sustainable residential building, which complies with all the relevant planning policy, and includes the following measures:

- Code for Sustainable Homes – Level 3
- Cycle Storage
- Resource Efficient Heating
- Passive Ventilation
- Energy Efficient Lighting
- Water efficient fittings
- On-site renewable energy generation - 12.50 kWp Photovoltaics

6.0.6 Through this approach the Proposed Development has gone as far as is practical in attaining compliance with all relevant environmental Planning Policy:

- The London Plan 2011: Policies 5.2 – 5.13 & 5.15.
- The London Plan: Sustainable Design and Construction SPG (April 2014)
- LBRUT LDF Core Strategy: Policies CP1 & CP2.
- LBRUT Development Management DPD: Policy DM SD 1 & DM SD 2
- LBRUT SPD – Sustainable Construction Checklist. (C Rating)

7.0 Appendix A – Second Floor Layout Plan

Accomodation Schedule
Apt 1 - 1 bed 2 person - 50.03 sq m
Apt 2 - studio apt - 40.05 sq m
Apt 3 - 1 bed 2 person - 51.0 sq m
Apt 4 - studio apt - 39.75 sq m
Apt 5 - 1 bed 2 person - 50.03 sq m
Apt 6 - studio apt - 40.05 sq m
Apt 7 - 1 bed 2 person - 51.0 sq m
Apt 8 - studio apt - 39.75 sq m

8.0 Appendix B – LBRUT Sustainable Construction Checklist

LBRUT SUSTAINABLE CONSTRUCTION CHECKLIST

TO BE FILLED IN FOR ALL RESIDENTIAL DEVELOPMENT PROVIDING ONE OR MORE NEW RESIDENTIAL UNITS, AND ALL OTHER FORMS OF DEVELOPMENT PROVIDING 100sqm OR MORE OF NON-RESIDENTIAL DEVELOPMENT

ALL OTHER CLASSES OF DEVELOPMENT ARE ENCOURAGED TO COMPLY WITH THIS CHECKLIST

This document forms part of the Sustainable Construction Checklist SPD, and **should be read in conjunction with the associated Guidance Document**. 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. Scores will be awarded for different achievements on site, and a final score attributed to the site as a whole.

Property Name (if relevant):	2-6 Queens Road	Application No. (if known):	
Development Type	Extension of 14 flat units above an existing office building		
Address (include. postcode)	2-6 Queens Road, Teddington, Richmond upon Thames,TW11		
Completed by:	Mark Newbery		

MINIMUM POLICY COMPLIANCE

Please check the Sustainable Construction webpage for the policy requirements

Environmental Rating of development:

	Rating achieved		
Residential new-build			
Code for Sustainable Homes Level	Code Level 3	A pre-assessment is required to support this. Has this been provided?	☑
Non-Residential new-build (100sqm or more)			
BREEAM Level	Please Select	A pre-assessment is required to support this. Has this been provided?	☐
Extensions and conversions (residential dwellings)			
EcoHomes Level	Please Select	A pre-assessment is required to support this. Has this been provided?	☐
If other environmental rating sought please state:			

Score awarded for Environmental Rating (this will only be awarded once a pre-assessment is submitted to verify the level achieved): **Score** 4

CSH: Level 3 = *4* , Level 4 = *8* , Level 5 = *16* , Level 6 = *20*
BREEAM: Good = *0* , Very Good = *0* , Excellent = *8,* Outstanding = *16*
EcoHomes: Good = *0* , Very Good = *0* , Excellent = *8*

Accredited Assessors *(Please see Guidance document for more details on accredited assessors)*

Have you used a licensed Code for Sustainable Homes, EcoHomes and BREEAM Accredited Assessor respectively? ☑

Energy Assessment *(Please see Justification & Guidance document for more details on howto prepare an Energy Assessment)*

An energy assessment is required 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. Has this been submitted? If yes, please tick. ☑

Carbon Dioxide emissions reduction *(Please see Justification & Guidance document for more details on howto calculate these figures as part of the Energy Assessment)*

- Percentage of **total** site CO_2 emissions saved through renewable energy installation? 0
- Percentage of **regulated** CO_2 emissions saved below Building Regulations target level through all low carbon measures? 20

1. ENERGY USE AND POLLUTION

1.1 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* ☐

1.2 Heat Generation

b. How have the heating and cooling systems, with preference to the heating system hierarchy, been selected (defined in London Plan policy 4A.6)? Tick the heating and cooling system that will be used in the development:

