Sustainability & Energy Statement

Kingston Bridge House, Hampton Wick. KT1 4AG

Prepared by Ivan Ball

Bluesky Unlimited
39 Marsh Baldon
Oxfordshire
OX44 9LP

www.blueskyunlimited.co.uk

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Executive Summary

This Sustainability and Energy Statement considers the sustainability issues relating to the proposed conversion and extension of Kingston Bridge House, Hampton Wick to provide a total of 89, Studio, 1, 2 & 3-bedroom apartments.

The Statement sets out the commitments of the applicant to the site and the targets that will be applied to the development. The site is located in a sustainable location close to existing facilities and infrastructure and will provide homes to meet local need.

Throughout the design process, the applicant and design team members have given careful consideration to the sustainability issues relating to the site, and how these can be enhanced in a marketable and feasible manner. As a result, this Statement demonstrates that the development meets relevant sustainability criteria and in a number of areas exceeds them.

The fabric standards of the building exceed the requirements of the Building Regulations. The proposed development has insufficient energy demand and quantum of development to sustain a communal heating system, which would result in significant unnecessary additional management costs. A communal heating system is not financially viable for the site.

The methodology used has been based upon the emerging policy in the new London Plan (and provided in 'Energy Assessment Guidance' published by the Mayor of London in October 2018) and uses the carbon factors for gas and electricity proposed for SAP 10.

In order to demonstrate the energy efficiency of the building a set of SAP calculations have been prepared for the 'Be Lean' scenario based on the use of gas boilers to each apartment. This is not the proposed strategy but purely demonstrates the reduction from the 'Be Lean' condition.

The Regulations Compliance Reports for this option are attached as Appendix 1 and the 'Be Lean' GLA spreadsheet based on the SAP 10 carbon factors are is attached as Appendix 2.

It is proposed to install Vaillant aroSTOR air source heat pump hot water cylinders into each of the apartments. The 'Be Clean' SAP 10 spreadsheet is attached as Appendix 4, which uses the energy demand calculations from the SAP calculations (attached as Appendix 3) to calculate the total site emissions.

In order to maximise the reduction in emissions it is also proposed to install a photovoltaic array of 155 x 400W photovoltaic panels (62.0 kW). A Roof Plan showing the indicative layout of the panels is attached as Appendix 5.

The reductions in emissions can be summarised as follows:

	Total Emissions	% Reduction
	T CO_2 per year	
Be Lean		
Baseline (Building Regulations TER) – based on gas	75.274	
Be Lean - after energy efficiency (DER) – based on gas	63.667	**15.42%**
Be Clean		
Baseline (Building Regulations TER) – based on electricity	74.429	
Emissions – after ASHP hot water cylinders (Be Clean)	48.704	**34.56%**
Be Green		
Emissions – after renewable technologies (Be Green)	35.529	**52.26%**

The residual emissions are 35.529 tonnes and therefore, using the carbon offset charge the payment should be **£63,952 (**35.529 x £1,800).

The London Borough of Richmond upon Thames Sustainable Construction Checklist is attached as Appendix 6.

1.0 Introduction

This report has been commissioned by the Westcombe Group and provides a Sustainability and Energy Statement for the extension and conversion of Kingston Bridge House, Hampton Wick to create 89, Studio, 1, 2 & 3-bedroom apartments.

The description of development is;

'Erection of two-storey and single-storey extensions to the roof, an infill extension at ground floor level, façade improvements and change of use of the building to provide 89 residential units with associated landscaping, parking/refuse provision, and external alterations.'

The report describes the methodology used in assessing the development and the initiatives proposed.

The alterations to the building have been designed and will be constructed to reduce energy demand and carbon dioxide emissions.

The objective is to reduce the energy demand to an economic minimum by making investments in the parts of the building that has the greatest impact on energy demand and are the most difficult and costly to change in the future, namely the building fabric.

Once a cost-effective structure has been designed, low-carbon and renewable technologies have been considered for installation to provide heat and/or electricity.

The following hierarchy has been followed:

- Lean reduce demand and consumption
- Clean increase energy efficiency
- Green provide low carbon renewable energy sources

The report has been prepared by Ivan Ball of Bluesky Unlimited who are sustainability consultants.

2.0 Planning Policy Context

National Policy

The UK Government published its sustainable development strategy in 1999 entitled "A better quality of life: A strategy for sustainable development in the UK". This sets out four main objectives for sustainable development in the UK:

- Social progress that recognises the needs of everyone.
- Effective protection of the environment.
- Prudent use of natural resources.
- Maintenance of high stable levels of economic growth and employment.

Sustainable Communities: Building for the Future, known colloquially as the Communities Plan was published in 2003. The Plan sets out a long-term programme of action for delivering sustainable communities in both urban and rural areas. It aims to tackle housing supply issues in parts of the country, low demand in other parts and the quality of our public spaces. The Communities Plan describes sustainable communities as: Active, inclusive and safe, well run, environmentally sensitive, well designed and built, well connected, thriving, well served and fair for everyone.

The most relevant national planning policy guidance on sustainability is set out in:

- National Planning Policy Framework - 2019

Paragraph 148 states;

"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure."

Regional and Local Policies

The Development Plan comprises the London Plan (2016) and the London Borough of Richmond Local Plan (2018).

London Plan, published March 2016 **–** the following policies are relevant to the application:

Policy 5.2 – Minimising carbon dioxide emissions *

A *Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:*

1 *Be lean: use less energy*

2 *Be clean: supply energy efficiently*

3 *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.*

Residential and Non-residential buildings:

Year	***Improvement on 2013 Building Regulations***
2013 – 2016	*35 per cent*

C *Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.*

D *As a minimum, energy assessments should include the following details:*

a *calculation of the energy demand and carbon dioxide emissions covered by the Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations (see paragraph 5.22) at each stage of the energy hierarchy*

b *proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services*

c *proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power (CHP)*

d *proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.*

E *The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.*

Policy 5.3 – Sustainable design and construction

A *The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.*

B *Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.*

C *Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:*

- *a. minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)*
- *b. avoiding internal overheating and contributing to the urban heat island effect*
- *c. efficient use of natural resources (including water), including making the most of natural systems both within and around buildings*
- *d. minimising pollution (including noise, air and urban runoff)*
- *e. minimising the generation of waste and maximising reuse or recycling*
- *f. avoiding impacts from natural hazards (including flooding)*
- *g. ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions*
- *h. securing sustainable procurement of materials, using local supplies where feasible, and*
- *i. promoting and protecting biodiversity and green infrastructure.*

Policy 5.6 – Decentralised energy in development proposals

A *Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems.*

B *Major development proposals should select energy systems in accordance with the following hierarchy:*

1. *Connection to existing heating or cooling networks*
2. *Site wide CHP network*
3. *Communal heating and cooling.*

C *Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.*

Policy 5.7 – Renewable Energy

B *Within the framework of the energy hierarchy (Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.*

Policy 5.15 – Water Use and Supplies

B Development should minimise the use of mains water by:

a incorporating water saving measures and equipment

b designing residential development so that mains water consumption would meet a target of 105 litres or less per head per day

Sustainable Design and Construction SPG – April 2014

The SPG provides Guidance on how schemes should comply with the London Plan and this Sustainability Statement has been prepared in accordance with the Guidance provided.

