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# Sustainability and Energy Statement

**Car Showroom and Workshop, 45 - 49 Station Road**
London Borough of Richmond-upon-Thames

On Behalf of
**G Kingsbury and Son Ltd.**

28/10/2015
Job Ref: 5366

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## CONTENTS

# 1.0 INTRODUCTION

1.1 This Sustainability and Energy Statement has been prepared by Metropolis Green on behalf of G Kingsbury and Son Ltd. It accompanies the planning application submitted to the London Borough of Richmond-upon-Thames' Council for the proposed development at 45-49 Station Road, Hampton, Richmond-upon-Thames, TW12 2BU.

1.2 The proposed development consists of the demolition of the existing buildings at the 45-49 Station Road site to provide a car showroom and workshop/garage, 8 No. residential units, soft landscaping, car parking and cycle storage spaces. This report will only be focussing on the commercial areas of the development: the car showroom and workshop.

1.3 The proposed development has met or exceeded all relevant sustainable development policies stipulated at national and local levels. Following these policies has meant that sustainability has been targeted throughout the lifetime of the building; in particular, energy efficiency measures, sustainable material selection, low water consumption, pollution and waste management and incorporating areas of green space will be integral to the site's design and specification.

1.4 The London Borough of Richmond-upon-Thames (LBRUT) Policy CP1 and Policy DMSD1 require all new non-residential buildings over 100m$^2$ to achieve a BREEAM 'Excellent' rating and to submit an LBRUT Sustainable Construction Checklist for their planning applications. As the proposed development has a gross internal area of 372m$^2$, a BREEAM 2014 Pre-Assessment, achieving an Excellent rating (and a score of 73.40%), and an LBRUT Sustainable Construction Checklist have been prepared for the development, and are included in Appendices B and C, respectively. This report assumes a basic understanding of the BREEAM assessment methodology; however, for further information please refer to the BREEAM 2014 New Construction Non-Domestic Buildings Technical Manual[1]

1.5 The London Borough of Richmond-upon-Thames Policy CP2 requires all new developments to achieve a reduction in carbon dioxide emissions of 20% from on-site renewable energy generation.

1.6 The proposed commercial development is considered to be a minor development in term of the London Plan, as it consists of less than 1000m$^2$ of non-residential floor space. The scheme is therefore not required to comply with London Plan Sustainability and Energy policies, but does comply with the London Borough of Richmond's Core Strategy Policy CP2, by utilising both an Air Source Heat Pump (ASHP) and PV

[1] http://www.breeam.com/BREEAMUK2014SchemeDocument/

panels to achieve a reduction in $CO_2$ emissions solely from renewables of 21.15%.

1.7 This Sustainability and Energy Statement should be read alongside other supplementary planning documents prepared by the design team for the planning application.

# 2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

## 2.1 Proposed Development

2.1.1 The proposed development consists of the demolition of the existing buildings at the 45-49 Station Road site to provide a car showroom and workshop/garage, 8 No. residential units, soft landscaping, car parking and cycle storage spaces. This Sustainability and Energy Statement will only be focussing on the commercial areas of the development, however it will make reference to the other areas- these will be referred to as the 'residential spaces'; the site as a whole will be referred to as the 'entire development'. Figure 1 shows the Architect's designs of the entire development.

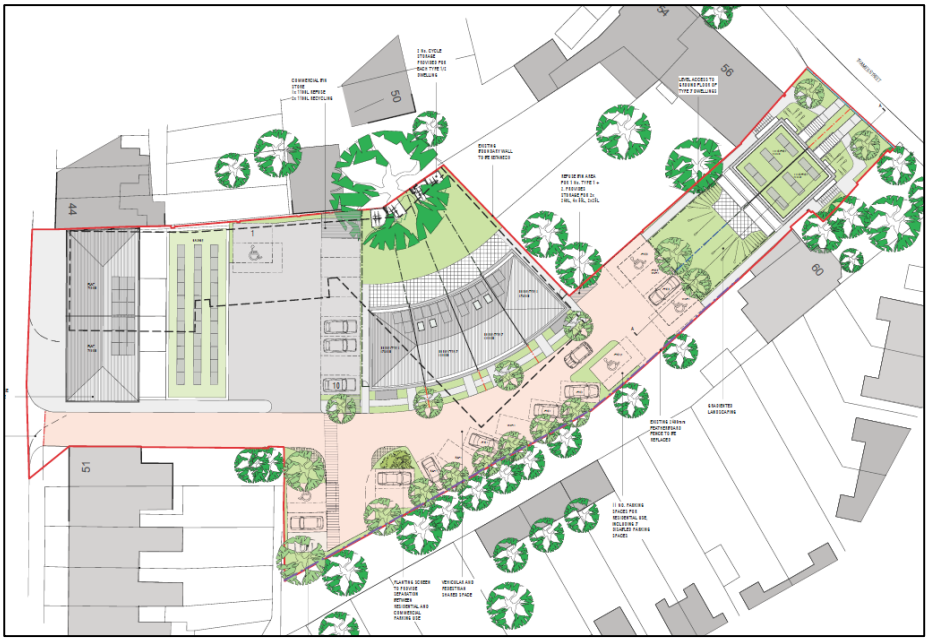


**Figure 1: Architect's Impression of the Entire Development.**

2.1.2 The commercial areas of the proposed development consists of the car showroom (ground floor of a two-storey building; dwelllings on the first floor) and a one-storey car workshop to the rear with a green roof; also included are 14 No. car parking spaces, cycle storage spaces and landscaping. The total gross internal area of commercial development is 372m$^2$. Figure 2 shows the Architect's elevations of the car show room and the garage.


**Figure 2: Architect's Elevations of Car Show Room (North Façade) and Garage (South Façade), respectively.**

2.1.3 For further details of the proposed development works, please refer to design drawings and the design and access statement produced by Clive Chapman Architects.

## 2.2 Site and Surrounding Area

2.2.1 The site of the proposed development is located on the south side of Station Road in Hampton, and is currently a car showroom and workshop owned by G Kingsbury and Son Ltd. It consists of 2 No. large single-storey buildings (a car show room and a warehouse) and a two-storey office building. Figure 3 shows the west-facing façade of the existing buildings on the 45-49 Station Road site.


**Figure 3: Existing Site and Surrounding Area (entire development site defined by blue outline; commercial area denoted by red line). Image from Bing Maps.**

2.2.2 The area surrounding the site consists of a mixture of residential and commercial use buildings. The area in general contains a lot of green space and water- due south of the site is the River Thames, to the west is the Thames Water Hampton Water Treatment Works, Bushy Park resides to the east and to the North is Hampton and Richmond Borough Football Club.

# 3.0 POLICY CONTEXT

## 3.1 Policy Compliance

3.1.1. Sustainable development is the core principle underpinning planning, and has a key role to play in the creation of sustainable communities. In order to ensure the implementation of sustainable development and determine the targets and standards to be met by the proposed development, it is necessary to review the relevant national, regional and local planning policies and standards that are applicable to the development with respect to sustainability and the site's location.

3.1.2. The proposed development is considered to be a minor development in terms of the London Plan, as it consists of less than 1000 $m^2$ of new non-residential floor space. As such, it is therefore not required to comply with London Plan sustainability and energy policies, however it will still need to adhere to relevant London Borough of Richmond-upon-Thames policies.

3.1.3. The national and local sustainability and energy policies applicable to the proposed development are discussed in more detailed in the subsequent sections of this chapter and are as follows:

- The National Planning Policy Framework, March 2012
- The Building Regulations, Approved Document Part L2A and L2B, 2013 Editions
- London Borough of Richmond-upon-Thames' Core Strategy, Adopted April 2009
- London Borough of Richmond-upon-Thames' Development Management Plan, Adopted November 2011
- London Borough of Richmond-upon-Thames' Refuse and Recycling Requirements Supplementary Planning Document, April 2015
- London Borough of Richmond-upon-Thames' Sustainable Construction Checklist, September 2015
- BREEAM 2014 New Construction Non-Domestic Buildings

3.1.1. The subsequent chapters of this report summarise how the design team have addressed the three dimensions of sustainable development noted in the NPPF and how they have met the sustainable design principles found within the London Borough of Richmond-upon-Thames Core Strategy, Development Management Plan and Supplementary Planning Documents. The sustainability principles for the proposed development are addressed in chapter 4.0 and the energy strategy is addressed in chapter 5.0.

3.1.2. Overall, the proposed development demonstrates that sustainable design standards have been integral to the proposal, and can be applied to both its construction and operation.

## 3.2 National Policy

***National Planning Policy Framework, March 2012***

3.2.1 The National Planning Policy Framework (NPPF) was published in March 2012 and sets out the Government's planning policies for England, and how these policies are expected to be applied. The policies in the document, taken as a whole, constitute the Government's view of what sustainable development in England means in practice for the planning system.

3.2.2 Fundamentally for the proposed development, paragraph 7 of the NPPF states that:

> There are three dimensions to sustainable development: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:
>
> - **an economic role** – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
> - **a social role** – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and
> - **an environmental role** – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

3.2.3 Paragraph 14 of the NPPF states that:

> At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development**, which should be seen as a golden thread running through both plan-making and decision-taking.
>
> For **decision-taking** this means:

- approving development proposals that accord with the development plan without delay

3.2.4 The NPPF outlines a set of core land-use planning principles that should underpin both plan-making and decision-taking, three of which are particularly relevant to this Sustainability Statement. Under paragraph 17, these principles are that planning should:

- support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourage the use of renewable resources (for example, by the development of renewable energy);
- contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser environmental value, where consistent with other policies in this Framework; and
- encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.

3.2.5 Design is addressed in section 7 of the NPPF, and paragraph 56 states:

> The Government attaches great importance to the design of the built environment. Good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.

3.2.6 Meeting the challenge of climate change is addressed in section 10 of the NPPF, and paragraph 93 notes that planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development.

3.2.7 Further to the above, paragraphs 95 and 96 state:

To support the move to a low carbon future, local planning authorities should:

- plan for new development in locations and ways which reduce greenhouse gas emissions;
- actively support energy efficiency improvements to existing buildings; and

- when setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards.

In determining planning applications, local planning authorities should expect new development to:

- comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

3.2.8 Conserving and enhancing the natural environment is addressed in section 11 of the NPPF, and excerpts from paragraph 109 state that the planning system should contribute to and enhance the natural and local environment by:

- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; and
- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

3.2.9 Paragraph 118 notes that when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by encouraging opportunities to incorporate biodiversity in and around developments.

3.2.10 Noise is addressed under paragraph 123 which notes that Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development; and
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions.

3.2.11 Additionally, paragraph 125 notes that by encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity.

## 3.3 Local Policy

3.3.1. Policies in the London Borough of Richmond-Upon-Thames' Local Plan relating to sustainability and the proposed development are contained within the following documents: the Core Strategy (April 2009), Development Management Plan (November 2011) and various Supplementary Planning Documents. The London Borough of

***London Borough of Richmond-Upon-Thames' Core Strategy, Adopted April 2009***

**Core Strategy Policy CP1: Sustainable Development**

A. The policy seeks to maximise the effective use of resources including land, water and energy, and assist in reducing any long term adverse environmental impacts of development. Development will be required to conform to the Sustainable Construction checklist, including the requirement to meet the Code for Sustainable Homes level 3 (for new homes), Ecohomes "excellent" (for conversions) or BREEAM "excellent" (for other types of development). This requirement will be adjusted in future years through subsequent DPDs, to take into account the then prevailing standards in the Code for Sustainable Homes and any other National Guidance, and ensure that these standards are met or exceeded.

*The following principles will be promoted:*

B. Appropriate location of land uses: Facilities and services should be provided at the appropriate level locally, taking account of the network of town centres identified in policy CP8. Higher density residential and mixed use developments to be in town centres, near to public transport to reduce the need to travel by car.

C. Making best use of land: The use of existing and proposed new facilities should be maximised through management initiatives, such as co-location or dual use. Redevelopment of sites should normally only take place where there can be an increase in the number of housing units and/or quantity of commercial floorspace.

D. Reducing environmental impact: The environmental benefits of retaining and, where appropriate, refurbishing existing buildings, should be compared against redevelopment. Development should seek to minimise the use of open land for development and seek to maintain the natural vegetation, especially trees, where possible. Local environmental impacts of development with respect to factors such as noise, air quality and contamination should be minimised.

E. Environmental gain to compensate for any environmental cost of development will be sought.

**Core Strategy Policy CP2: Reducing Carbon Emissions**

A. The Borough will reduce its carbon dioxide emissions by requiring measures that minimise energy consumption in new development and promoting these measures in existing development, particularly in its own buildings.

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

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

**Core Strategy Policy CP3: Climate Change – Adapting to the Effects**

A. Development will need to be designed to take account of the impacts of climate change over its lifetime, including:

- Water conservation and drainage
- The need for Summer cooling
- Risk of subsidence
- Flood risk from the River Thames and its tributaries.

B. Development in areas of high flood risk will be restricted, in accordance with PPS25, and using the Environment Agency's Catchment Flood Management Plan, Borough's Strategic Flood Risk Assessment and site level assessments to determine risk.