- Connect to existing CCHP/CHP networks *6* ☐
- Site-wide CCHP/CHP powered by renewable energy *5* ☐
- Gas-fired CCHP/CHP *4* ☐
- Communal heating/cooling powered by renewable energy *3* ☐
- Communal heating/cooling powered by gas *2* ☐
- Individual heating/cooling powered by renewable energy *1* ☐
- Individual heating/cooling powered by gas or electricity *0* ☑

1.3 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 to include a biomass boiler? - ☐

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

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 *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 **6.0**

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

2. TRANSPORT

2.1 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, such as electric cars? 2 ☐

b. **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 ☐

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

d. Does your development provide cycle storage? 2 ☑
- If so, for how many bicycles?
- Is this shown on the site plans? - ☑

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

Subtotal **2.0**

Please give any additional relevant comments to the Transport Section below

3 BIODIVERSITY

3.1 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 compared to the pre-development site? (Tick if yes) -2 ☐
- If so, please state how much in sqm? sqm

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

c. Does your development plan to add any tree(s) on site? (Tick 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
• A brown roof	1 ☐	Area provided:		sqm
• Garden space	4 ☐	Area provided:		sqm
• Additional native and/or wildlife friendly planting to peripheral areas	3 ☑	Area provided:		sqm
• Additional planting to peripheral areas	2 ☑	Area provided:		sqm
• A living wall	2 ☐	Area provided:		sqm
• Bat boxes	0.5 ☑			
• Bird boxes	0.5 ☑			
• Other	0.5 ☐			

Subtotal **6.0**

Please give any additional relevant comments, including specific reasons why living roofs cannot be incorporated in proposals with roof plate areas of 100sqm or more should this be the case, to the Biodiversity Section below

4 FLOODING AND DRAINAGE

4.1 Reducing and mitigating the risks of flooding and other impacts of climate change in the borough

a. Is your site located in an area at risk of flooding? (Tick if yes) - ☐

If yes, please tick only ONE option below:

- New development in a high flood risk zone (3a) -2 ☐
- New development in a medium flood risk zone (2) -1 ☐
- Redevelopment of an existing building or conversion 0 ☑

Is your development within 20 metres of a watercourse or a flood defence? (Tick if yes) - ☐

Have you submitted a Flood Risk Assessment? (Tick 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: 0 sqm
Please provide details of the permeable surfacing below *please represent a loss in permeable area as a negative number*

Subtotal **3.0**

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

A FRA will be carried out as a madatory requirement to achieve CSH compliance.

5 IMPROVING RESOURCE EFFICIENCY

5.1 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? 0 ☐

- Will 10% of demolition waste or more be reused in the new development? 1 ☑
- Will 15% of demolition waste or more be recycled? 1 ☑

b. Does your site have any contaminated land or has the site previously been used for potentially contaminating uses? 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 ☐

c. Are plans in place to include composting on site? 1 ☑

5.2 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, dual flush toilets 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 ☑

b. What is the water consumption target of the development (in litres per person per day?) 104.8

- The recommended target for conversions or other small scale residential properties is 105 litres/person/day. Will this be met? (Indicate if yes) 1 ☑

c. If applicable, have you submitted evidence that capacity exists in the public sewerage and water supply network? ☐

Subtotal **7.0**

Please give any additional relevant comments, including reasons why the water consumption target has not been met should this be the case, to the Improving Resource Efficiency Section below

6 DESIGN STANDARDS AND ACCESSIBILITY

6.1 Ensure flexible adaptable and long-term use of structures

a. **If the development is residential**, will it meet the requirements set out in the Residential Design Standards SPD 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 the criteria included in the Lifetime Home Standards? *2* ☐

- If not all Lifetime Homes criteria are to be met, in the space below, please provide details of any accessibility measures included in the development.

c. • Are 10% or more of the units in the development wheelchair accessible? *1* ☐

OR

d. **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 1

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

LBRUT Sustainable Construction Checklist- Scoring Matrix

TOTAL ***29***

Score for new construction	Score for extensions or conversions	Rating	Significance
80 or more	*70 or more*	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
71-79	*61-69*	*A*	Makes a major contribution towards achieving sustainable development in Richmond
51-70	*41-60*	*B*	Helps to significantly improve the Borough's stock of sustainable developments
36-50	*26-40*	*C*	Minimal effort to increase sustainability beyond general compliance
35 or less	*25 or less*	*FAIL*	Does not comply with planning policies on sustainabililty and climate change

Authorisation:

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

Signature MARK NEWBERY (SRE) Date 24.07.2014