London Borough of Richmond

The London Borough of Richmond adopted its Local Plan on the 3rd July 2018 and this supersedes the Core Strategy (2009) and the Development Management Plan (2011).

The following policy is of particular relevance to the topic area of this Statement and has been edited for clarity and relevance to the application in question.

Local Plan (2018)

Policy LP 22 - Sustainable Design and Construction

A. Developments will be required to achieve the highest standards of sustainable design and construction to mitigate the likely effects of climate change. Applicants will be required to complete the following:

1. *Development of 1 dwelling unit or more, or 100sqm or more of non-residential floor space (including extensions) will be required to complete the Sustainable Construction Checklist SPD. A completed Checklist has to be submitted as part of the planning application.*
2. *Development that results in a new residential dwelling, including conversions, change of use, and extensions that result in a new dwelling unit, will be required to incorporate water conservation measures to achieve maximum water consumption of 110 litres per person per day for homes (including an allowance of 5 litres or less per person per day for external water consumption).*
3. *New non-residential buildings over 100sqm will be required to meet BREEAM 'Excellent' standard.*

Reducing Carbon Dioxide Emissions

B. Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions:

1. *All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy.*

2. *All other new residential buildings should achieve a 35% reduction.*
3. *All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non-residential buildings should achieve zero carbon standards in line with London Plan policy.*

Targets are expressed as a percentage improvement over the target emission rate (TER) based on Part L of the 2013 Building Regulations.

C. This should be achieved by following the Energy Hierarchy:

1. *Be lean: use less energy*
2. *Be clean: supply energy efficiently*
3. *Be green: use renewable energy*

Decentralised Energy Networks

D. The Council requires developments to contribute towards the Mayor of London target of 25% of heat and power to be generated through localised decentralised energy (DE) systems by 2025. The following will be required:

1. *All new development will be required to connect to existing DE networks where feasible. This also applies where a DE network is planned and expected to be operational within 5 years of the development being completed.*

Applicants are required to consider the installation of low, or preferably ultra-low, NOx boilers to reduce the amount of NOx emitted in the borough.

Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged where appropriate.

* The London Plan will be revised in 2020/21. In addition, Part L of the Buildings Regulations will be revised in 2021 and the carbon emissions factors will be revised significantly compared to the current Part L (2013).

Consequentially the Mayor of London published Energy Assessment Guidance in October 2018, which requires the use of the current SAP methodology (2013) to calculate energy demand but the carbon emissions factors proposed for Part L 2020 are to be applied to the energy demand.

Whilst primarily intended for referrable schemes the GLA have allowed the Boroughs to decide whether they apply the Guidance to all developments.

3.0 Assessment Methodology

The baseline carbon dioxide emissions from the building has been established using agreed building specifications and detailed planning drawings and SAP calculations have been prepared for a representative range of apartments, which provide an assessment of the total emissions from the site.

Emission Factors

The CO_2 emission factors, where applicable, used throughout this report have been taken from the emerging Building Regulation Approved Document L - 2021.

	kg CO_2/kWh
Mains gas	0.210
Grid supplied and displaced electricity	0.233

4.0 Proposal

The proposal is for extension and conversion of an existing building to create 89, Studio, 1, 2 and 3-bedroom apartments.

The accommodation schedule in detail is;

Unit Type	Number	Area	Total Area
		m^2	m^2
Studio apartment	7	39.8	278.6
1-Bedroom apartment	8	50.0	400.0
1-Bedroom apartment	8	50.3	402.4
1-Bedroom apartment	8	51.2	409.6
1-Bedroom apartment	8	51.5	412.0
1-Bedroom apartment	1	55.6	55.6
1-Bedroom apartment	7	55.9	391.3
1-Bedroom apartment	5	60.5	302.5
1-Bedroom apartment	2	65.2	130.4
1-Bedroom apartment	1	65.5	65.5
2-Bedroom apartment	8	61.4	491.2
2-Bedroom apartment	1	63.4	63.4
2-Bedroom apartment	5	63.9	319.5
2-Bedroom apartment	3	65.2	195.6
2-Bedroom apartment	1	67.9	67.9
2-Bedroom apartment	5	74.9	374.5
3-Bedroom apartment	5	83.0	415.0
3-Bedroom apartment	1	86.7	86.7
3-Bedroom apartment	5	89.0	445.0
Total	**89**		**5,306.7**

5.0 Energy Efficiency

5.1 Demand Reduction (Be Lean)

Design

The energy performance of a building is affected by its design, construction and use and whilst occupant behaviour is beyond the remit of this statement, better design and construction methods can significantly reduce the life cycle emissions of a building and assist the occupant to reduce consumption.

Sustainable design is not just about incorporating renewable technologies; buildings should be designed at the outset to provide suitable environmental conditions for the occupants whilst also consuming as little energy as practical. It is possible to exceed Building Regulations requirements (Part L - 2013) through demand reduction measures alone, which typically include a combination of passive design measures (e.g. building design and efficient building fabric) and active design measures (e.g. variable speed motors).

Passive Design Measures

The passive design measures proposed include;

Passive Solar Gain

Passive measures include allowing for natural ventilation and exposed thermal mass coupled with high levels of insulation, air tightness and the control of solar gain.

The proposal is for the extension and conversion of an existing building and therefore the orientation of the window and door opening is largely fixed within the existing building. However, the apartments benefit from an orientation towards; (i) northeast, (ii) southwest, (iii) northwest or (iv) southeast.

All apartments will benefit from access to direct sunlight at some point throughout the day and there are no units with a solely northerly aspect.

Natural Daylighting

The orientation and the size of the windows have been optimised to maximise the amount of natural daylight and therefore reduce the demand for artificial lighting.

Efficient Building Fabric

Building Envelope

U-values of the building envelope must meet Building Regulations Part L standards and further improvements to U-values will reduce the apartments heating requirements.

The western part of the building currently has an undercroft, which will be partially infilled to provide accommodation. The ground floors to this element to the eastern part of the building will be insulated with 150mm 'Kingspan' PIR insulation or similar.

The new walls and existing wall will be insulated to achieve the U-value set out in the table below.

All windows and external doors will be replaced and will be double glazed with Low 'e' soft coat and argon filled.

It is proposed to set maximum limits for the elemental U-values as follows:

Element	Part L Limiting U-values	Proposed U-values	Proposed Improvement
	W/m^2K	W/m^2K	
Floor	**0.20**	**0.11**	**45%**
External Walls	**0.30**	**0.17**	**43%**
Flat Roof	**0.20**	**0.14**	**30%**
Windows	**2.00**	**1.40**	**30%**
Entrance Doors		**1.60**	

Air Leakage

Large amounts of heat are lost in winter through air leakage from a building (also referred to as infiltration or air permeability) often through poor sealing of joints and openings in the building

The Building Regulations set a minimum standard for air permeability of 10 m^3 of air per hour per m^2 of envelope area, at 50Pa.

It is proposed to achieve a 60% improvement over Building Regulations and the building will target a permeability of 4.0 $m^3/hr/m^2$.

Thermal Bridging

The significance of Thermal Bridging, as a potentially major source of fabric heat losses, is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the Thermal Bridging is no longer an option and will not achieve the fabric energy efficiency and energy and CO_2 reduction targets set out in this strategy.

The building will use the Accredited Construction Details where applicable and bespoke details where ACDs do not exist.