**Core Strategy Policy CP4: Biodiversity**

A. The Borough's biodiversity including the SSSIs and Other Sites of Nature Importance will be safeguarded and enhanced. Biodiversity enhancements will be encouraged particularly in areas of deficiency (parts of Whitton, Hampton, Teddington, Twickenham and South Kew), in areas of new development and along wildlife corridors and green chains such as the River Thames and River Crane corridors.

B. Weighted priority in terms of their importance will be afforded to protected species and priority species and habitats in the UK, Regional and Richmond upon Thames Biodiversity Action Plans.

**Core Strategy Policy CP5: Sustainable Travel**

A. The need for travel will be reduced by the provision of employment, shops and services at the most appropriate level locally, within the network of town centres identified in CP 8. To implement this policy the Council will:

- Protect and enhance local facilities and employment to reduce the need to travel.
- Require developments which would generate significant amounts of travel to be located on sites well served by public transport.

*In promoting safe, sustainable and accessible transport modes such as walking, cycling and public transport, in association with its partners the Council will seek to:*

B. Land for transport:

- Safeguard land for existing and proposed transport functions.
- Reflect the above priorities in the allocation of road spaces as part of the Parallel Initiatives Programme

C. Cycling and Walking:

- Give priority to pedestrians, including those with disabilities, particularly in Richmond town centre and the district and local shopping centres.
- Provide and promote a well-designed bicycle and walking network across the Borough (the Strategic Walks network, Richmond Borough Cycle Network and London Cycle Network Plus), and improve conditions for cyclists and pedestrians elsewhere.
- Prioritise the needs of pedestrians and cyclists in the design of new developments including links to existing networks and requiring the provision of adequate cycle parking.
- Investigate the possibility of a footbridge across the Thames between Ham and Twickenham for pedestrians and cyclists.

D. Public Transport:

- Improve provision for buses particularly in Richmond and Twickenham town centres, and seek to improve bus services within River Crane Corridor through the implementation of development proposals.
- Achieve integration and convenient interchange facilities at all the borough's stations.
- Seek improvements to orbital public transport including rail access to Heathrow.
- Improve walking, cycling and public transport in areas less well served by public transport, including some of the areas of relative deprivation.

E. Congestion and Pollution:

- Undertake traffic management measures to reduce the impact of traffic particularly in Richmond town centre, the district and local centres, residential areas and streets unsuitable for through traffic.

F. Car parking and Travel:

- Require new car free housing in Richmond and Twickenham town centres and in other areas where there is good public transport and elsewhere have regard to maximum parking standards.
- Require car share facilities and car clubs in appropriate new developments and encourage the use of low emission motor vehicles in order to reduce congestion and pollution.
- Discourage commuter parking particularly by giving priority to residents' needs. Limit any further expansion of parking in town and local centres and manage parking controls to help maintain the vitality and viability of the centres, including the evening economy.

G. Sustainable Travel:

- Encourage major employers and schools to develop Green Travel Plans and require these where appropriate with planning applications.
- Require all major developments to submit a Transport Assessment based on TfL's Best Practice Guidance.
- Encourage efficient, safe and sustainable freight transport.
- Encourage river transport through the retention and support for new transport infrastructure.

H. The Council will support measures to minimise the impacts of Heathrow, particularly on traffic and noise on the Borough and will oppose changes that increase local impacts. Specifically it will seek the support of BAA, the Government and relevant statutory authorities for the following measures:

i. maintenance of the 480,000 limit on total air transport movements;
ii. maintenance of the current system of segregated mode;
iii. maintenance of the current noise preferential routes;
iv. the discontinuation of night flights;
v. restrictions of the use of private cars and improvements to public transport including a southern rail link.

**Core Strategy Policy CP6: Waste**

This Borough supports the objectives of sustainable waste management and will:

A. Maximise self-sufficiency in waste management capacity (in line with London Plan target of 85% self-sufficiency within London by 2020).

B. Seek to minimise waste creation, increase household recycling and composting rates to at least 40% by 2010, 50% by 2020, address waste as a resource and look to disposal as the last option, in line with the waste hierarchy.

C. Work with its partners in the West London Waste Authority to prepare a Joint Waste Plan, which will identify locations suitable for waste management facilities to meet The London Plan consolidated with Alterations since 2004 apportionment and other requirements.

D. Safeguard and improve existing waste sites at Craneford Way, Twickenham and Townmead Road, Kew unless compensatory provision is made.

E. Monitor changes in the stock of waste management facilities, waste arisings, and the amount of waste recycled, recovered and going for disposal.

***London Borough of Richmond-Upon-Thames' Development Management Plan, Adopted November 2011***

**Policy DM SD 1: Sustainable Construction**

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

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

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

They also must achieve a minimum 25 per cent reduction in carbon dioxide emissions over Building Regulations (2010) in line with best practice from 2010 to 2013, 40 per cent improvement from 2013 to 2016, and 'zero carbon' standards (as designed in future legislation) from 2016. It is expected that efficiency measures will be prioritised as a means towards meeting these targets. These requirements may be adjusted in future years to take into account the then prevailing standards and any other national guidance to ensure the standards are met or exceeded.

New non-residential buildings over 100sqm will be required to meet the relevant BREEAM 'excellent' standards.

**Policy DM SD 2: Renewable Energy and Decentralised Energy Networks**

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

A. Maximise opportunities for the micro-generation of renewable energy. Some form of low carbon renewable and/or de-centralised energy will be expected in all new development, and

B. Developments of 1 dwelling unit or more, or 100sqm of non-residential floor space or more will be required to reduce their total carbon dioxide emissions by following a hierarchy that first requires an efficient design to minimise the amount of energy used, secondly, by using low carbon technologies and finally, where feasible and viable, including a contribution from renewable sources.

C. Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged where there is no over-riding adverse local impact.

D. All new development will be required to connect to existing or planned decentralised energy networks where one exists. In all major developments and large Proposals Sites identified in the (forthcoming) Site Allocations DPD, provision should be made for future connection to a local energy network should one become available.

**Policy DM SD 4: Adapting to Higher Temperatures and Need for Cooling**

All new developments, in their layout, design, construction, materials, landscaping and operation, are required to take into account and adapt to higher temperatures, avoid and mitigate overheating and excessive heat generation to counteract the urban heat island effect, and meet the need for cooling.

All new development proposals should reduce reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

1. minimise internal heat generation through energy efficient design
2. reduce the amount of heat entering a building in summer through shading, reducing solar reflectance, fenestration, insulation and green roofs and walls
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. passive ventilation
5. mechanical ventilation

6. active cooling systems (ensuring they are the lowest carbon options).

Opportunities to adapt existing buildings, places and spaces to manage higher temperatures should be maximised and will be supported.

**Policy DM SD 5: Living Roofs**

Living roofs should be incorporated into new developments where technically feasible and subject to considerations of visual impact. The onus is on the applicant/developer for proposals with roof plate areas of 100sqm or more to provide evidence and justification if a living roof cannot be incorporated. The aim should be to use at least 70% of any potential roof plate area as a living roof.

The use of living roofs in smaller developments, renovations, conversions and extensions is encouraged and supported.

3.3.2. Policy DM SD 6: Flood Risk has been considered within this report, however as the proposed development will be located in an area within Flood Zone 1, many of the requirements within this policy are not applicable to the site, i.e. a Flood Risk Assessment does not need to be produced for the development.

**Policy DM SD 7: Sustainable Drainage**

All development proposals are required to follow the drainage hierarchy when disposing of surface water and must utilise Sustainable Drainage Systems (SuDS) wherever practical. Any discharge should be reduced to greenfield run-off rates wherever feasible.

When discharging surface water to a public sewer, developers will be required to provide evidence that capacity exists in the public sewerage network to serve their development.

**Policy DM SD 9: Protecting Water Resources and Infrastructure**

The borough's water resources and supplies will be protected by resisting development proposals that would pose an unacceptable threat to surface water and groundwater quantity and quality. This includes pollution caused by water run-off from developments into nearby waterways.

New developments must achieve a high standard of water efficiency by:

1. meeting the minimum mandatory target for water consumption as set out in the Code for Sustainable Homes, or
2. meeting a minimum of 2 credits on water consumption for other types of developments (BREEAM "excellent"), or

3. meeting a minimum of 3 credits on water consumption for conversions (EcoHomes “excellent”), and
4. utilising rainwater harvesting for all external water uses to reduce the consumption of potable water wherever possible.

The above requirements may be adjusted in future years to take into account the then prevailing standards and any other national guidance to ensure that these standards are met or exceeded.

New developments should also consider the following:

1. utilising rainwater harvesting and greywater recycling for all non-potable uses to reduce the consumption of potable water wherever possible, and
2. designing of landscaping to minimise water demand.

Proposals that seek to increase water availability or protect and improve the quality of rivers or groundwater will be encouraged.

The development or expansion of water supply or waste water facilities will normally be permitted, either where needed to serve existing or proposed new development, or in the interests of long term water supply and waste water management, provided that the need for such facilities outweighs any adverse land use or environmental impact.

The Council will support in principle the implementation of the Thames Tunnel project.

Where rivers have been classified by the Environment Agency as having ‘poor’ status (currently the River Crane, the Beverley Brook and the River Thames, upstream of Teddington), any development affecting such rivers is encouraged to improve the water quality in these areas.

**Policy DM OS 5: Biodiversity and New Development**

All new development will be expected to preserve and where possible enhance existing habitats including river corridors and biodiversity features, including trees.

All developments will be required to enhance existing and incorporate new biodiversity features and habitats into the design of buildings themselves as well as in appropriate design and landscaping schemes of new developments with the aim to attract wildlife and promote biodiversity, where possible.

When designing new habitats and biodiversity features, consideration should be given to the use of native species as well as the adaptability to the likely effects of climate change.

New habitats and biodiversity features should make a positive contribution to and should be integrated and linked to the wider green and blue infrastructure network, including de-culverting rivers, where possible.

***London Borough of Richmond-upon-Thames Refuse and Recycling Requirements SPD, Adopted April 2015***

3.3.3. Clause 2.1 of the LBRUT Refuse and Recycling SPD states that:

> When considering the amount of storage space needed for any particular development, the following requirements will help to calculate the volume of waste generated. They should only be taken as a guide since individual developments may need specific storage requirements:
>
> 2.6m$^2$ waste storage should be provided for every 1,000m$^2$ gross floorspace. Note: 50% of this capacity should be retained for the storage of separated waste for recycling.

***London Borough of Richmond-upon-Thames Sustainable Construction Checklist SPD, September 2015***

3.3.4. The London Borough of Richmond-upon-Thames requires a Sustainable Construction Checklist (SCC) to be completed for all new non-residential developments providing a floor area greater than or equal to 100m$^2$. An SCC for the proposed development is included in Appendix C.

## 3.4 BREEAM 2014 New Construction

3.4.1 The Building Research Establishment's Environmental Assessment Method (BREEAM) is the world's leading and most widely used environmental assessment method for buildings. It sets out the standard for best practice in sustainable design and is used to describe a building's designed environmental performance.

3.4.2 BREEAM UK New Construction (NC) is a performance based assessment method and certification scheme for new non-residential buildings. The primary aim of BREEAM NC is to mitigate the life cycle impacts of new non-residential buildings on the environment, in a robust and cost effective manner.

3.4.3 The London Borough of Richmond-upon-Thames (LBRUT) requires all new non-residential buildings over 100m$^2$ to undertake a BREEAM assessment and expects developments to achieve an 'Excellent' rating.

3.4.4 To achieve a score of Excellent, a score of 70% or more must be achieved overall and a number of mandatory minimum BREEAM standards must also be met; these are as follows:

- **Man 03: Responsible Construction Practices** – at least 1 'Considerate Constructors' credit must be achieved.

- **Man 04: Commissioning and Handover –** a Building User Guide must be produced, in line with BREEAM requirements.
- **Man 5: Aftercare –** the 'Seasonal Commissioning' credit must be achieved.
- **Ene 01: Reduction of Energy Use and Carbon Emissions –** at least 5 credits must be achieved.
- **Ene 02: Energy Monitoring –** the 'Sub-metering of Major Energy Consuming Systems' credit must be achieved.
- **Wat 01: Water consumption –** at least 1 credit must be achieved.
- **Wat 02: Water Monitoring –** a water meter must be specified on site, in line with BREEAM requirements.
- **Mat 03: Responsible Sourcing of Materials –** all timber and timber-based products used on site must be legally harvested and traded timber, in line with BREEAM requirements.
- **Wst 03: Operational Waste –** at least 1 credit must be achieved.
- **LE 03: Minimising Impact on Existing Site Ecology –** at least 1 credit must be achieved

3.4.5 The proposed development has a gross internal area of 372m$^2$, therefore a BREEAM 2014 assessment is required. A pre-assessment targeting a score of 73.40% and achieving all relevant mandatory minimum requirements, equating to an Excellent rating has been prepared for the development, and is included in Appendix B. For further information on the assessment methodology, please refer to the BREEAM 2014 New Construction Non-Domestic Buildings Technical Manual[2].

[2] http://www.breeam.com/BREEAMUK2014SchemeDocument/

# 4.0 SUSTAINABILITY PRINCIPLES SUMMARY

## 4.1 Three Dimensions of Sustainable Development

4.1.1 This section of the report describes how the design team intends to address the three dimensions of sustainable development noted in the NPPF: social, economic and environmental benefits the proposed development can provide.