The bridging losses have been based upon the use of the ACDs and calculated using SAP Appendix K Table 1.

Ventilation

As a result of increasing thermal efficiency and air tightness, Building Regulations Approved Document F was also revised in 2006 to address the possibility of overheating and poor air quality.

Active Design Measures will include;

Efficient Lighting and Controls

Throughout the scheme natural lighting will be optimised.

Approved Document L1A requires three in four light fittings (75%) to be dedicated low energy fittings. The homes will exceed this and all light fittings will be of a dedicated energy efficient type.

External lighting will be fitted with time controls and light sensors to ensure illumination is restricted to required times. External lighting will be limited to a maximum fitting output of 150w.

Space Heating and Hot Water

The baseline SAP modelling has been based upon the use of a combination boiler installed to each apartment but the assessment considers other options for providing space heating and hot water.

5.2 Establishing Energy Demand and Carbon Dioxide Emissions (Be Lean)

The GLA Energy Assessment Guidance of October 2018 requires the energy efficient of a building (Be Lean) to be expressed using a gas heating system as a baseline.

A set of calculations have therefore been prepared on this basis, which are not necessarily the proposed final option but are used to test the 'Be Lean' reductions only.

SAP calculations have been prepared for a 1-Bedroom apartment with a southeast aspect at 51.5 m^2 modelled as a ground, mid and top-floor unit.

Calculations have also been prepared for a 2-Bedroom apartment with a northeast aspect at 65.2 m^2 and a 3-Bedroom apartment with a southwest aspect at 83.0 m^2, which are both modelled as ground, mid and top-floor units.

Baseline

The Regulations Compliance Reports are attached as Appendix 1 but the energy demand for the modelled apartments can be summarised as follows;

1-Bedroom apartment – 51.5 m^2 Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,621	1,448
Water heating	1,954	1,552
Electricity for pumps, fans & lighting	335	335
Total	**3,910**	**3,335**

1-Bedroom apartment – 51.5 m^2 Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,041	856
Water heating	1,973	1,558
Electricity for pumps, fans & lighting	335	335
Total	**3,349**	**2,749**

1-Bedroom apartment – 51.5 m^2 Top-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,664	1,666
Water heating	1,953	1,551
Electricity for pumps, fans & lighting	335	335
Total	**3,952**	**3,552**

2-Bedroom apartment – 65.2 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,514	2,395
Water heating	2,179	1,714
Electricity for pumps, fans & lighting	386	386
Total	**5,079**	**4,495**

2-Bedroom apartment – 65.2 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,801	1,691
Water heating	2,195	1,718
Electricity for pumps, fans & lighting	386	386
Total	**4,382**	**3,795**

2-Bedroom apartment – 65.2 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,339	2,302
Water heating	2,183	1,714
Electricity for pumps, fans & lighting	386	386
Total	**4,908**	**4,402**

3-Bedroom apartment – 83.0 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,622	2,186
Water heating	2,424	1,884
Electricity for pumps, fans & lighting	430	430
Total	**5,476**	**4,500**

3-Bedroom apartment – 83.0 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,831	1,445
Water heating	2,444	1,890
Electricity for pumps, fans & lighting	430	430
Total	**4,705**	**3,765**

3-Bedroom apartment – 83.0 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,659	2,447
Water heating	2,423	1,883
Electricity for pumps, fans & lighting	430	430
Total	**5,512**	**4,760**

The energy demand figures calculated above have been inputted into the SAP 10 spreadsheet, which is attached as Appendix 2 and provides the total site TER and DER emissions using the emerging carbon emissions factors and as required by the GLA Energy Assessment Guidance (October 2018).

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **75,274 kg CO_2 per year**, with the actual carbon dioxide emissions (DER) assessed as **63,667 kg CO_2 per year.**

The reduction in emissions using from energy efficiency for the 'Be Lean' scenario and using the SAP 10 carbon factors is **11,607 kg CO_2 per year**, which equates to;

- **15.42%**

5.3 Low-Carbon and Renewable Technologies (Be Clean and Be Green)

The carbon dioxide emissions established above have been used to test the viability of various renewable and low carbon technologies as follows.

The Government's Renewable Obligation defines renewable energy in the UK. The identified technologies are;

- Small hydro-electric
- Landfill and sewage gas
- Onshore and offshore wind
- Biomass
- Tidal and wave power
- Geothermal power
- Solar

The use of landfill or sewage gas, offshore wind or any form of hydroelectric power is not suitable for the site due to its location. The remaining technologies are considered below;

Wind

Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.

The Government wind speed database predicts local wind speeds at Church Grove to be 4.8 m/s at 10m above ground level and 5.6 m/s at 25m above ground level. This is below the level generally required for commercial investment in large wind turbines. In addition the land take, potential for noise and signal interference make a large wind turbine unsuitable for this development.

Roof mounted turbines could be used at the development to generate small but valuable amounts of renewable electricity but the small output and contribution to total emissions means any investment would be small and purely tokenism. In addition the use of wind turbines will have a detrimental aesthetic impact on the appearance of the development.

Combined Heat and Power and Community Heating

Combined heat and power (CHP) also called co-generation is a de-centralised method of producing electricity from a fuel and 'capturing' the heat generated for use in buildings. The plant is essentially a small-scale electrical power station. The production and transportation of electricity via the National Grid is very inefficient with over 65% of the energy produced at the power station being lost to the atmosphere and through transportation.

Consequently CHP can demonstrate significant CO_2 savings and although not necessary classed as renewable energy (depending on the fuel used) the technology is low carbon.

For a CHP plant to be economic it needs to operate for as much of the time as possible (usually deemed to be in excess of 14 hours per day) and therefore the size of the unit are usually based upon the hot water load of the building (s) with additional boilers meeting the peak space heating demand.

There is insufficient baseload to justify a CHP unit and therefore this technology is not proposed.

Ground Source Heat Pumps

Sub soil temperatures are reasonably constant and predictable in the UK, providing a store of the sun's energy throughout the year. Below London the groundwater in the lower London aquifer is at a fairly constant temperature of 12º C. Ground source heat pumps (GSHP) extract this low-grade heat and convert it to usable heat for space heating.

GSHP operates on a similar principle to refrigerators, transferring heat from a cool place to a warmer place. They operate most efficiently when providing space heating at a low temperature, typically via under floor heating or with low temperature radiators.

There is insufficient external area to install a shallow, horizontal collection system and in order to use ground source heat pumps the collection system would need to include a number of boreholes. There are limited opportunities to place these away from the building and there is insufficient ground area to accommodate the required number.

The installation of ground source heat pumps into this site is not appropriate.

Solar

(i) Solar Water Heating

Solar hot water panels use the suns energy to directly heat water circulating through panels or pipes. The technology is simple and easily understood by purchasers.

Solar hot water heating panels are based generally around two types, which are available being 'flat plate collectors' and 'evacuated tubes'. Flat plate collectors can achieve an output of up to 1,124 kWh/annum (Schuco) and evacuated tubes can achieve outputs up to 1,365 kWh/annum (Riomay).

Panels are traditionally roof mounted and for highest efficiencies should be mounted plus or minus 30 degrees of due south. Evacuated tubes can be laid horizontally on flat roofs but flat plate collectors are recommended for installation at an incline of 30 degrees

In apartment buildings servicing apartments below the top-floor can be problematic for solar thermal panels. The total hot water demand of the 13 top-floor apartments is 21,697 kWh per year (based on the gas system) and assuming panels would reduce demand by 50% the reduction in CO_2 emissions would be 2,278 kg CO_2 per year. When combined with the energy efficiency measures incorporated into the scheme this equates to a total reduction of 18.44%.

Solar hot water panels could be used to reduce emissions but additional technologies would be required to achieve the policy target and the use of solar hot water heating panels would require the use of a conventional gas boiler with hot water cylinders in selected units.

Solar hot water heating panels are not proposed.

(ii) Photovoltaics

Photovoltaic panels (PV) provide clean silent electricity. They generate electricity during most daylight conditions although they are most efficient when exposed to direct sunlight or are orientated to face plus or minus 30 degrees of due south.

PV panels can be integrated into many different aspects of a development including roofs, walls, shading devices or architectural panels.

The panels typically have an electrical warranty of 20-25 years and an expected system lifespan of 25-40 years.

The building contains large flat roofs and photovoltaic panels could be installed without detrimentally impacting on the aesthetics of the development. The Roof Plan attached as Appendix 5 demonstrate a total of 155 panels could be installed. These would be installed on racks and gently inclined towards the southwest and southeast. Assuming the installation of 400W panels the total reduction in emissions from the array would be **13,175 kg CO_2 per year**.

Air Source Heat Pumps (ASHP)

Air sourced heat pumps operate using the same reverse refrigeration cycle as ground source heat pumps, however the initial heat energy is extracted from the external air rather than the ground.

Whilst ASHPs generally have a coefficient of performance (CoP) of around 3 because electricity costs around 4.5 times more than gas (per kWh) the annual heating bills for ASHPs can be more expensive than using a gas system.

However, due to the reduction in the carbon emissions factors proposed in the new SAP the use of electrical heating system can reduce emissions more than comparable gas installation.

5.4 Establishing Energy Demand and Carbon Dioxide Emissions (Be Clean)

Using the methodology set out in the Mayor of London's 'Energy Assessment Guidance' (Oct 2018), the carbon emissions have been calculated using the new carbon factors proposed as part of the new Part L of the Building Regulations, which is expected to be published in 2021 but using the existing SAP methodology (2012).

The apartments modelled above under the 'Be Lean' scenario have been remodelled using a Vaillant aroSTOR air source heat pump hot water cylinder in lieu of a gas system.

The Regulations Compliance Reports are attached as Appendix 3 but the energy demand for the modelled apartments can be summarised as follows;

1-Bedroom apartment – 51.5 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,466	1,377
Water heating	2,085	698
Electricity for pumps, fans & lighting	335	290
Total	**3,886**	**2,365**

1-Bedroom apartment – 51.5 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	904	820
Water heating	2,107	698
Electricity for pumps, fans & lighting	335	290
Total	**3,346**	**1,808**

1-Bedroom apartment – 51.5 m² Top-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,508	1,582
Water heating	2,084	698
Electricity for pumps, fans & lighting	335	290
Total	**3,927**	**2,570**

2-Bedroom apartment – 65.2 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,348	2,267
Water heating	2,241	783
Electricity for pumps, fans & lighting	386	341
Total	**4,975**	**3,391**

2-Bedroom apartment – 65.2 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,644	1,607
Water heating	2,259	783
Electricity for pumps, fans & lighting	386	341
Total	**4,289**	**2,731**

2-Bedroom apartment – 65.2 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,175	2,181
Water heating	2,245	783
Electricity for pumps, fans & lighting	386	341
Total	**4,806**	**3,305**

3-Bedroom apartment – 83.0 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,495	2,066
Water heating	2,422	870
Electricity for pumps, fans & lighting	430	385
Total	**5,347**	**3,321**

3-Bedroom apartment – 83.0 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,717	1,369
Water heating	2,444	870
Electricity for pumps, fans & lighting	430	385
Total	**4,591**	**2,624**

3-Bedroom apartment – 83.0 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,532	2,310
Water heating	2,422	870
Electricity for pumps, fans & lighting	430	385
Total	**5,384**	**3,565**

The energy demand figures calculated above have been inputted into the SAP 10 spreadsheet, which is attached as Appendix 4 and provides the total site TER and DER emissions using the emerging carbon emissions factors and as required by the GLA Energy Assessment Guidance (October 2018).

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **74,429 kg CO_2 per year**, with the actual carbon dioxide emissions (DER) assessed as **48,704 kg CO_2 per year.**

The reduction in emissions using from energy efficiency and air source heat pump hot water cylinders and using the SAP 10 carbon factors is **25,725 kg CO_2 per year**, which equates to;

- **34.56%**

5.5 Summary of Calculations and Proposals for Low-carbon and Renewable Technologies

Be Lean

A baseline calculation has been prepared using 2013 Building Regulations and the SAP 10 carbon factors. Using the current Regulations and based upon a gas heating system for the apartments the total site CO_2 emissions are calculated as **75,274 kg CO_2 per year** (TER) and **63,667 kg CO_2 per year** (DER)**.**

This equates to a reduction of **11,607 kg CO_2 per year** or **15.42%** of the total TER emissions and is therefore compliant with the GLA energy planning guidance. The Regulation Compliance Reports are attached as Appendix 1 and the SAP 10 'Be Lean' spreadsheet is attached as Appendix 2.

Be Clean

A further set of calculations has been prepared for the proposed energy strategy. This proposes the installation of Vaillant aroSTOR air source heat pump hot water cylinders. These calculations have been converted to SAP 10 emissions and the 'Be Clean' spreadsheet is attached as Appendix 4. The Regulation Compliance Reports for the proposed energy strategy (based on Part L – 2013) are attached as Appendix 3.

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **74,429 kg CO_2 per year**, with the actual carbon dioxide emissions (DER) assessed as **48,704 kg CO_2 per year.**

The reduction in emissions using from energy efficiency and air source heat pump hot water cylinders and using the SAP 10 carbon factors is **25,725 kg CO_2 per year**, which equates to **34.56%.**

Be Green

It is proposed to install a photovoltaic array of 62 kW on the roof of the building. The array will be comprised of 155 x 400W panels, which will be installed on racks and inclined towards the southwest and southeast. The panels will reduce emissions by a further **13,175 kg CO_2 per year** (based on panels inclined at 20 degrees, orientated to due southwest and southeast at postcode KT1 and using the SAP 10 emissions factors)**.**

A Roof Plan showing the indicative location of the panels is attached as Appendix 5.

Summary

The total reduction in emissions from energy efficiency, low-carbon and renewable technologies are calculated as; 38,900 kg CO_2 per year, which equates to a reduction of 52.26% (% of TER).

The residual emissions are **35.529 tonnes**, which requires a carbon offset payment of **£63,952** (based on the carbon offset payment of £1,800 per tonne).

6.0 Climate change adaption and Water resources

Sustainable Drainage Systems (SUDS)

The site lies within Flood Zone 1 and Flood Zone 2 and a site-specific Flood Risk Assessment has been prepared which considers the issues and sets out what measures may be incorporated.

The existing site is mostly covered with buildings and hard surfacing and the proposal does not increase the volume or rate of surface water run-off. It is understood that it will be disposed of into the combined sewer in Church Grove.

Surface Water Management

Consideration has been given to the use of grey water recycling. However, customer's resistance to the appearance of the recycled water and the cost of the systems does not currently make them a viable option. They have therefore not been included in the proposals.