4.1.2 The site currently consists of 3 buildings and a large expanse of hard landscaping, which acts as car parking. The proposed development will better utilise the space by redesigning and relocating the car showroom, workshop/garage and commercial car parking area so it is more compact and close to the entrance of the site; it will also incorporate cycle storage for the employees of the car showroom and garage. Eight residential units will then be constructed in the remaining site space, as well as soft landscaping, and resident parking and cycle storage.

4.1.3 The Kingsbury and Son Ltd. car showroom and garage is already boosting the economy of the local area by providing vehicle sales and services; by better utilising the space, the proposed development can provide improved services, and further increase the economic value of the area by creating new homes. Other local service providers will also benefit financially from the more densely populated development.

4.1.4 The influx of new customers and residents will likely also improve the social interactions in the area and can provide the potential for diversification. Creating high quality housing has been identified as a high priority societal requirement at both the local and national levels.

4.1.5 The construction stage of the proposed development has significant employment and economic potential: with any future development, there is a requirement for skilled and unskilled labour, as well as the procurement of materials for the construction of buildings and associated infrastructure.

4.1.6 The environmental role of the proposed development is acknowledged and has been addressed through the design and master-planning prepared for the site to date, for the purposes of the planning application. It is therefore imperative that the proposed development meets or exceeds high standards of sustainable design and construction, to ensure that environmental stability is maintained and will not be compromised by the development.

4.1.7 The following sections of this report demonstrate that sustainable design standards stemming from national and local policies have been integral to the proposal, and will be applied to both its construction and operation. These standards and policies have ensured that the proposed development will contribute to a reduction in carbon

emissions, improve biodiversity, use natural resources prudently, minimise waste and pollution, encourage the use of sustainable transport and mitigate and adapt to climate change, including moving to a low carbon economy.

## 4.2 Use of Land

4.2.1 The proposed development works at the Kingsbury and Son Ltd. site will better utilise the previously developed land and increase the density of the site, whilst also incorporating green space. Car parking facilities for the development will be reduced and cycle storage spaces will be incorporated, which will help to reduce the need to travel to the site by car.

## 4.3 Water Consumption, Surface Water Run-Off and Flood Risk

4.3.1 Policy DM SD 9 of the London Borough of Richmond-upon-Thames' Development Management Plan document states that developments should target a minimum of 2 BREEAM credits on water consumption (Wat 01). 3 BREEAM Wat 01 credits have been targeted for the development, equating to a 40% improvement over baseline building water consumption. This exceeds the mandatory minimum number of Wat 01 credits required to achieve Excellent.

4.3.2 A water meter will be installed for the commercial areas of the development in line with BREEAM Wat 02, as this is also a mandatory minimum requirement to achieve Excellent.

4.3.3 Rainwater harvesting will be utilised for all external water uses where possible, in order to reduce the consumption of potable water. Soft landscaping will be designed to rely solely on precipitation or manual watering, and not on an irrigation system. Greywater recycling is not deemed appropriate for the commercial space, as no shower facilities will be provided.

4.3.4 Policy DM SD 7 of LBRUT's Development Management Plan states that: *"all development proposals are requires to follow the drainage hierarchy when disposing of surface water and must utilise Sustainable Drainage Systems (SuDS) wherever practical; any discharge should be reduced to greenfield run-off rates wherever feasible. When discharging surface water to a public sewer, developers will be required to provide evidence that capacity exists in the public sewerage network to serve their development."* The proposed development incorporates soft landscaping and a green roof which will greatly reduce the surface water run off of the site, compared to the existing hardstanding impermeable surface.

4.3.5 According to the Environment Agency interactive flood map, the proposed development is located within Flood Zone 1, meaning that there is a low risk of flooding. London Borough of Richmond-upon-Thames' Development Management Plan Policy DM SD 6: Flood Risk states that for developments within Flood Zone 1, there will be no land use restrictions and no requirement for a Flood Risk Assessment (FRA), or sequential and exception tests, for sites less than 1 hectare; therefore an FRA is not required for the proposed development.

4.3.6 The completed building is anticipated to connect to the public drainage network in the main road. The contractor will be required to ensure proper connections with checks made prior to practical completion and handover.

4.3.7 Water pollution policies will be implemented during the construction phase of the proposed development works to mitigate water pollution and ensure water quality is maintained.

## 4.4 Ecology and Biodiversity

4.4.1 The proposed development will greatly improve the ecology and biodiversity of the existing site, which contains no green space or trees. The commercial area of the development will incorporate a green roof above the garage and the entire development site includes soft landscaping and trees around the car parking areas, with additional garden space for the majority of the residential units.

4.4.2 As a requirement of BREEAM, a suitably qualified ecologist will be appointed to determine the ecological value of the existing site (in line with BREEAM LE 01 and LE 03), provide specific advice on the ecological enhancement of the site (in line with BREEAM LE 04) and to determine the increase in the ecological value of the site (in line with BREEAM LE 03 and 04). A landscape and habitat management plan covering at least the first 5 years after project completion will also be produced for the site (in line with BREEAM LE 05). At least 1 BREEAM LE 03 credit will be targeted, as this is a mandatory minimum requirement to achieve Excellent.

4.4.3 All planting specified on site will rely solely on precipitation or manual watering from rainwater collection (if this is found to be feasible), to ensure that potable water use is minimised. Planting will also be hardy and drought resistant to ensure that it will acclimatise to climate change effects.

## 4.5 Transport

4.5.1 Transport has a significant impact on the social and economic characteristics of a community, as well as on the environment. In order for the UK economy to grow sustainably, communities need efficient and integrated transport systems linking employment areas, services, shops and leisure facilities.

4.5.2 The proposed development has a PTAL rating of 2 (poor), but it is located a 7-minute walk from Hampton Train Station and is in close proximity to a number of bus routes. The proposed development provides 14 No. parking spaces for the commercial space (2 No. of which are disability spaces), which is a reduction on the previous site, and it will also provide cycle storage spaces to encourage users of the car showroom and garage to travel to site using low-carbon, more sustainable methods. Car share and car club facilities will be encouraged when the proposed development is in operation, as well as the development of a Green Travel Plan. The changes to the site will not affect the provision of street-side pedestrian facilities.

4.5.3 The layout of the development has been designed to restrict vehicle speeds and incorporate homezone principles to provide shared surfaces for pedestrians, cyclists and vehicles and enables access to public transport provision. The proposed development makes efficient and maximum use of a previously developed site, achieving an appropriate density in an accessible location.

## 4.6 Materials and Waste

4.6.1 The environmental impact of materials used on site will be minimised by specifying locally supplied, sustainably-sourced, low-impact and recycled material, where feasible. It is anticipated that 100% of the timber used for the proposed development will be from FSC or PEFC sources. At least 1 BREEAM Mat 03 Responsible Sourcing of Materials credit will be targeted, as this is a mandatory minimum requirement to achieve Excellent.

4.6.2 The detailed characteristics of the materials to be specified will be determined at the detailed design stage, however the specified materials will achieve a rating of A+ to D in the BRE's Green Guide to Specification, as these have a low embodied impact on the environment. Materials will also be durable to cater for their level of use and exposure, and will not release toxins into the internal and external environment, including those that deplete stratospheric ozone. Pre-fabricated building elements will be used where feasible.

4.6.3 Construction and demolition waste will be minimised on site by utilising the principles of the 'waste hierarchy', thereby limiting the amount of resources used and waste generated. The preferred approach to specifying materials will therefore be:

i. The use of reclaimed materials;
ii. The use of materials with higher levels of recycled content; and
iii. The use of new materials

4.6.4 At the detailed design stage it is anticipated that construction materials will be responsibly sourced, taking into account the social, environmental and economic impacts of building and finishing materials from their raw state, through manufacture and production, to use and eventually their disposal. Locally produced building materials can be utilised wherever possible. All timber used within the development will be legally and responsibly harvested. Material taken from the demolition of the car park will be reused within the construction of the development where feasible.

4.6.5 We encourage the production of a Site Waste/Resource Management Plan (SW/RMP) (in line with BREEAM Wst 01) for the construction stage of the proposed development, which records construction waste, set targets, and outlines measures and procedures to divert waste from landfill.

4.6.6 The LBRUT Refuse and Recycling SPD states that "*2.6m$^2$ waste storage space should be provided for every 1000m$^2$ of gross floor space, with 50% of this capacity retained for the storage of separated waste for recycling*". At least 1 BREEAM Wst 03 credit must be targeted, as it is a mandatory minimum requirement to achieve Excellent. BREEAM states that developments with a net floor area than 5000m$^2$ should provide at least 2m$^2$ of waste storage space.

4.6.7 The commercial area of the proposed development has a floor space of 372m$^2$, therefore 2m$^2$ of waste storage space (in line with BREEAM Wst 03) will be provided to ensure that sufficient and well-designed storage for recyclable and general waste is provided. The development does not include a canteen or cafeteria, so it is not considered necessary to incorporate composting facilities into the waste strategy. The waste storage area will be located in an area which can be easily accessed internally by the occupants and externally for the removal of waste.

## 4.7 Health and Wellbeing and Pollution Minimisation

4.7.1 The health and wellbeing of the occupants of the proposed development can be ensured by designing good levels of daylighting within the proposed development. The development will optimise window height and size to enable an adequate view out of the building for staff, whilst

allowing adequate solar gains. The provision of more green space and the encouragement of walking and cycling to work will also help to improve the health and wellbeing of occupants

4.7.2 The design of the proposals has been considered with the wider environment in mind, and as such there will be minimal disruption in terms of water, noise and light pollution upon completion of the development. Best practice construction mitigation measures will be implemented during construction to reduce air and surface water pollution.

4.7.3 The commercial areas of the development do not have any positive found features that require protection, however the M&E services plant will be within an acoustically treated enclosure to reduce any potential noise impact to the residential dwellings.

4.7.4 The energy strategy for the development comprises Air Source Heat Pumps. The Air Source Heat Pumps use grid electricity, so have a global impact on air quality, however there are no local air quality issues associated with their use. The ventilation system contains no refrigerants, therefore has negligible impact on air quality.

# 5.0 ENERGY STRATEGY

5.0.1 This section of the report has been prepared to ensure that the relevant national and local energy policies are achieved by the proposed 45-49 Station Road development.

5.0.2 As the commercial area of the proposed development is less than 1000m$^2$ of non-residential space, it is not required to comply with the London Plan Policy 5.2 for a 35% reduction in carbon emissions against 2013 Building Regulations.

5.0.3 However the proposed development is required to comply with the London Borough of Richmond-upon-Thames' Core Strategy Policy CP2, which requires all new developments to achieve a reduction in carbon dioxide emissions of 20% from on-site renewable energy generation, unless it can be demonstrated that such provision is not feasible. A BREEAM Excellent rating must also be achieved, which in relation to energy requires at least 5 Ene 01 credits to be attained, based on the BRUKL outputs of the proposed development.

5.0.4 The proposed development has met both of these requirements, achieving a carbon reduction due to renewables of 21.15% and 6 Ene 01 credits.

5.0.5 The energy strategy for the proposed development has been prepared by following the energy hierarchy: minimise energy demand (Be Lean), supply energy efficiently (Be Clean), and encourage the use of renewables (Be Green); this means assessing the energy efficiency measures of the proposed development and the low carbon options for supplying energy, before examining the potential for renewable energy technologies to reduce carbon emissions.

5.0.6 Measures incorporated in the proposed development include the combination of high levels of fabric performance and insulation to achieve low U-values, optimising solar gains and natural daylight, low air permeability, efficient use of shading, the use of an Air Source Heat Pump to provide heating and cooling, and the use of PV panels for renewable electricity.

5.0.7 All energy and carbon figures have been calculated using approved Simplified Building Energy Model (SBEM) software to demonstrate compliance with Approved Document Part L2A.

5.0.8 Further detailed results, and BRUKL reports can be found in Appendix A.

## 5.1 Site Energy and Notional Baseline

5.1.1 Metropolis Green has assessed the energy demands of the commercial areas of the proposed 45-49 Station Road development against current 2013 Building Regulations.

5.1.2 The energy hierarchy promotes a 'regulated' energy approach to calculating the energy demand and carbon baseline of the development. The baseline therefore includes the energy consumed in the operation of the space heating/cooling, hot water systems, ventilation and all internal lighting.

5.1.3 Reported separately are the carbon savings from all electrical appliances and other occupant small power demands, which are not covered by Building Regulations, this is called 'unregulated' energy.

5.1.4 Table 1 provides a summary of the Notional Baseline results for the proposed development, against regulated and unregulated carbon emissions.

**Table 1 Notional Baseline**

| Notional Baseline | Total |
|---|---|
| Un-Regulated Carbon Emissions (t/CO2/yr) | 4.26 |
| Regulated Carbon Emissions (t/CO2/yr) | 14.02 |

## 5.2 Energy Efficiency Measures

5.2.1 Metropolis Green have worked with the project architects, Clive Chapman Architects, to determine the most efficient and feasible way to reduce the carbon emissions through passive and active design measures.

5.2.2 Improving the fabric and services efficiency is the most effective way of reducing carbon emissions as these measures will last the lifetime of the building. Reducing the $CO_2$ emissions in turn reduces the amount of low carbon and renewable energy technologies required to comply with regulations and policies, as well as lowering costs.