Water efficiency measures

In excess of 20% of the UK's water is used domestically with over 50% of this used for flushing WCs and washing (source: Environment Agency). The majority of this comes from drinking quality standard or potable water.

The water efficiency measures included will ensure that the water use target of 110 litres per person per day is achieved.

Water efficient devices will be fully evaluated, and installed, wherever possible. The specification of such devices will be considered at detailed design stage and each will be subject to an evaluation based on technical performance, cost and market appeal, together with compliance with the water use regulations.

The following devices will be incorporated within the apartments:

- water efficient taps
- water efficient toilets
- low output showers
- flow restrictors to manage water pressures to achieve optimum levels and
- water meters

Water consumption calculations have been carried out using the Water Efficiency Calculator provided by the BRE. Although not perfect this calculator gives a good indication of the probable water use in a dwelling, although this is largely dependent on the way on which occupants use their homes.

Below is a typical specification, which would achieve the 110 Litres per person per year target.

Schedule of Appliance Water Consumption		
Appliance	Flow rate or capacity	Total Litres
WC	4/2.6 litres dual flush	14.72
Basin	1.7 litres/min.	5.98
Shower	9.5 litres/min	28.50
Bath	160 litres	25.60
Sink	4 litres/min	14.13
Washing Machine	Default used	16.66
Dishwasher	Default used	3.90
		109.49

7.0 Materials and Waste

The BRE Green Guide to Specification is a simple guide for design professionals. The guide provides environmental impact, cost and replacement interval information for a wide range of commonly used building specifications over a notional 60-year building life. The construction specification will prioritise materials within ratings A+, A or B.

Preference will be given to the use of local materials & suppliers where viable to reduce the transport distances and to support the local economy. A full evaluation of these suppliers will be undertaken at the next stage of design.

In addition, timber would be sourced, where practical, certified by PEFC or an equivalent approved certification body and all site timber used within the construction process would be recycled.

All insulation materials to will have a zero ozone depleting potential

Construction waste

Targets will be set to promote resource efficiency in accordance with guidance from WRAP, Envirowise, BRE and DEFRA.

The overarching principle of waste management is that waste should be treated or disposed of within the region where it is produced.

Construction operations generate waste materials as a result of general handling losses and surpluses. These wastes can be reduced through appropriate selection of the construction method, good site management practices and spotting opportunities to avoid creating unnecessary waste.

The Construction Strategy will explore these issues, some of which are set out below:

- Proper handling and storage of all materials to avoid damage.
- Efficient purchasing arrangements to minimise over ordering.
- Segregation of construction waste to maximise potential for reuse/recycling.
- Suppliers who collect and reuse/recycle packaging materials.

Appendix 1 – Regulations Compliance Reports for Modelled Units using Baseline Gas

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:36

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 1BF 52 GND GAS

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.37 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.96 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	40.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.0 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.88m²
Windows facing: South East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:29

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 1BF 52 MID GAS
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	16.02 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.51 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	28.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	23.3 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.88m²
Windows facing: South East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:23

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 1BF 52 TOP GAS

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.55 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.87 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	40.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	37.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.88m²
Windows facing: South East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:17

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 2BF 65 GND GAS

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.62 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.69 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.3 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	40.2 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North East	5.76m²
Windows facing: North East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:12

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 2BF 65 MID GAS

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	16.32 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.37 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	35.6 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	30.2 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North East	5.76m²
Windows facing: North East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:08

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 2BF 65 TOP GAS

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.06 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.38 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	44.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	38.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North East	5.76m²
Windows facing: North East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Thermal bridging	0.036 W/m²K
Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:05

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 3BF 83 GND GAS
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	15.82 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.28 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	41.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	31.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	2.88m²
Windows facing: South West	16.74m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:02

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 3BF 83 MID GAS
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	13.81 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.37 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	30.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	23.7 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	2.88m²
Windows facing: South West	16.74m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 13:01:01

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 3BF 83 TOP GAS
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	15.92 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.96 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	41.5 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.8 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 464, product index 017955):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Ideal
Model: LOGIC COMBI
Model qualifier: ESP1 24
(Combi)
Efficiency 89.6 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	No cylinder	

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	2.88m²
Windows facing: South West	16.74m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Appendix 2: 'Be Lean' GLA SAP 10 Spreadsheet

Be Lean - SAP 2012 Methodology SAP 10 Carbon Factors

Project	Kingston Bridge House, Hampton Wick
Client	
File ref and engineer	
Sheet	1
Date	Oct-20
Rev	A

	SAP 2012	Carbon Factor	SAP 10	Carbon Factor
	Gas	0.216	Gas	0.210
	Grid Elec	0.519	Grid Elec	0.233

	Price	
Gas	£0.0392	per kW/hr
Electricity	£0.1696	per kW/hr

TER

Plot	Bedrooms	Floor Area	Location	Space Htg	Water Htg	Pumps/ Lighting	Emissions
1	3	86.7	GND	2739	2532	449	1212
2	1	55.6	GND	1750	2110	362	895
3	2	67.9	GND	2618	2269	402	1120
4	1	65.5	GND	2062	2485	426	1054
5	2	61.4	GND	2367	2052	364	1013
6	1	51.2	GND	1612	1943	333	824
7	1	50.0	GND	1574	1897	325	805
8	1	51.5	GND	1621	1954	335	829
9	1	50.3	GND	1583	1908	327	809
10	2	63.4	GND	2445	2119	375	1046
11	3	83.0	MID	1831	2444	430	998
12	1	60.5	MID	1223	2318	394	835
13	2	74.9	MID	2069	2522	443	1067
14	1	65.2	MID	1318	2498	424	900
15	3	89.0	MID	1963	2621	461	1070
16	2	63.9	MID	1765	2151	378	911
17	2	61.4	MID	1696	2067	364	875
18	1	51.2	MID	1035	1962	333	707
19	1	50.0	MID	1011	1916	325	690
20	1	51.5	MID	1041	1973	335	711
21	1	50.3	MID	1017	1927	327	694
22	ST	39.8	MID	805	1525	259	549
23	1	55.9	MID	1130	2142	364	772
24	3	83.0	MID	1831	2444	430	998
25	1	60.5	MID	1223	2318	394	835
26	2	74.9	MID	2069	2522	443	1067
27	1	65.2	MID	1318	2498	424	900
28	3	89.0	MID	1963	2621	461	1070
29	2	63.9	MID	1765	2151	378	911
30	2	61.4	MID	1696	2067	364	875
31	1	51.2	MID	1035	1962	333	707
32	1	50.0	MID	1011	1916	325	690
33	1	51.5	MID	1041	1973	335	711
34	1	50.3	MID	1017	1927	327	694
35	ST	39.8	MID	805	1525	259	549
36	1	55.9	MID	1130	2142	364	772
37	3	83.0	MID	1831	2444	430	998
38	1	60.5	MID	1223	2318	394	835
39	2	74.9	MID	2069	2522	443	1067
40	2	65.2	MID	1801	2195	386	929
41	3	89.0	MID	1963	2621	461	1070
42	2	63.9	MID	1765	2151	378	911
43	2	61.4	MID	1696	2067	364	875
44	1	51.2	MID	1035	1962	333	707
45	1	50.0	MID	1011	1916	325	690
46	1	51.5	MID	1041	1973	335	711
47	1	50.3	MID	1017	1927	327	694
48	ST	39.8	MID	805	1525	259	549
49	1	55.9	MID	1130	2142	364	772
50	3	83.0	MID	1831	2444	430	998
51	1	60.5	MID	1223	2318	394	835
52	2	74.9	MID	2069	2522	443	1067
53	2	65.2	MID	1801	2195	386	929
54	3	89.0	MID	1963	2621	461	1070
55	2	63.9	MID	1765	2151	378	911
56	2	61.4	MID	1696	2067	364	875
57	1	51.2	MID	1035	1962	333	707
58	1	50.0	MID	1011	1916	325	690
59	1	51.5	MID	1041	1973	335	711
60	1	50.3	MID	1017	1927	327	694
61	ST	39.8	MID	805	1525	259	549
62	1	55.9	MID	1130	2142	364	772
63	3	83.0	TOP	2659	2423	430	1167
64	1	60.5	TOP	1955	2294	394	984
65	2	74.9	TOP	2687	2508	443	1194
66	2	65.2	TOP	2339	2183	386	1040
67	3	89.0	TOP	2851	2598	461	1252
68	2	63.9	TOP	2292	2139	378	1019
69	2	61.4	MID	1696	2067	364	875
70	1	51.2	MID	1035	1962	333	707
71	1	50.0	MID	1011	1916	325	690
72	1	51.5	MID	1041	1973	335	711
73	1	50.3	MID	1017	1927	327	694
74	ST	39.8	MID	805	1525	259	549
75	1	55.9	MID	1130	2142	364	772
76	2	61.4	MID	1696	2067	364	875
77	1	51.2	MID	1035	1962	333	707
78	1	50.0	MID	1011	1916	325	690
79	1	51.5	MID	1041	1973	335	711
80	1	50.3	MID	1017	1927	327	694
81	ST	39.8	MID	805	1525	259	549
82	1	55.9	MID	1130	2142	364	772
83	2	61.4	TOP	2203	2056	364	979
84	1	51.2	TOP	1654	1942	333	833
85	1	50.0	TOP	1616	1896	325	813
86	1	51.5	TOP	1664	1953	335	838
87	1	50.3	TOP	1625	1907	327	818
88	ST	39.8	TOP	1286	1509	259	647
89	1	55.9	TOP	1806	2120	364	909
		5306.7					**75274.4**