5.2.3 The thermal performance of the building fabric proposed is significantly better than the limiting parameters of Building Regulations Part L, improving overall fabric efficiency and reducing carbon emissions for the lifetime of the development. Table 2 details the fabric performance of car workshop and garage.

**Table 2 Building fabric performance**

| Specification | Notional baseline | Efficient Baseline |
|---|---|---|
| **External Wall U-value** | 0.26 | 0.16 |
| **Internal no heat loss wall U-Value** | 1.78 | 0 |
| **Internal heat loss wall U-Value** | 0.16 | 0.16 |
| **Ground Floor/Exposed Floor U-Value** | 0.22 | 0.13 |
| **Roof U-value** | 0.18 | 0.13 |
| **Windows U-values** | 1.4 | |

5.2.4 Passive and active design measures such as fabric performance and air tightness will be utilised in the proposed development to prevent overheating and subsequent carbon emissions. Tables 3 and 4 outline the design measures which will be utilised by the proposed development.

**Table 3 Passive Design measures**

| Passive Design Measures | Specific Project Measures |
|---|---|
| Description on types of glazing/windows | Double glazing windows. Windows full height, which also suit the showroom use of the building.<br>Glazing g-value of 0.4. |
| Optimise natural daylight | Internal spaces receive natural daylight through windows;<br>Ceiling heights are optimum height according to building use. |
| Optimise solar gain | Solar gains are maximised during winter months through optimal percentage of glazing at the south elevation. |
| Limit overshadowing | The development will benefit from a high percentage of glazing optimising natural daylight and beneficial solar gains. |
| Optimise insulation | Insulation will be designed to achieve the specified U-values. |
| Minimise cold bridging | Accredited construction details. |
| Optimise air tightness | Air Permeability of 5 m3/(h.m2) at 50 Pa has been specified. |
| Use light coloured materials | Interior spaces will be light colours. |
| Internal or external shading elements | The canopy located above the double height windows on the south elevation will prevent glare and prevent excessive solar gains. |

**Table 4 Active design measures**

| Active Design Measures | Specific Project Measures |
|---|---|
| Air Permeability | 5 m3/(h.m2) at 50 Pa |
| Domestic Hot Water System | By Electric Point Of Use |
| Space Heating System | By ASHP with SCoP of 4.5 or higher |
| Space Cooling System | By ASHP with SEER of 4.5 or higher |
| Ventilation System | Natural with intermittent mechanical extracts for the toilet areas;<br>Optional – by the main HVAC system (Heat pump) |
| Lighting (office) | Luminaire efficacy 90 lm/W, metering with 'out of range' alarm, photoelectric dimming |

5.2.5 As a result of the above energy efficiency measures and improvements, the first stage of the energy hierarchy, to be lean and use energy efficiently, is complete. The new baseline has been calculated and is referred to as the Efficient Baseline. Energy efficiency measures relating to BREEAM include the use of energy display devices (in line with BREEAM Ene 02 requirements), energy efficient lighting (in line with Ene 03 requirements), and the passive design measures mentioned in table 3 above (in line with Ene 03 requirements).

5.2.6 Table 5 shows that an improvement of 8.20% can be made through the energy efficiency measures, lowering the total regulated carbon emissions by 3.1t/$CO_2$/yr from the Notional Baseline.

**Table 5 Efficient Baseline**

| Efficient Baseline | Total |
|---|---|
| Un-Regulated Carbon Emissions (t/CO2/yr) | 4.26 |
| Regulated Carbon Emissions (t/CO2/yr) | 12.87 |

## 5.3 Overheating and Cooling

5.3.1 Through the application of energy efficient design, the design team have worked to ensure that the risk of summer overheating is minimised in line with the 'cooling hierarchy'.

5.3.2 Good natural daylighting within the proposed development will create significant benefits in terms of reduced electrical use for lighting, and maximise solar gains in the winter months to reduce space heating consumption and create a healthier, more pleasant environment.

5.3.3 A combination of high levels of fabric performance and insulation has been implemented, resulting in low U-values.

5.3.4 A green roof has also been specified for the roof of the garage to encourage biodiversity and contribute to natural cooling by reducing the surface temperature of the building, and surrounding air temperature through evaporation and transpiration.

5.3.5 Initial analysis using SBEM software shows that the solar gain limits in Summer have not been exceeded for the commercial spaces, therefore satisfying Criterion 3 requirements of Building Regulations Part L.

5.3.6 To meet space heating and cooling requirements for the car showroom space, an Air Source Heat Pump (ASHP), with SEER and SCoP of 4.5 has been specified.

## 5.4 Communal Heating and Combined Heat and Power (CHP)

5.4.1 The energy hierarchy and the London Borough of Richmond-upon-Thames' Core Strategy Policy CP2 requires the evaluation, development and use of decentralised energy in appropriate developments; using the London Plan as a guide, these are selected in accordance with the following hierarchy:

1. Connection to existing or planned area wide, low carbon heat distribution networks;
2. Site wide heat networks;
3. Combined Heat and Power (CHP).

5.4.2 Due to the small size of the commercial space and the low heat demand, a CHP would not be appropriate for the proposed development.

## 5.5 Renewable Energy

5.5.1 The third stage of the energy hierarchy refers to the production of renewable energy, which relates to London Plan Policy 5.7.

5.5.2 Each of the approved renewable energy technologies have been appraised, examining the suitability to the site and potential for delivering $CO_2$ reductions.

5.5.3 London Plan's approved renewable energy technologies include:

- Photovoltaics
- Solar Water Systems

- Biomass Heating
- Air and Ground Sourced Heating/Cooling
- Wind

5.5.4 The choice of technology will be dependent upon a range of factors including: orientation, height, window size, surrounding buildings and environment, site size and layout, geology, conservation and biodiversity.

5.5.5 Site analysis and calculations have determined that high efficiency ASHPs providing both heating and cooling, to be the most suitable renewable energy technology for the development. The following section sets out the strategy for implementing the ASHP and the carbon reductions predicted for the solution.

**Air Source Heat Pump**

5.5.6 An ASHP is a system which transfers heat from outside to inside a building, or vice versa. Under the principles of vapour compression refrigeration, an ASHP uses a refrigerant system involving a compressor and a condenser to absorb heat at one place and release it at another.

5.5.7 Heat produced in this way can be used to heat radiators, underfloor heating systems, or warm air convectors and hot water in buildings. A single system can be designed to transfer heat in either direction, to heat or cool the interior of the building in winter and summer respectively.

5.5.8 Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, air, or water is constantly being renewed naturally. In addition, they produce more units of energy than the electricity they consume which is defined as the Seasonal Coefficient of Performance (SCoP) and therefore deliver higher carbon savings than traditional heating technologies.

5.5.9 The installed ASHP is required to comply with the minimum performance standards as set out in the Enhanced Capital Allowances[3] (ECA). Selection of particular ASHP product. In addition, the final selected ASHP will comply with all other relevant issues as outlined in the Microgeneration Certification Scheme Heat Pump Product Certification Requirements[4].

5.5.10 The ASHPs will be used to provide space heating and cooling for the proposed commercial space. The ASHP selected for this analysis is a

[3] http://etl.decc.gov.uk
[4] http://www.microgenerationcertification.org

highly efficient heat pump with a Seasonal Coefficient of Performance (SCoP) and SEER of minimum 4.5.

**Photovoltaics**

5.5.11 Photovoltaic systems convert solar energy from both direct light and diffuse light, into electricity through semiconductor cells. PV systems require an inverter to convert the low voltage, direct current (DC) electricity produced by the array of panels into 230V 50/60Hz alternating current (AC).

5.5.12 Through investigation it has been found that there is sufficient roof space for 21 No. PV panels. This area is calculated to ensure that there is sufficient space for access to the panels required for maintenance, and to avoid any potential shading from surrounding obstructions such as lift overruns and neighbouring buildings or other taller structures.

5.5.13 For the purposes of the analysis, the Sunpower E20/333 model has been used, however there are a number of products available which may be selected and as such the PV array is subject to change. It is therefore the overall output of the system that is important, which is the kilowatt peak (kWp) of the system; the proposed panel array will provide a total system size of 6.99kWp.

5.5.14 The PV panels have been positioned for optimal performance in terms of exposure to light, orientation, and angle and to reduce their visual impact. The panels are therefore be south facing at angle of 30°. At less than 10°, the modules will not self-clean, invalidating their warranty. An indicative layout of the PV array is illustrated in Figure 5 below.

5.5.15 Table 6 shows that a carbon reduction of 21.15% (7.3t/$CO_2$/yr) over the Efficient Baseline can be achieved by introducing the high efficiency ASHP and 21 No. PV panels.

**Table 6 Renewable Baseline**

| Renewable Baseline | Total |
|---|---|
| Un-Regulated Carbon Emissions (t/CO2/yr) | 4.26 |
| Regulated Carbon Emissions (t/CO2/yr) | 10.14 |

## 5.6 Energy Strategy Summary

5.6.1 As highlighted in Section 5.0 of this report, the proposed development can achieve a 21.15% carbon reduction from renewable energy technologies. In addition, the strategy also achieves a 27.35% improvement over 2013 Building Regulations.

5.6.2 London Borough of Richmond Policy CP1 requires a BREEAM Excellent rating to be achieved, which in relation to energy requires at least 5 Ene 01 credits to be attained. The BRUKL documents generated for the energy strategy for the proposed development have been inputted in the BREEAM Pre-Assessment scoring and reporting tool, and the results show that 6 Ene 01 credits have been achieved; the development therefore meets the Ene 01 mandatory minimum requirements to reach Excellent.

**Table 7: Regulated Carbon Emissions Reduction.**

| | | |
|---|---|---|
| **Notional Baseline** | **Un-Regulated Carbon Emissions (tCO2/yr)** | 4.26 |
| | **Regulated Carbon Emissions (tCO2/yr)** | 14.02 |
| **Efficient Baseline** | **Regulated Carbon Emissions (tCO2/yr)** | 12.87 |
| | **% Improvement over Notional Baseline** | 8.20% |
| **Renewable Baseline** | **Regulated Carbon Emissions (tCO2/yr)** | 10.14 |
| | **% Improvement over Efficienct Baseline** | 21.15% |
| **Total Regulated Carbon Emission Improvement (over 2013 BRs)** | | 27.65% |
| **BREEAM Ene 01 Credits Achieved (calculated from BRUKL results)** | | 6 credits (Excellent) |

# 6.0 CONCLUSIONS

6.0.1 This Sustainability and Energy Statement demonstrates that the proposed development of the car showroom and workshop at 45-49 Station Road meets the sustainability standards and policies set out in the London Borough of Richmond-upon-Thames' Core Strategy, Development Management Document and Supplementary Planning Documents.

6.0.2 The sustainability strategy focuses on the implementation of sustainable systems for energy, water, waste management, pollution, and construction management; sustainable transport methods, occupant health and wellbeing and ecology have also been considered. Much attention has been given to reducing the environmental impact throughout the lifetime of the building, during construction, refurbishment and occupation of the building.

6.0.3 In conclusion, the design team has considered the site's potential environmental impacts and this report details how those impacts will be managed and mitigated. The approach to designing and constructing a sustainable development will result in a building that complies with the London Borough of Richmond-upon-Thames' policies on sustainability and exceeds the requirements for energy.

## APPENDIX A: BRUKL DOCUMENTS

### Energy Efficient Baseline BRUKL Document

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

**Car showroom** As designed

**Date:** Mon Oct 26 17:35:25 2015

## Administrative information

**Building Details**

**Address:** 45-49 Station road, Hampton, City, TW12 2BU

**Certification tool**

**Calculation engine:** SBEM

**Calculation engine version:** v5.2.d.2

**Interface to calculation engine:** Virtual Environment

**Interface to calculation engine version:** v7.0.2

**BRUKL compliance check version:** v5.2.d.2

**Owner Details**

**Name:** Name

**Telephone number:** Phone

**Address:** Street Address, City, Postcode

**Certifier details**

**Name:** Name

**Telephone number:** Phone

**Address:** Street Address, City, Postcode

## Criterion 1: The calculated $CO_2$ emission rate for the building should not exceed the target

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 37.6 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 37.6 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 34.5 |
| Are emissions from the building less than or equal to the target? | BER =< TER |
| Are as built details the same as used in the BER calculations? | Separate submission |

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

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

**Building fabric**

| Element | $U_{a\text{-Limit}}$ | $U_{a\text{-Calc}}$ | $U_{i\text{-Calc}}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 0.16 | 0.16 | RM000000_W1_-1 |
| Floor | 0.25 | 0.13 | 0.13 | RM000000_F_-1 |
| Roof | 0.25 | 0.13 | 0.13 | RM000000_C_-1 |
| Windows***, roof windows, and rooflights | 2.2 | 1.4 | 1.4 | RM000000_W1-W0 |
| Personnel doors | 2.2 | - | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | - | "No external vehicle access doors" |
| High usage entrance doors | 3.5 | - | - | "No external high usage entrance doors" |

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)]

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

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

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

Page 1 of 6

**Building services**

The standard values listed below are minimum values for efficiencies and maximum values for SFPs.
Refer to the Non-Domestic Building Services Compliance Guide for details.

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | YES |
| **Whole building electric power factor achieved by power factor correction** | >0.95 |

1- Tolet extracts

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.5 | - | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- Heating and cooling

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.5 | 4.5 | - | - | - |
| **Standard value** | 2.5* | 2.6 | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0002-DHW

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 1 | - |
| **Standard value** | 1 | N/A |

**Local mechanical ventilation, exhaust, and terminal units**

| ID | System type in Non-domestic Building Services Compliance Guide |
|---|---|
| A | Local supply or extract ventilation units serving a single area |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery |
| E | Local supply and extract ventilation system serving a single area with heating and heat recovery |
| F | Other local ventilation units |
| G | Fan-assisted terminal VAV unit |
| H | Fan coil units |
| I | Zonal extract system where the fan is remote from the zone with grease filter |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ID of system type** | A | B | C | D | E | F | G | H | I | | |
| **Standard value** | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | **Zone** | **Standard** |
| Toilets | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| Toilets | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| Showroom and garage | - | - | - | - | - | - | - | - | - | - | N/A |
| Staff kitchen | - | - | - | - | - | - | - | - | - | - | N/A |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| Toilets | - | 90 | - | 45 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| Zone name | Luminaire | Lamp | Display lamp | General lighting [W] |
| Standard value | 60 | 60 | 22 | |
| Toilets | - | 90 | - | 77 |
| Showroom and garage | - | 90 | 22 | 3369 |
| Staff kitchen | - | 90 | - | 112 |

## Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| Showroom and garage | NO (-51.7%) | NO |

## Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

## Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

## EPBD (Recast): Consideration of alternative energy systems

| | |
|---|---|
| Were alternative energy systems considered and analysed as part of the design process? | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Area [m²] | 373.1 | 373.1 |
| External area [m²] | 847.6 | 847.6 |
| Weather | LON | LON |
| Infiltration [m³/hm²@ 50Pa] | 5 | 7 |
| Average conductance [W/K] | 204.46 | 265.68 |
| Average U-value [W/m²K] | 0.24 | 0.31 |
| Alpha value* [%] | 22.87 | 49.19 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| 100 | **A1/A2 Retail/Financial and Professional services** |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| | B1 Offices and Workshop businesses |
| | B2 to B7 General Industrial and Special Industrial Groups |
| | B8 Storage or Distribution |
| | C1 Hotels |
| | C2 Residential Inst.: Hospitals and Care Homes |
| | C2 Residential Inst.: Residential schools |
| | C2 Residential Inst.: Universities and colleges |
| | C2A Secure Residential Inst. |
| | Residential spaces |
| | D1 Non-residential Inst.: Community/Day Centre |
| | D1 Non-residential Inst.: Libraries, Museums, and Galleries |
| | D1 Non-residential Inst.: Education |
| | D1 Non-residential Inst.: Primary Health Care Building |
| | D1 Non-residential Inst.: Crown and County Courts |
| | D2 General Assembly and Leisure, Night Clubs and Theatres |
| | Others: Passenger terminals |
| | Others: Emergency services |
| | Others: Miscellaneous 24hr activities |
| | Others: Car Parks 24 hrs |
| | Others - Stand alone utility block |

## Energy Consumption by End Use [kWh/m²]

| | Actual | Notional |
|---|---|---|
| Heating | 13.87 | 12.43 |
| Cooling | 16.32 | 12.93 |
| Auxiliary | 0.64 | 1.02 |
| Lighting | 35.6 | 46.67 |
| Hot water | 1.68 | 1.94 |
| Equipment* | 22.04 | 22.04 |
| TOTAL** | **68.11** | **74.99** |

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [kWh/m²]

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

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [MJ/m²] | 436.93 | 286.1 |
| Primary energy* [kWh/m²] | 203.87 | 220.78 |
| Total emissions [kg/m²] | 34.5 | 37.6 |

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

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| [ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 302 | 75.8 | 26.9 | 0 | 9.7 | 3.12 | 0 | 3.5 | 0 |
| | Notional | 208.8 | 149.2 | 23.9 | 0 | 15.5 | 2.43 | 0 | ---- | ---- |
| [ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 195.5 | 245.5 | 13 | 17.5 | 0 | 4.19 | 3.91 | 4.5 | 5.5 |
| | Notional | 101.7 | 179.4 | 11.6 | 13.8 | 0 | 2.43 | 3.6 | ---- | ---- |

### Key to terms

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

## Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

**Building fabric**

| Element | $U_{i\text{-}Typ}$ | $U_{i\text{-}Min}$ | Surface where the minimum value occurs* |
|---|---|---|---|
| Wall | 0.23 | 0.16 | RM000000_W1_-1 |
| Floor | 0.2 | 0.13 | RM000000_F_-1 |
| Roof | 0.15 | 0.13 | RM000000_C_-1 |
| Windows, roof windows, and rooflights | 1.5 | 1.4 | RM000000_W1-W0 |
| Personnel doors | 1.5 | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | "No external vehicle access doors" |
| High usage entrance doors | 1.5 | - | "No external high usage entrance doors" |

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

| Air Permeability | Typical value | This building |
|---|---|---|
| m³/(h.m²) at 50 Pa | 5 | 5 |

## Renewable Energy Baseline BRUKL Document

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## Car showroom

As designed

**Date:** Wed Oct 28 15:24:44 2015

### Administrative information

**Building Details**

**Address:** 45-49 Station road, Hampton, City, TW12 2BU

**Certification tool**

**Calculation engine:** SBEM

**Calculation engine version:** v5.2.d.2

**Interface to calculation engine:** Virtual Environment

**Interface to calculation engine version:** v7.0.2

**BRUKL compliance check version:** v5.2.d.2

**Owner Details**

**Name:** Name

**Telephone number:** Phone

**Address:** Street Address, City, Postcode

**Certifier details**

**Name:** Name

**Telephone number:** Phone

**Address:** Street Address, City, Postcode

### Criterion 1: The calculated $CO_2$ emission rate for the building should not exceed the target

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 37.6 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 37.6 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 27.2 |
| Are emissions from the building less than or equal to the target? | BER =< TER |
| Are as built details the same as used in the BER calculations? | Separate submission |

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

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

**Building fabric**

| Element | $U_{a\text{-Limit}}$ | $U_{a\text{-Calc}}$ | $U_{i\text{-Calc}}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 0.16 | 0.16 | RM000000_W1_-1 |
| Floor | 0.25 | 0.13 | 0.13 | RM000000_F_-1 |
| Roof | 0.25 | 0.13 | 0.13 | RM000000_C_-1 |
| Windows***, roof windows, and rooflights | 2.2 | 1.4 | 1.4 | RM000000_W1-W0 |
| Personnel doors | 2.2 | - | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | - | "No external vehicle access doors" |
| High usage entrance doors | 3.5 | - | - | "No external high usage entrance doors" |

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

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

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

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

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

**Building services**

The standard values listed below are minimum values for efficiencies and maximum values for SFPs.
Refer to the Non-Domestic Building Services Compliance Guide for details.

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | YES |
| **Whole building electric power factor achieved by power factor correction** | >0.95 |

1- Tolet extracts

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.5 | - | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- Heating and cooling

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.5 | 4.5 | - | - | - |
| **Standard value** | 2.5* | 2.6 | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0002-DHW

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 1 | - |
| **Standard value** | 1 | N/A |

**Local mechanical ventilation, exhaust, and terminal units**

| ID | System type in Non-domestic Building Services Compliance Guide |
|---|---|
| A | Local supply or extract ventilation units serving a single area |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery |
| E | Local supply and extract ventilation system serving a single area with heating and heat recovery |
| F | Other local ventilation units |
| G | Fan-assisted terminal VAV unit |
| H | Fan coil units |
| I | Zonal extract system where the fan is remote from the zone with grease filter |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | Zone | Standard |
| Toilets | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| Toilets | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| Showroom and garage | - | - | - | - | - | - | - | - | - | - | N/A |
| Staff kitchen | - | - | - | - | - | - | - | - | - | - | N/A |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| Zone name | Luminaire | Lamp | Display lamp | General lighting [W] |
| Standard value | 60 | 60 | 22 | |
| Toilets | - | 90 | - | 45 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| Zone name | Luminaire | Lamp | Display lamp | General lighting [W] |
| Standard value | 60 | 60 | 22 | |
| Toilets | - | 90 | - | 77 |
| Showroom and garage | - | 90 | 22 | 3369 |
| Staff kitchen | - | 90 | - | 112 |

## Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| Showroom and garage | NO (-51.7%) | NO |

## Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

## Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

## EPBD (Recast): Consideration of alternative energy systems

| | |
|---|---|
| Were alternative energy systems considered and analysed as part of the design process? | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Area [m²] | 373.1 | 373.1 |
| External area [m²] | 847.6 | 847.6 |
| Weather | LON | LON |
| Infiltration [m³/hm²@ 50Pa] | 5 | 7 |
| Average conductance [W/K] | 204.46 | 265.68 |
| Average U-value [W/m²K] | 0.24 | 0.31 |
| Alpha value* [%] | 22.87 | 49.19 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| 100 | **A1/A2 Retail/Financial and Professional services** |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| | B1 Offices and Workshop businesses |
| | B2 to B7 General Industrial and Special Industrial Groups |
| | B8 Storage or Distribution |
| | C1 Hotels |
| | C2 Residential Inst.: Hospitals and Care Homes |
| | C2 Residential Inst.: Residential schools |
| | C2 Residential Inst.: Universities and colleges |
| | C2A Secure Residential Inst. |
| | Residential spaces |
| | D1 Non-residential Inst.: Community/Day Centre |
| | D1 Non-residential Inst.: Libraries, Museums, and Galleries |
| | D1 Non-residential Inst.: Education |
| | D1 Non-residential Inst.: Primary Health Care Building |
| | D1 Non-residential Inst.: Crown and County Courts |
| | D2 General Assembly and Leisure, Night Clubs and Theatres |
| | Others: Passenger terminals |
| | Others: Emergency services |
| | Others: Miscellaneous 24hr activities |
| | Others: Car Parks 24 hrs |
| | Others - Stand alone utility block |

## Energy Consumption by End Use [kWh/m²]

| | Actual | Notional |
|---|---|---|
| Heating | 13.48 | 12.43 |
| Cooling | 16.32 | 12.93 |
| Auxiliary | 0.64 | 1.02 |
| Lighting | 35.6 | 46.67 |
| Hot water | 1.68 | 1.94 |
| Equipment* | 22.04 | 22.04 |
| TOTAL** | 67.72 | 74.99 |

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [kWh/m²]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 13.54 | 0 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [MJ/m²] | 436.93 | 286.1 |
| Primary energy* [kWh/m²] | 202.69 | 220.78 |
| Total emissions [kg/m²] | 27.2 | 37.6 |

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

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| [ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 302 | 75.8 | 20.9 | 0 | 9.7 | 4.01 | 0 | 4.5 | 0 |
| | Notional | 208.8 | 149.2 | 23.9 | 0 | 15.5 | 2.43 | 0 | ---- | ---- |
| [ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 195.5 | 245.5 | 13 | 17.5 | 0 | 4.19 | 3.91 | 4.5 | 5.5 |
| | Notional | 101.7 | 179.4 | 11.6 | 13.8 | 0 | 2.43 | 3.6 | ---- | ---- |

### Key to terms

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

## Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

**Building fabric**

| Element | $U_{i\text{-}Typ}$ | $U_{i\text{-}Min}$ | Surface where the minimum value occurs* |
|---|---|---|---|
| Wall | 0.23 | 0.16 | RM000000_W1_-1 |
| Floor | 0.2 | 0.13 | RM000000_F_-1 |
| Roof | 0.15 | 0.13 | RM000000_C_-1 |
| Windows, roof windows, and rooflights | 1.5 | 1.4 | RM000000_W1-W0 |
| Personnel doors | 1.5 | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | "No external vehicle access doors" |
| High usage entrance doors | 1.5 | - | "No external high usage entrance doors" |

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

| Air Permeability | Typical value | This building |
|---|---|---|
| m³/(h.m²) at 50 Pa | 5 | 5 |

## APPENDIX B: BREEAM NC 2014

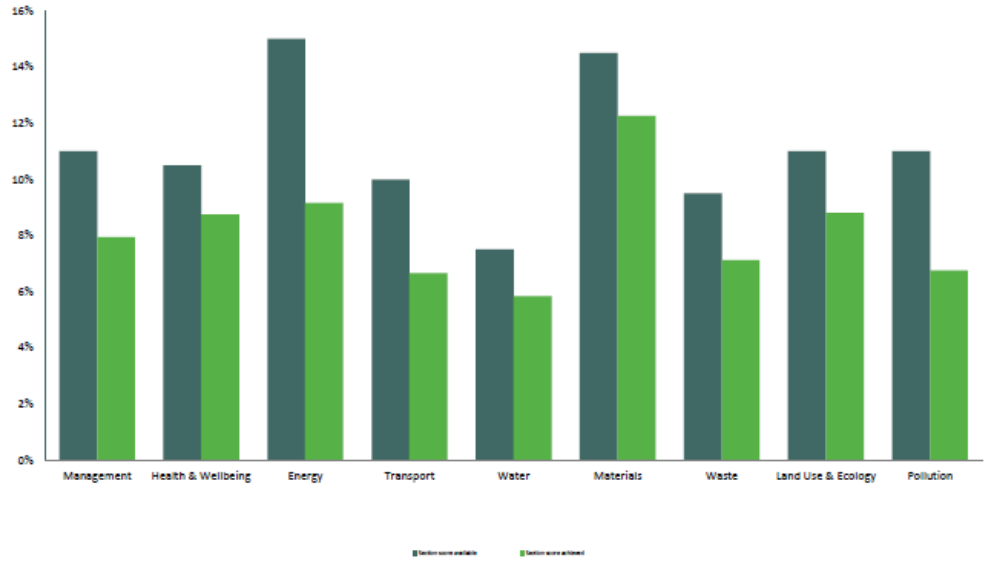
BREEAM®

**BREEAM UK New Construction 2014 Pre-Assessment Estimator: Indicative Rating & Building Performance** BREEAM® UK

### Overall Building Performance

| | |
|---|---|
| Building name | 49 Station Road (Car Showroom and Workshop) |
| Indicative BREEAM rating | Excellent |
| Indicative Total Score | 74.2% |
| Min. standards level achieved | Excellent level |