DER - Based on Gas Heating with SAP 10 Carbon Factors

Plot	Space Htg	Water Htg	Pumps/ Lighting	Emissions
1	2283	1968	449	997.5
2	1563	1676	362	764.4
3	2494	1785	402	992.3
4	1842	1974	426	900.5
5	2255	1614	364	897.3
6	1440	1543	333	703.9
7	1406	1507	325	687.4
8	1448	1552	335	708.1
9	1414	1516	327	691.6
10	2329	1667	375	926.5
11	1445	1890	430	800.5
12	1006	1830	394	687.2
13	1943	1974	443	925.7
14	1084	1972	424	740.6
15	1549	2027	461	858.4
16	1657	1684	378	789.8
17	1592	1618	364	758.9
18	851	1549	333	581.6
19	831	1513	325	568.0
20	856	1558	335	585.0
21	836	1522	327	571.4
22	662	1204	259	452.1
23	929	1691	364	635.0
24	1445	1890	430	800.5
25	1006	1830	394	687.2
26	1943	1974	443	925.7
27	1084	1972	424	740.6
28	1549	2027	461	858.4
29	1657	1684	378	789.8
30	1592	1618	364	758.9
31	851	1549	333	581.6
32	831	1513	325	568.0
33	856	1558	335	585.0
34	836	1522	327	571.4
35	662	1204	259	452.1
36	929	1691	364	635.0
37	1445	1890	430	800.5
38	1006	1830	394	687.2
39	1943	1974	443	925.7
40	1691	1718	386	805.8
41	1549	2027	461	858.4
42	1657	1684	378	789.8
43	1592	1618	364	758.9
44	851	1549	333	581.6
45	831	1513	325	568.0
46	856	1558	335	585.0
47	836	1522	327	571.4
48	662	1204	259	452.1
49	929	1691	364	635.0
50	1445	1890	430	800.5
51	1006	1830	394	687.2
52	1943	1974	443	925.7
53	1691	1718	386	805.8
54	1549	2027	461	858.4
55	1657	1684	378	789.8
56	1592	1618	364	758.9
57	851	1549	333	581.6
58	831	1513	325	568.0
59	856	1558	335	585.0
60	836	1522	327	571.4
61	662	1204	259	452.1
62	929	1691	364	635.0
63	2447	1883	430	1009.5
64	1957	1822	394	885.3
65	2644	1969	443	1072.1
66	2302	1714	386	933.3
67	2624	2019	461	1082.5
68	2256	1680	378	914.7
69	1592	1618	364	758.9
70	851	1549	333	581.6
71	831	1513	325	568.0
72	856	1558	335	585.0
73	836	1522	327	571.4
74	662	1204	259	452.1
75	929	1691	364	635.0
76	1592	1618	364	758.9
77	851	1549	333	581.6
78	831	1513	325	568.0
79	856	1558	335	585.0
80	836	1522	327	571.4
81	662	1204	259	452.1
82	929	1691	364	635.0
83	2168	1614	364	878.9
84	1656	1542	333	749.2
85	1617	1506	325	731.7
86	1666	1551	335	753.6
87	1627	1515	327	736.1
88	1288	1199	259	582.4
89	1808	1684	364	818.0
				63667.3

Total Site Target Emissions	**75,274**	$kgCO_2$ per year
Total Site Design Emissions (Be Clean)	**63,667**	$kgCO_2$ per year
Total Reduction	**11,607**	$kgCO_2$ per year
% Reduction	**15.42%**	

Appendix 3 – Regulations Compliance Reports for Modelled Units using ASHP cylinders

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:49

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 1BF GND 52 ASHP
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	26.47 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	23.84 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	40.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.0 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.88m²
Windows facing: South East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:41

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 1BF MID 52 ASHP
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	22.95 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.22 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	28.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	23.3 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.88m²
Windows facing: South East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:34

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 1BF TOP 52 ASHP

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	26.73 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	25.90 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	40.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	37.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.88m²
Windows facing: South East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:28

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 2BF GND 65 ASHP

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	26.64 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	27.00 kg/m²	**Fail**

Excess emissions = 0.36 kg/m² (1.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.3 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	40.2 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North East	5.76m²
Windows facing: North East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:23

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 2BF MID 65 ASHP

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	23.12 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	21.75 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	35.6 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	30.2 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North East	5.76m²
Windows facing: North East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:19

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m²

Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 2BF TOP 65 ASHP

Address :

Client Details:

Name: Westcombe Group

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	25.77 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	26.31 kg/m²	**Fail**

Excess emissions = 0.54 kg/m² (2.1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	44.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	38.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North East	5.76m²
Windows facing: North East	3.72m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Thermal bridging	0.036 W/m²K
Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:16

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 3BF GND 83 ASHP
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	22.52 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	20.76 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	41.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	31.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	2.88m²
Windows facing: South West	16.74m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:13

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 3BF MID 83 ASHP
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	19.47 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.41 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	30.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	23.7 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	2.88m²
Windows facing: South West	16.74m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 29 October 2020 at 14:55:12