### Building Performance by Environment Section




| Environmental Section | No. credits available | Indicative no. credits Achieved | % credits achieved | Section Weighting | Indicative Section Score |
|---|---|---|---|---|---|
| Management | 18 | 13 | 72.22% | 11.00% | 7.94% |
| Health & Wellbeing | 12 | 10 | 83.33% | 10.50% | 8.75% |
| Energy | 18 | 11 | 61.11% | 15.00% | 9.16% |
| Transport | 9 | 6 | 66.67% | 10.00% | 6.67% |
| Water | 9 | 7 | 77.78% | 7.50% | 5.83% |
| Materials | 13 | 11 | 84.62% | 14.50% | 12.26% |
| Waste | 8 | 6 | 75.00% | 9.50% | 7.12% |
| Land Use & Ecology | 10 | 8 | 80.00% | 11.00% | 8.80% |
| Pollution | 13 | 8 | 61.54% | 11.00% | 6.76% |
| Innovation | 10 | 1 | 10.00% | N/A | 1 |

# BREEAM UK New Construction 2014 Pre-Assessment Estimator: Assessment Issue Scoring

| | |
|---|---|
| Building name | 49 Station Road (Car Showroom and Workshop) |
| Building score (%) | 74.20% |
| Building rating | Excellent |
| Minimum standards level achieved | Excellent level |

## MANAGEMENT

### Man 01 Project brief and design

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 4 | Available contribution to overall score | 2.44% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will stakeholder consultation (project delivery) take place? | Yes | 1 | 1 |
| Will stakeholder consultation (third party) take place? | No | 1 | 0 |
| Will a sustainability champion (design) be assigned? | Yes | 1 | 1 |
| Will a sustainability champion (monitoring progress) be assigned? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 1.83% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | N/A |

Comments/notes:

Roles and responsiblities of the design team will be established at the outset of the project.

### Man 02 Life cycle cost and service life planning

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 4 | Available contribution to overall score | 2.44% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will an elemental life cycle cost (LCC)analyses be carried out? | No | 2 | 0 |
| Will a component level LCC plan be developed? | No | 1 | 0 |
| Will the predicted capital cost be reported? | Yes | 1 | 1 |
| Expected capital cost of the project (if available) | | £/m$^2$ | |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.61% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

The project team will report on the capital cost of the project.

## Man 03 Responsible construction practices

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 6 | Available contribution to overall score | 3.67% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | Yes |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Is all site timber used in the project 'legally harvested and traded timber'? | Yes | | |
| Will/does the principal contractor operate a compliant Environmental Management System? | Yes | 1 | 1 |
| Will a construction stage sustainability champion be assigned? | Yes | 1 | 1 |
| Will a considerate construction scheme be used by the principal contractor? (One credit where 'compliance' has been achieved. Two credits where 'compliance' is significantly exceeded.) | 2 | 2 | 2 |
| Will construction site impacts be metered/monitored? | Yes | | |
| Will site utility consumption be metered/monitored? | Yes | 1 | 1 |
| Will transport of construction materials and waste be metered/monitored? | Yes | 1 | 1 |
| Will exemplary level criteria be met? | No | 1 | 0 |

Key Performance Indicators: Construction site energy use

| | | |
|---|---|---|
| Energy consumption (total) - site processes | | Information not available at design stage |
| Energy consumption (intensity) - site processes | | Information not available at design stage |
| Distance (total) - materials transport to site | | Information not available at design stage |
| Distance (total) -waste transport from site | | Information not available at design stage |
| Energy consumption (total) - materials transport to site | | Information not available at design stage |
| Energy consumption (total) - waste transport from site | | Information not available at design stage |
| Energy consumption (intensity) - materials transport to site | | Information not available at design stage |
| Energy consumption (intensity) - waste transport from site | | Information not available at design stage |

Key Performance Indicators: Construction site greenhouse gas emissions

| | | |
|---|---|---|
| Process greenhouse gas emissions (total) - site processes | | Information not available at design stage |
| Greenhouse gas emissions (intensity) - site processes | | Information not available at design stage |
| Greenhouse gas emissions (total) - materials transport to site | | Information not available at design stage |
| Greenhouse gas emissions (total) - waste transport from site | | Information not available at design stage |
| Greenhouse gas emissions (intensity) - materials transport to site | | Information not available at design stage |
| Greenhouse gas emissions (intensity) - waste transport from site | | Information not available at design stage |

Key Performance Indicators: Construction site use of freshwater resources

| | | |
|---|---|---|
| Use of freshwater resource (total) - site processes | | Information not available at design stage |
| Use of freshwater resource (intensity) - site processes | | Information not available at design stage |

| | |
|---|---|
| Total BREEAM credits achieved | 6 |
| Total contribution to overall building score | 3.67% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

Consideration will be given to the above when selecting the principal contractor, and the above requirements will be written in to the contract documents.

## Man 04 Commisioning and handover

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 4 | Available contribution to overall score | 2.44% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | Yes |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will commissioning schedule and responsibilities be developed & accounted for? | Yes | 1 | 1 |
| Will a commissioning manager be appointed? | Yes | 1 | 1 |
| Will the building fabric be commissioned? | No | 1 | 0 |
| Will a building user guide be developed prior to handover? | Yes | 1 | 1 |
| Will a training schedule be prepared for building occupiers/managers? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 1.83% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

It is anticipated that commissioning will be undertaken for the installed services and a building user guide handed to the building occupants at handover.

## Man 05 Aftercare

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will aftercare support be provided to building occupiers? | | | |
| Will seasonal commissioning occur over 12months once substantially occupied? | | | |
| Will a post occupancy evaluation be carried out 1 year after occupation? | | | |
| Will exemplary level criteria be met? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |

| | |
|---|---|
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | N/A |

Comments/notes:

## HEALTH & WELLBEING

### Hea 01 Visual Comfort

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 5 | Available contribution to overall score | 4.38% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will the design provide adequate glare control for building users? | Yes | 1 | 1 |
| How many credits will be targeted for the daylighting criteria? | 2 | 2 | 2 |
| Will the design provide adequate view out for building users? | Yes | 1 | 1 |
| Will internal/external lighting levels, zoning and controls be specified in accordance with the relevant CIBSE Guides/British Standards? | Yes | 1 | 1 |
| Will exemplary level criteria be met? | No | 1 | 0 |

| | |
|---|---|
| Total BREEAM credits achieved | 5 |
| Total contribution to overall building score | 4.38% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | N/A |

Comments/notes:

The car garage/showroom will be fitted with external shading (in the form of a canopy) to design out solar glare. Due to the floor to ceiling windows, the car garage is likely to achieve good daylighting levels, a daylighting analysis will need to be undertaken at the detailed design stage. All relevant areas are anticipated to have an adequate view out, and lighting will be specified in line with the relevant CIBSE guidance.

### Hea 02 Indoor Air Quality

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 1.75% |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will an air quality plan be produced and building designed to minimise air pollution? | | | |
| Will building be designed to minimise the concentration and recirculation of pollutants in the building? | No | 1 | 0 |

| | | | |
|---|---|---|---|
| Will the relevant products be specified to meet the VOC testing and emission levels required? | | | |
| Will formaldehyde and total VOC levels be measured post construction? | | | |
| Will the building be designed to, or have the potential to provide, natural ventilation? | No | 1 | 0 |
| Will exemplary level VOCs (products)criteria be met? | | | |

Key Performance Indicators: Indoor air quality

| | | |
|---|---|---|
| Concentration levels of formaldehyde | | Information not available at design stage |
| Total volatile organic compound (TVOC) concentration | | Information not available at design stage |

| | |
|---|---|
| Total BREEAM credits achieved | 0 |
| Total contribution to overall building score | 0.00% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | N/A |

Comments/notes:

Due to the nature of the development, it is unclear whether adequate separation will be achieved, and natural ventilation may not be possible, therefore these credits have been excluded at this stage. Further investigation at the detailed design stage may allow these credits to be awarded.

## Hea 03 Safe containment in laboratories

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will an objective risk assessment of proposed laboratory facilities' design be completed? | | | |
| Will the manufacture & installation of fume cupboards and containment devices meet best practice standards? | | | |
| Will containment level 2 & 3 labs meet best practice safety & performance criteria? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Hea 04 Thermal comfort

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 1.75% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will thermal modelling of the design be carried out? | Yes | 1 | 1 |
| Will the building design be adapted for a projected climate change scenario? | Yes | 1 | 1 |

Key Performance Indicators: Thermal comfort

| | |
|---|---|
| Predicted Mean Vote (PMV) | INA |
| Predicted Percentage Dissatisfied (PPD) | INA |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 1.75% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

Thermal modelling will be undertaken to ensure a comfortable internal environment is created.

## Hea 05 Acoustic Performance

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 0.88% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Credits | Credits available | Credits achieved |
|---|---|---|---|
| Will the building meet the appropriate acoustic performance standards and testing requirements for:<br>a. Sound insulation<br>b. Indoor ambient noise level<br>c. Reverberation times? | 1 | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.88% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Hea 06 Safety and Security

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 1.75% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Where external site areas are present, will safe access be designed for pedestrians and cyclists? | Yes | 1 | 1 |
| Will a suitably qualified security consultant be appointed and security considerations accounted for? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 1.75% |
| Total BREEAM innovation credits achieved | N/A |

| Minimum standard(s) level | N/A |
|---|---|

Comments/notes:

The site will be designed to provide safe pedestrian and cycle routes, and will be assessed from a security perspective.

# ENERGY

## Ene 01 Reduction of energy use and carbon emissions

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 12 | Available contribution to overall score | 10.00% |
| No. of BREEAM innovation credits available | 5 | Minimum standards applicable | Yes |

| | |
|---|---|
| How do you wish to assess the number of BREEAM credits achieved for this issue? | Enter building performance data into the Ene01 calculator |

### Ene 01 Calculator

| | | | |
|---|---|---|---|
| Country of the UK where the building is located | England | Confirm building regulation and version to be used: | Scotland Section 6 2015 |

### New Construction (shell and core)

| | | |
|---|---|---|
| Building floor area | 373 | m2 |
| Notional building heating and cooling energy demand | 286.10 | MJ/m2yr |
| Actual building heating and cooling energy demand | 436.93 | MJ/m2yr |
| Notional building primary energy consumption | 220.78 | kWh/m2yr |
| Actual building primary energy consumption | 202.69 | kWh/m2yr |
| Target emission rate (TER) | 37.60 | kgCO2/m2yr |
| Building emission rate (BER) | 27.2 | kgCO2/m2yr |
| Building emission rate improvement over TER | 27.7% | |
| Heating & cooling demand energy performance ratio ($EPR_{ED}$) | 0.000 | |
| Primary consumption energy performance ratio ($EPR_{PC}$) | 0.170 | |
| $CO_2$ Energy performance ratio ($EPR_{CO2}$) | 0.282 | |
| Overall building energy performance ratio ($EPR_{NC}$) | 0.451 | |

| | |
|---|---|
| Where specified, please confirm the energy production from onsite or near site energy generation technologies | |
| Equivalent % of the building's 'regulated' energy consumption generated by carbon neutral sources and used to meet energy demand from 'unregulated' building systems or processes? | |
| Is the building designed to be 'carbon negative' ? | |
| If the building is defined as 'carbon negative' what is the total (modelled) renewable/carbon neutral energy generated and exported? | |

| | |
|---|---|
| Total BREEAM credits achieved | 6 |
| Total contribution to overall building score | 5.00% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | Excellent level |

Comments/notes:

## Ene 02 Energy monitoring

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 1.67% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | Yes |

| Assessment criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a BMS or sub-meters be specified to monitor energy use from major building services systems? | Yes | 1 | 1 |
| Will a BMS or sub-meters be specified to monitor energy use by tenant/building function areas? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 1.67% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

Electricity submeters will be provided for major energy consuming systems and areas.

## Ene 03 External lighting

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 0.83% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will external light fittings and controls be specified in accordance with the BREEAM criteria? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.83% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

External lighting to the Car garage/showroom will be fitted in line with the BREEAM criteria.