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83m²
Site Reference : Kingston Bridge House, Hampton Wick **Plot Reference:** 3BF TOP 83 ASHP
Address :

Client Details:

Name: Westcombe Group
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity
Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)	22.67 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	22.29 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	41.5 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.8 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.17 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Efficiency 99.8

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Time and temperature zone control by device in database	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	2.88m²
Windows facing: South West	16.74m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Party Walls U-value	0 W/m²K

Appendix 4: 'Be Clean' GLA SAP 10 Spreadsheet

Be Clean - SAP 2012 Methodology SAP 10 Carbon Factors

Project	Kingston Bridge House, Hampton Wick
Client	
File ref and engineer	
Sheet	1
Date	Oct-20
Rev	A

	SAP 2012	Carbon Factor	SAP 10	Carbon Factor
	Gas	0.216	Gas	0.210
	Grid Elec	0.519	Grid Elec	0.233

	Price	
Gas	£0.0392	per kW/hr
Electricity	£0.1696	per kW/hr

TER

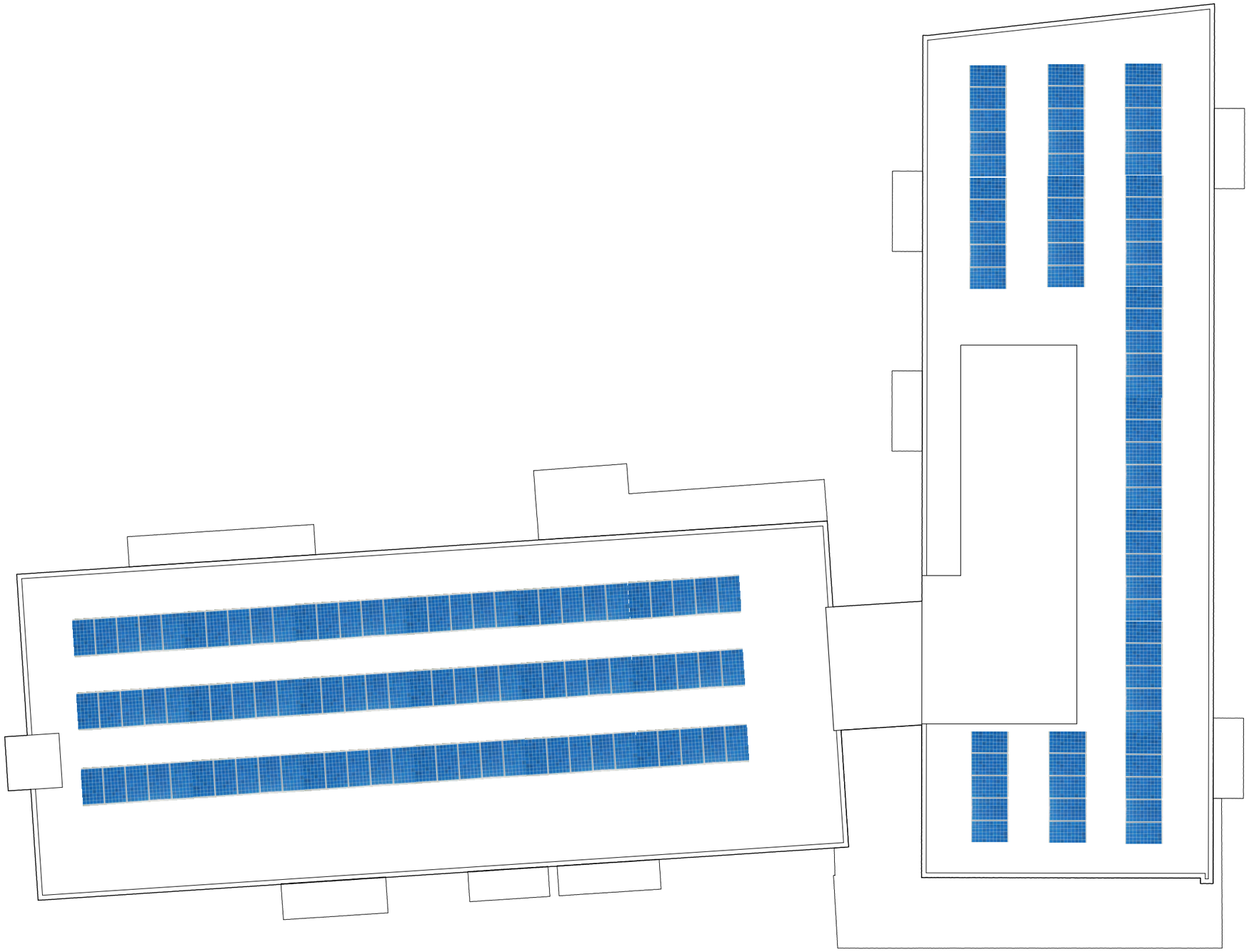
Plot	Bedrooms	Floor Area	Location	Space Htg	Water Htg	Pumps/ Lighting	Emissions
1	3	86.7	GND	2606	2530	449	1183
2	1	55.6	GND	1583	2251	362	889
3	2	67.9	GND	2445	2334	402	1097
4	1	65.5	GND	1865	2652	426	1048
5	2	61.4	GND	2211	2110	364	992
6	1	51.2	GND	1457	2073	333	819
7	1	50.0	GND	1423	2024	325	800
8	1	51.5	GND	1466	2085	335	824
9	1	50.3	GND	1432	2036	327	805
10	2	63.4	GND	2283	2179	375	1025
11	3	83.0	MID	1717	2444	430	974
12	1	60.5	MID	1062	2475	394	835
13	2	74.9	MID	1889	2595	443	1045
14	1	65.2	MID	1144	2668	424	899
15	3	89.0	MID	1841	2621	461	1044
16	2	63.9	MID	1611	2214	378	891
17	2	61.4	MID	1548	2127	364	857
18	1	51.2	MID	899	2095	333	706
19	1	50.0	MID	878	2046	325	690
20	1	51.5	MID	904	2107	335	710
21	1	50.3	MID	883	2058	327	694
22	ST	39.8	MID	699	1628	259	549
23	1	55.9	MID	981	2287	364	771
24	3	83.0	MID	1717	2444	430	974
25	1	60.5	MID	1062	2475	394	835
26	2	74.9	MID	1889	2595	443	1045
27	1	65.2	MID	1144	2668	424	899
28	3	89.0	MID	1841	2621	461	1044
29	2	63.9	MID	1611	2214	378	891
30	2	61.4	MID	1548	2127	364	857
31	1	51.2	MID	899	2095	333	706
32	1	50.0	MID	878	2046	325	690
33	1	51.5	MID	904	2107	335	710
34	1	50.3	MID	883	2058	327	694
35	ST	39.8	MID	699	1628	259	549
36	1	55.9	MID	981	2287	364	771
37	3	83.0	MID	1717	2444	430	974
38	1	60.5	MID	1062	2475	394	835
39	2	74.9	MID	1889	2595	443	1045
40	2	65.2	MID	1644	2259	386	910
41	3	89.0	MID	1841	2621	461	1044
42	2	63.9	MID	1611	2214	378	891
43	2	61.4	MID	1548	2127	364	857
44	1	51.2	MID	899	2095	333	706
45	1	50.0	MID	878	2046	325	690
46	1	51.5	MID	904	2107	335	710
47	1	50.3	MID	883	2058	327	694
48	ST	39.8	MID	699	1628	259	549
49	1	55.9	MID	981	2287	364	771
50	3	83.0	MID	1717	2444	430	974
51	1	60.5	MID	1062	2475	394	835
52	2	74.9	MID	1889	2595	443	1045
53	2	65.2	MID	1644	2259	386	910
54	3	89.0	MID	1841	2621	461	1044
55	2	63.9	MID	1611	2214	378	891
56	2	61.4	MID	1548	2127	364	857
57	1	51.2	MID	899	2095	333	706
58	1	50.0	MID	878	2046	325	690
59	1	51.5	MID	904	2107	335	710
60	1	50.3	MID	883	2058	327	694
61	ST	39.8	MID	699	1628	259	549
62	1	55.9	MID	981	2287	364	771
63	3	83.0	TOP	2532	2421	430	1140
64	1	60.5	TOP	1772	2448	394	978
65	2	74.9	TOP	2499	2579	443	1170
66	2	65.2	TOP	2175	2245	386	1018
67	3	89.0	TOP	2715	2596	461	1223
68	2	63.9	TOP	2132	2200	378	998
69	2	61.4	MID	1548	2127	364	857
70	1	51.2	MID	899	2095	333	706
71	1	50.0	MID	878	2046	325	690
72	1	51.5	MID	904	2107	335	710
73	1	50.3	MID	883	2058	327	694
74	ST	39.8	MID	699	1628	259	549
75	1	55.9	MID	981	2287	364	771
76	2	61.4	MID	1548	2127	364	857
77	1	51.2	MID	899	2095	333	706
78	1	50.0	MID	878	2046	325	690
79	1	51.5	MID	904	2107	335	710
80	1	50.3	MID	883	2058	327	694
81	ST	39.8	MID	699	1628	259	549
82	1	55.9	MID	981	2287	364	771
83	2	61.4	TOP	2048	2114	364	959
84	1	51.2	TOP	1499	2072	333	828
85	1	50.0	TOP	1464	2023	325	808
86	1	51.5	TOP	1508	2084	335	832
87	1	50.3	TOP	1473	2035	327	813
88	ST	39.8	TOP	1165	1611	259	643
89	1	55.9	TOP	1637	2262	364	903
		5306.7					**74429.3**

DER - Based on ASHP Hot Water Cylinders with SAP 10 Carbon Factors

Plot	Space Htg	Water Htg	Pumps/ Lighting	Emissions
1	2158	909	402	808.3
2	1487	754	313	594.9
3	2361	815	355	822.8
4	1751	888	369	700.8
5	2135	737	321	744.1
6	1369	694	288	547.8
7	1337	678	282	535.0
8	1377	698	290	551.0
9	1345	682	283	538.2
10	2204	761	332	768.3
11	1369	870	385	611.4
12	963	820	341	494.9
13	1846	899	392	731.0
14	1038	884	367	533.3
15	1468	933	413	655.6
16	1575	767	334	623.6
17	1513	737	321	599.2
18	815	694	288	418.8
19	796	678	282	409.0
20	820	698	290	421.3
21	801	682	283	411.4
22	634	539	224	325.6
23	890	758	315	457.3
24	1369	870	385	611.4
25	963	820	341	494.9
26	1846	899	392	731.0
27	1038	884	367	533.3
28	1468	933	413	655.6
29	1575	767	334	623.6
30	1513	737	321	599.2
31	815	694	288	418.8
32	796	678	282	409.0
33	820	698	290	421.3
34	801	682	283	411.4
35	634	539	224	325.6
36	890	758	315	457.3
37	1369	870	385	611.4
38	963	820	341	494.9
39	1846	899	392	731.0
40	1607	783	341	636.3
41	1468	933	413	655.6
42	1575	767	334	623.6
43	1513	737	321	599.2
44	815	694	288	418.8
45	796	678	282	409.0
46	820	698	290	421.3
47	801	682	283	411.4
48	634	539	224	325.6
49	890	758	315	457.3
50	1369	870	385	611.4
51	963	820	341	494.9
52	1846	899	392	731.0
53	1607	783	341	636.3
54	1468	933	413	655.6
55	1575	767	334	623.6
56	1513	737	321	599.2
57	815	694	288	418.8
58	796	678	282	409.0
59	820	698	290	421.3
60	801	682	283	411.4
61	634	539	224	325.6
62	890	758	315	457.3
63	2310	870	385	830.6
64	1858	820	341	703.5
65	2505	899	392	884.6
66	2181	783	341	770.1
67	2477	933	413	890.7
68	2138	767	334	754.7
69	1513	737	321	599.2
70	815	694	288	418.8
71	796	678	282	409.0
72	820	698	290	421.3
73	801	682	283	411.4
74	634	539	224	325.6
75	890	758	315	457.3
76	1513	737	321	599.2
77	815	694	288	418.8
78	796	678	282	409.0
79	820	698	290	421.3
80	801	682	283	411.4
81	634	539	224	325.6
82	890	758	315	457.3
83	2054	737	321	725.2
84	1573	694	288	595.3
85	1536	678	282	581.4
86	1582	698	290	598.8
87	1545	682	283	584.9
88	1223	539	224	462.8
89	1717	758	315	650.0
				48704.4

Total Site Target Emissions	**74,429**	$kgCO_2$ per year
Total Site Design Emissions (Be Clean)	**48,704**	$kgCO_2$ per year
Total Reduction	**25,725**	$kgCO_2$ per year
% Reduction	**34.56%**	

Appendix 5 – Roof Plans showing Indicative Layout of Photovoltaic Panels



155 x 400W Photovoltaic Panels

Rev	Date	Description

FLUENT
ARCHITECTURAL DESIGN SERVICES
69-71 Windmill Road, Sunbury,
Middlesex, TW16 7DT
Tel: 0800 0438838
E-mail: info@fluent-ads.co.uk
Web: fluent-ads.co.uk

Kingston Bridge House
Church Grove, Hampton Wick

Proposed Roof Plan

0 2 4 6 8

Scale: 1:200 @ A3	Dwg No.: FLU.1191.3.24
Date: 29.10.20	Rev
Drawn: N.Millin	

Appendix 6 – London Borough of Richmond Sustainable Construction 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): Kingston Bridge House, Hampton Wick — Application No. (if known):

Address (include. postcode): Kingston Bridge House, Hampton Wick
Completed by: Ivan Ball

For Non-Residential
Size of development (m2)

For Residential
Number of dwellings: 89

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 — 52.26

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? — 27.05

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: Please Select — 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:
BREEAM: Good = *0* , Very Good = 4, Excellent = *8,* Outstanding = *16*

Subtotal 0

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 providng/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 **18**

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

A Construction Plan will be prepared, which will seek to reduce dust, noise and other disturbances to immediate neighbours.

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?	160	
	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 **9**

Please give any additional relevant comments to the Transport Section below

Cycle storage is provided.

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? See DAS 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:	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 5

Please give any additional relevant comments to the Biodiversity Section below

The proposal is for the conversion of an existing building and there is only limited external space for landscape and ecological enhancements.

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 3

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? 20 %

What percentage of demolition waste will be recycled? 80 %

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

The standards of the SPD will be met.

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 **4**

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 ***43***

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 _____ Date _____