## Ene 04 Low carbon design

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 3 | Available contribution to overall score | 2.50% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will passive design measures be used in line with an analysis be carried out during concept design stage (RIBA stage 2 or equivalent)? | Yes | 1 | 1 |
| Will free cooling measures be implemented in the whole building in line with the passive design analysis? | No | 1 | 0 |
| Will a LZC technology be specified in line with a feasibility study carried out by the completion of the Concept Design stage (RIBA Stage 2 or equivalent)? | Yes | 1 | 1 |

KPI - Low and/or zero carbon energy generation

| | | |
|---|---|---|
| Total on-site and/or near-site LZC energy generation | INA | kWh/yr |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 1.67% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Ene 05 Energy efficient cold storage

Assessment issue not applicable

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| Assessment criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Will the refrigeration system be designed, installed & commissioned in accrodance with BREEAM criteria? | | N/A | N/A |
| Will the refrigeration system demonstrate a saving in indirect greenhouse gas emissions? | | N/A | N/A |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Ene 06 Energy efficient transportation systems

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| Assessment criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a transportation system analysis be carried out to determine and specify the optimum number, size and type of lifts that is most energy efficient? | | | |
| Will the relevant energy-efficient features criteria be met? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Ene 07 Energy efficient laboratory systems

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| Assessment criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Pre-requisite: Criterion 1 of Hea 03 - risk assessment of laboratory facilities | | | |
| Have the occupants' laboratory requirements & performance criteria been confirmed during the preparation of the initial project brief to minimise energy demand? | | | |
| Best Practice Energy Practices in Laboratories (table 27) | | | |
| Will the laboratory meet criteria item b) Fan power? | | | |
| Will the laboratory criteria item c) Fume cupboard volume flow rates? | | | |
| Will the lab meet item d) Grouping / isolation of high filtration/ventilation activities? | | | |
| Will the laboratory meet criteria item e) Energy recovery - heat? | | | |
| Will the laboratory meet criteria item f) Energy recovery - cooling? | | | |

| | |
|---|---|
| Will the laboratory meet criteria item g) Grouping of cooling loads? | |
| Will the laboratory meet criteria item h) Free cooling? | |
| Will the laboratory meet criteria item i) Load responsiveness? | |
| Will the laboratory meet criteria item j) Cleanrooms? | |
| Will the laboratory meet criteria item k) Diversity? | |
| Will the laboratory meet criteria item l) Room air-change rates? | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Ene 08 Energy efficient equipment

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

Assessment criteria

| Which of the following will be present and likely to be a/the major contributor to 'unregulated' energy use? | Present | Major impact |
|---|---|---|
| Ref A Small power and plug in equipment? | | |
| Ref B Swimming pool? | | |
| Ref C Communal laundry? | | |
| Ref D Data centre? | | |
| Ref E IT-intensive operation areas? | | |
| Ref F Residential areas? | | |
| Ref G Healthcare? | | |
| Ref H Kitchen and catering facilities? | | |

| | Compliant | Credits available | Credits achieved |
|---|---|---|---|
| Will the significant majority contributor(s) to 'unregulated' energy use above meet the BREEAM criteria? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Ene 09 Drying space

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

Assessment criteria | Compliant? | Credits available | Credits achieved

| | | | |
|---|---|---|---|
| Will internal/external drying space and fixings be provided? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## TRANSPORT

### Tra 01 Public Transport Accessibility

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 5 | Available contribution to overall score | 5.56% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| | |
|---|---|
| Building type category (for purpose of Tra01 issue assessment) | Retail |

| Assessment Criteria | Compliant | Credits available | Credits achieved |
|---|---|---|---|
| Indicative public transport accessibility index (AI): | 8.44 | 5 | 3 |
| Will the building have a dedicated bus service? | | | N/A |

| AI | Indicative Accessibility Index for pre-assessment |
|---|---|
| 0 | Poor or no public transport provision |
| 1 | A single BREEAM compliant public transport node available |
| 2 | Some BREEAM compliant public transport nodes/services available |
| 4 | A selection of BREEAM compliant public transport nodes/services available |
| 8 | Good provision of public transport i.e. small urban centre / suburban area |
| 10 | Very Good provision of public transport i.e. small/medium urban centre |
| 12 | Excellent provision of public transport, i.e. medium urban centre |
| 18 | Excellent provision of public transport, i.e. large urban/metropolitan city centre |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 3.33% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

### Tra 02 Proximity to Amenities

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.11% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will the building be in close proximity of and accessible to applicable amenities? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.11% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Tra 03 Cyclist facilities

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 2.22% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| | |
|---|---|
| Building type category (for purpose of Tra03 issue assessment) | Retail – Individual retail unit |
| How many compliant cycle storage spaces will be provided? | 4 |
| What cyclist facilities will be provided? | No compliant facilities |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Cycle storage spaces | Yes | 2 | 1 |
| Cyclist facilities | No | | |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.11% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Tra 04 Maximum Car Parking Capacity

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| | |
|---|---|
| Building type category (for purpose of Tra04 issue) | |
| Building's indicative Accessibility Index (sourced from issue Tra01) | |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will BREEAM's maximum parking capacity criteria for the building type/Accessibility Index be met? | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

### Tra 05 Travel Plan

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.11% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a transport plan based on site specific travel survey/assessment be developed? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.11% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

It is anticipated that a Travel Plan will be produced.

## WATER

### Wat 01 Water Consumption

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 5 | Available contribution to overall score | 4.17% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | Yes |

| | |
|---|---|
| How do you wish to assess the number of BREEAM credits to be achieved for this issue? | Define a target % improvement over baseline sanitary fittings |
| What is the target for % reduction in potable water consumption for sanitary use in the building? | 40% - three credits |

| | |
|---|---|
| Please select the calculation procedure used | |

Standard approach data

| | |
|---|---|
| Water Consumption from building micro-components | |
| Water demand met via greywater/rainwater sources | |
| Total net water consumption | |

| | |
|---|---|
| Improvement on baseline performance | |

Key Performance Indicator - use of freshwater resource

| | |
|---|---|
| Total net Water Consumption | |
| Default building occupancy | |

Alternative approach data

| | |
|---|---|
| Overall microcomponent performance level achieved | |
| | |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 2.50% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

## Wat 02 Water Monitoring

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 0.83% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | Yes |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will there be a water meter on the mains water supply to the building(s)? | Yes | 1 | 1 |
| Will metering/monitoring equipment be specified on the water supply to any relevant plant/building areas? | N/A | | |
| Will all specified water meters have a pulsed output? | Yes | | |
| If the site/building has an existing BMS connection, will all pulsed meters be connected to the BMS? | N/A | | |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.83% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

## Wat 03 Water Leak Detection and Prevention

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 1.67% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a mains water leak detection system be installed on the building's mains water supply? | Yes | 1 | 1 |
| Will flow control devices be installed in each sanitary area/facility? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 1.67% |
| Total BREEAM innovation credits achieved | N/A |

| Minimum standard(s) level | N/A |
|---|---|

Comments/notes:

### Wat 04 Water Efficient Equipment

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 0.83% |
| No. of BREEAM innovation credits available | No | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Has a meaningful reduction in unregulated water demand been achieved? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.83% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## MATERIALS

### Mat 01 Life Cycle Impacts

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 5 | Available contribution to overall score | 5.58% |
| No. of BREEAM innovation credits available | 3 | Minimum standards applicable | No |

| | |
|---|---|
| How do you wish to assess the number of BREEAM credits to be achieved for this issue? | Define the number of Mat 01 credits achieved |

Assessment Criteria

| | |
|---|---|
| Predicted total Mat01 credits achieved | 4 |
| Predicted total Mat01 points achieved | |
| Number of building elements assessed | |
| Green Guide exemplary level compliant? | |
| Has IMPACT compliant software been used? | |

| Key Performance Indicator - embodied green house gas emissions by element | Total area of element $m^2$ | Total impact $kgCO_2$ eq. | Area of element impact data relevant to $m^2$ |
|---|---|---|---|
| External walls | | | |

| | | | |
|---|---|---|---|
| Windows | | | |
| Roof | | | |
| Upper floor construction | | | |
| Internal wall | | | |
| Floor finishes/coverings | | | |

Key Performance Indicator - embodied green house gas emissions for building (assessed elements only)

| | | | | |
|---|---|---|---|---|
| Total embodied green house gas emissions for building (by assessed elements) | Missing data | $kgCO_2$ eq. | | $kgCO_2$ eq./$m^2$ |
| Proportion of applicable building elements that data reported covers | | | | |

| | |
|---|---|
| Total BREEAM credits achieved | 4 |
| Total contribution to overall building score | 4.46% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | N/A |

Comments/notes:

## Mat 02 Hard Landscaping and Boundary Protection

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.12% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will ≥80% of all external hard landscaping and boundary protection achieve a Green Guide A or A+ rating? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.12% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Mat 03 Responsible Sourcing

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 4 | Available contribution to overall score | 4.46% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | Yes |

| Assessment Criteria | Compliant | Credits available | Credits achieved |
|---|---|---|---|
| All timber and timber based products are 'Legally harvested and trader timber' | Yes | | |
| Is there a documented sustainable procurement plan? | Yes | 1 | 1 |
| Percentage of available responsible sourcing of materials points achieved | 40.00% | 3 | 2 |

| | |
|---|---|
| Please confirm the route used to assess Mat03 | Please select |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 3.35% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

## Mat 04 Insulation

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.12% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | | Credits available | Credits achieved | |
|---|---|---|---|---|
| What is the building's targeted insulating index? | 2.50 | 1 | 1 | Note: An insulatio |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.12% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Mat 05 Designing for durability and resilience

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.12% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | N/A |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will suitable durability/protection measures be specified and installed to vulnerable areas of the building? | Yes | 1 | 1 |
| Will suitable durability/protection measures be specified and installed to exposed parts of the building? | Yes | | |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.12% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Mat 06 Material efficiency

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.12% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will material efficiency measures be identified & implemented during all RIBA stages? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.12% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

# WASTE

## Wst 01 Construction Waste Management

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 4 | Available contribution to overall score | 4.75% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | Yes |

| | | | |
|---|---|---|---|
| How do you wish to assess the number of BREEAM credits to be achieved for this issue? | Define a target number of BREEAM credits | | |
| Select the number of BREEAM credits being targeted for issue Wst 01: | 3 | BREEAM Wst01 Innovation credits: | |

| Assessment Criteria | Compliant? |
|---|---|
| Construction resource management plan | |
| Compliant Pre-demolition audit | |
| Does the excavation waste meet the exemplary level requirements? | |

Key Performance Indicators - Construction Waste

| | | |
|---|---|---|
| Measure/units for the data being reported | | |
| Non-hazardous construction waste (excluding demolition/excavation) | | |
| Total non-hazardous construction waste generated | | Note: At the pre-assessment stage this |
| Non-hazardous non-demolition const. waste diverted from landfill | | Note: At this stage this will be a target b |
| Total non-hazardous non-demolition const. waste diverted from landfill | | Note: At the pre-assessment stage this |
| Total non-hazardous demolition waste generated | | Note: At this stage this will be a target b |
| Non-hazardous demolition waste diverted from landfill | | Note: At this stage this will be a target b |
| Total non-hazardous demolition waste to disposal | | Note: At the pre-assessment stage this |
| Material for reuse | | Note: At this stage this will be a target b |
| Material for recycling | | Note: At this stage this will be a target b |
| Material for energy recovery | | Note: At this stage this will be a target b |
| Hazardous waste to disposal | | Note: At this stage this will be a target b |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 3.56% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

## Wst 02 Recycled Aggregates

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.19% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | No |

| Assessment Criteria | Total |
|---|---|
| What is the target total % of high-grade aggregate that will be recycled/secondary aggregate? | 0% |

% of high-grade aggregate that is recycled/secondary aggregate - by application

| | |
|---|---|
| Structural frame | |
| Bitumen/hydraulically bound base, binder and surface courses | |
| Building foundations | |
| Concrete road surfaces | |
| Pipe bedding | |
| Granular fill and capping | |

| | |
|---|---|
| Total BREEAM credits achieved | 0 |
| Total contribution to overall building score | 0.00% |
| Total BREEAM innovation credits achieved | 0 |
| Minimum standard(s) level | N/A |

Comments/notes:

## Wst 03 Operational Waste

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.19% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | Yes |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will operational recyclable waste volumes be segregated and stored? | Yes | 1 | 1 |
| Will static waste compactor(s) or baler(s) be specified where appropriate? | N/A | | |
| Will vessel(s) for composting suitable organic waste where appropriate? | N/A | | |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.19% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

## Wst 04 Speculative Floor and Ceiling Finishes

**Assessment issue not applicable**

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | N/A | Available contribution to overall score | N/A |
| No. of BREEAM innovation credits available | N/A | Minimum standards applicable | N/A |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| | | | |

| | |
|---|---|
| Total BREEAM credits achieved | N/A |
| Total contribution to overall building score | N/A |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Wst 05 Adaption to climate change

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.19% |
| No. of BREEAM innovation credits available | 1 | Minimum standards applicable | N/A |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a climate change adaptation strategy appraisal for structural and fabric resilience be conducted by the end of Concept Design (RIBA Stage 2 or equivalent)? | Yes | 1 | 1 |
| Will exemplary level criteria – Responding to adaptation to climate change be met? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.19% |
| Total BREEAM innovation credits achieved | 1 |
| Minimum standard(s) level | N/A |

Comments/notes:

### Wst 06 Functional adaptability

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 1.19% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | N/A |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a building specific functional adaptation strategy appraisal be conducted by Concept Design (RIBA Stage 2 or equivalent) and will functional adaptation measures be implemented? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.19% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## LAND USE & ECOLOGY

### LE 01 Site Selection

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 2.20% |

| | | | |
|---|---|---|---|
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will at least 75% of the proposed development's footprint be located on previously occupied land? | Yes | 1 | 1 |
| Is the site deemed to be significantly contaminated? | No | 1 | 0 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.10% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## LE 02 Ecological Value of Site and Protection of Ecological Features

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 2.20% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| | |
|---|---|
| Ecological value of the land defined using | Please select |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Can the land within the construction zone be defined as 'land of low ecological value'? | Yes | 1 | 1 |
| Will all features of ecological value surrounding the construction zone/site boundary be protected? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 2.20% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## LE 03 Mitigating Ecological Impact

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 2.20% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | Yes |

| | |
|---|---|
| Data sourced for calculating the change in ecological value from | Suitably Qualified Ecologist site survey of plant species |

Assessment Criteria

| | | |
|---|---|---|
| What is the likely change in ecological value as a result of the sites development? | ≥0 species (i.e. no negative change) | Plant species richn |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 2.20% |

| | |
|---|---|
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | Outstanding level |

Comments/notes:

## LE 04 Enhancing Site Ecology

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 2.20% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved | |
|---|---|---|---|---|
| Will a suitably qualified ecologist be appointed to report on enhancing and protecting site ecology? | Yes | 2 | 1 | |
| Will the suitably qualified ecologist's general recommendations be implemented? | Yes | | | |
| What is the targeted/intended improvement in ecological value as a result of enhancement actions? | <6 species (small positive change) | | | Plant species richr |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 1.10% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## LE 05 Long Term Impact on Biodiversity

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 2 | Available contribution to overall score | 2.20% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will a Suitably Qualified Ecologist be appointed to monitor/minimise impacts of site activities on biodiversity? | Yes | 2 | 2 |
| Will a landscape and habitat management plan be produced covering at least the first five years after project completion in accordance with British Standards? | Yes | | |
| Number of applicable measures to improve biodiversity confirmed by SQE: | 2 | | |
| Number of applicable measures implemented: | 2 | | |

| | |
|---|---|
| Total BREEAM credits achieved | 2 |
| Total contribution to overall building score | 2.20% |

| | |
|---|---|
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## POLLUTION

### Pol 01 Impact of Refrigerants

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 3 | Available contribution to overall score | 2.54% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | | Credits available | Credits achieved |
|---|---|---|---|
| Refrigerant containing systems installed in the assessed building? | Yes | 2 | 2 |
| Do all systems (with electric compressors) comply with the requirements of BS EN 378:2008 (parts 2 & 3) & where refrigeration systems containing ammonia are installed, the IoR Ammonia Refrigeration Systems Code of Practice? | Yes | | |
| Global Warming Potential of the specified refrigerant(s) 10 or less? | Yes | | |
| What is the target range Direct Effect Life Cycle CO2eq. emissions for the system? | | kgCO2eq/kW coolth capacity | |
| Cooling/Heating capacity of the system | | kW | |
| Will a refrigerant leak detection and containment system be specified/installed? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 2.54% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

### Pol 02 $NO_x$ Emissions

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 3 | Available contribution to overall score | 2.54% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

Assessment Criteria

| | | |
|---|---|---|
| $NO_x$ emission level - space heating | 1200.00 | mg/kWh |
| $NO_x$ emission level - cooling | 1200.00 | mg/kWh |

| | | |
|---|---|---|
| Does this building meet BREEAM's definition of a highly insulated building? | | |
| Energy consumption: heating and hot water | | kWh/m2 yr |

| | |
|---|---|
| Total BREEAM credits achieved | 0 |
| Total contribution to overall building score | 0.00% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Pol 03 Surface Water Run off

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 5 | Available contribution to overall score | 4.23% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| What is the actual/likely annual probability of flooding for the assessed site? | Low | 2 | 2 |
| Will a Flood Risk Assessment be undertaken? | Yes | | |
| Will the site meet the BREEAM criteria for peak rate surface water run off? | Yes | 1 | 1 |
| Will the site meet the criteria for surface water run off volume, attenuation and/or limiting discharge? | No | 1 | 0 |
| Will the site be designed to minimise watercourse pollution in accordance with the BREEAM criteria? | No | 1 | 0 |

| | |
|---|---|
| Total BREEAM credits achieved | 3 |
| Total contribution to overall building score | 2.54% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## Pol 04 Reduction of Night Time Light Pollution

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 0.85% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Will the external lighting specification be designed to reduce light pollution? | Yes | 1 | 1 |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.85% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

### Pol 05 Noise Attenuation

| | | | |
|---|---|---|---|
| No. of BREEAM credits available | 1 | Available contribution to overall score | 0.85% |
| No. of BREEAM innovation credits available | 0 | Minimum standards applicable | No |

| Assessment Criteria | Compliant | Credits available | Credits achieved |
|---|---|---|---|
| Will there be noise-sensitive areas/buildings within 800m radius of the development? | Yes | 1 | 1 |
| Will a noise impact assessment be carried out and, if applicable, noise attenuation measures specified? | Yes | | |

| | |
|---|---|
| Total BREEAM credits achieved | 1 |
| Total contribution to overall building score | 0.85% |
| Total BREEAM innovation credits achieved | N/A |
| Minimum standard(s) level | N/A |

Comments/notes:

## INNOVATION

### Inn 01 Innovation

| | | | |
|---|---|---|---|
| No. of BREEAM innovation credits available | 10 | Available contribution to overall score | 10.00% |
| | | Minimum standards applicable | No |

| Assessment Criteria | Compliant? | Credits available | Credits achieved |
|---|---|---|---|
| Man 03 Responsible construction practices | No | 1 | 0 |
| Man 05 Aftercare | N/A | N/A | 0 |
| Hea 01 Visual Comfort | No | 1 | 0 |
| Hea 02 Indoor Air Quality | N/A | N/A | 0 |
| Ene 01 Reduction of energy use and carbon emissions | No | 5 | 0 |
| Wat 01 Water Consumption | No | 1 | 0 |
| Mat01 Life Cycle Impacts | No | 3 | 0 |
| Mat03 Responsible Sourcing of Materials | No | 1 | 0 |

| | | | |
|---|---|---|---|
| Wst01 Construction Waste Management | No | 1 | 0 |
| Wst02 Recycled Aggregates | No | 1 | 0 |
| Wst 05 Adaption to climate change | N/A | N/A | 1 |

| | |
|---|---|
| Number of 'approved' innovation credits achieved? | |

| | |
|---|---|
| Total BREEAM innovation credits achieved | 1 |
| Total contribution to overall building score | 1.00% |
| Minimum standard(s) level | N/A |

Comments/notes:

# APPENDIX C: LONDON BOROUGH OF RICHMOND-UPON-THAMES' SUSTAINABLE CONSTRUCTION CHECKLIST

## LBRUT Sustainable Construction Checklist - Draft for Consultation, September 2015

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): | 45-49 Station Road | Application No. (if known): | |
| Address (include. postcode) | 45-49 Station Road, Hampton, TW12 2BU | | |
| Completed by: | Metropolis Green Ltd<br>Clive Chapman Architects | | |
| *For Non-Residential*<br>Size of development (m2) | 372 | *For Residential*<br>Number of dwellings | 8 |

### 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 — 35%

*Policy DM SD 1 and London Plan Policy 5.2 (2016) require a 35% reduction in $CO_2$ emissions beyond Building Regulations 2013.*

Percentage of total site CO2 emissions saved through renewable energy installation? — 20.35%

### 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)*<br>BREEAM Level | Excellent | Have you attached a pre-assessment to support this? | ☑ |
| *Extensions and conversions for residential dwellings*<br>BREEAM Domestic Refurbishment | Please Select | Have you attached a pre-assessment to support this? | ☐ |
| *Extensions and conversions for non-residential buildings*<br>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 = *6*, Outstanding = *16*

**Subtotal** 6

### 1B MINIMUM POLICY COMPLIANCE (RESIDENTIAL)

**Water Usage**

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

**Subtotal** 1

## 2. ENERGY USE AND POLLUTION

**2.1 Need for Cooling**

| | | Score |
|---|---|---|
| a. | How does the development incorporate cooling measures? Tick all that apply: | |
| | Energy efficient design incorporating specific heat demand to less than or equal to 15 kWh/sqm | ☐ 6 |
| | Reduce heat entering a building through providing/improving insulation and living roofs and walls | ☑ 2 |
| | Reduce heat entering a building through shading | ☑ 3 |
| | Exposed thermal mass and high ceilings | ☐ 4 |
| | Passive ventilation | ☑ 3 |
| | Mechanical ventilation with heat recovery | ☑ 1 |
| | Active cooling systems, i.e. Air Conditioning Unit | ☐ 0 |

**2.2 Heat Generation**

| | | |
|---|---|---|
| b. | How have the heating and cooling systems, with preference to the heating system hierarchy, been selected (defined in London Plan policy 5.6)? Tick all heating and cooling systems that will be used in the development: | |
| | Connection to existing heating or cooling networks powered by renewable energy | ☐ 6 |
| | Connection to existing heating or cooling networks powered by gas or electricity | ☐ 5 |
| | Site wide CHP network powered by renewable energy | ☐ 4 |
| | Site wide CHP network powered by gas | ☐ 3 |
| | Communal heating and cooling powered by renewable energy | ☐ 2 |
| | Communal heating and cooling powered by gas or electricity | ☐ 1 |
| | Individual heating and cooling | ☑ 0 |

**2.3 Pollution: Air, Noise and Light**

| | | |
|---|---|---|
| a. | Does the development plan to implement reduction strategies for dust emissions from construction sites? | ☐ 2 |
| b. | Does the development plan include a biomass boiler? | ☐ - |
| | If yes, please refer to the biomass guidelines for the Borough of Richmond, please see guidance for supplementary information. If the proposed boiler is of a qualifying size, you may need to completed the information request form found on the Richmond website. | ☐ - |
| c. | Please tick only one option below | |
| | Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site? | ☑ 3 |
| | Has the development taken care to not create any new noise generation/transmission issues in its intended operation? | ☐ 1 |
| d. | Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity? | ☑ 3 |
| e. | Have you attached a Lighting Pollution Report? | ☐ - |

**Subtotal** 16

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

A customer car parking will be incorporated into the site, which will minimise on-street car parking within the local area, and 10 cycle storage space will be provided for the employees/users of the car
Light Pollution: A more domestic approach to lighting rather than industrial.
Noise Pollution: Reduction in the size and scope of the existing workshops should positively improve noise pollution to the area.

## 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. | ☐ 6 |
| d. | **For smaller developments ONLY:** Have you provided a Transport Statement? | ☑ 6 |
| 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? | 14 |
| | 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

An customer car parking will be incorporated into the site, which will minimise on-street car parking within the local area, and 10 cycle storage space will be provided for the employees/users of the car
For the residential units, 2 secure cycle spaces are allocated to each of the 3-bed houses, and 1 secure cycle space is allocated to each of the 2-bed flats. Total of 14 assigned to residential

## 4 BIODIVERSITY

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

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

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

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

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

| | | | Area provided: | |
|---|---|---|---|---|
| Pond, reedbed or extensive native planting | 6 | ☐ | Area provided: | sqm |
| An extensive green roof | 6 | ☑ | Area provided: | 247 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** 16

Please give any additional relevant comments to the Biodiversity Section below

## 6 FLOODING AND DRAINAGE

**6.1 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 | ☐ 6 |
| 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: 1790 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

Site is within Flood Zone 1
See 'SRH-05E Site Plan' for further information regarding permeable materials

## 8 IMPROVING RESOURCE EFFICIENCY

**8.1 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? %

What percentage of demolition waste will be recycled? 10 %

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

**8.2 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** 7

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

Intrusive site contamination report to be submitted shortly

| 7 | ACCESSIBILITY | |
|---|---|---|
| 7.1 | **Ensure flexible adaptable and long-term use of structures** | |
| a. | **If the development is residential,** will it meet the requirements of the nationally described space standard for internal space and layout? | ☑ 1 |
| | If the standards are not met, in the space below, please provide details of the functionality of the internal space and layout | |
| | | |
| **AND** | | |
| b. | **If the development is residential,** will it meet Building Regulation Requirement M4 (2) 'accessible and adaptable dwellings'? | ☑ 2 |
| | If this is not met, in the space below, please provide details of any accessibility measures included in the development. | |
| | | |
| | For major residential developments, are 10% or more of the units in the development to Building Regulation Requirement M4 (3) 'wheelchair user dwellings'? | ☐ 1 |
| **OR** | | |
| c. | **If the development is non-residential,** does it comply with requirements included in Richmond's Design for Maximum Access SPG | ☑ 2 |
| | Please provide details of the accessibility measures specified in the Maximum Access SPG that will be included in the development | |
| | See Design and Access Statement for further information | |
| | | **Subtotal** 6 |

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

See Design and Access Statement for further information

**LBRUT Sustainable Construction Checklist- Scoring Matrix for *New Construction*** **(Non-Residential and domestic refurb)** **TOTAL** 63

| 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 |
| 61-70 | B | Helps to significantly improve the Borough's stock of sustainable developments |
| 36-60 | 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 |
| 36-54 | 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 27.10.2015