# 18 Park Square East

## Energy and Sustainability Statement

## The Diorama Estates LTD

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| Job No: | 1016745 |
| Doc Ref: | 1016745-RPT-SY-001 |
| Revision: | D |
| Revision Date: | 14 February 2020 |

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| **Project title** | 18 Park Square East | **Job Number** |
| **Report title** | Energy and Sustainability Statement | 1016745 |

## Document Revision History

| Revision Ref | Issue Date | Purpose of issue / description of revision |
|---|---|---|
| — | 8/11/2019 | Draft issue for comment |
| A | 2/12/2019 | Revised to include comments |
| B | 4/12/2019 | Revised to include comments |
| C | 14/02/2020 | Revised to include comments |
| D | 14/02/2020 | Revised to include comments |
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## Document Validation (latest issue)

| | | |
|---|---|---|
| 14/02/2020 | 14/02/2020 | 14/02/2020 |
| X Maria Papantoni | X Oliver Watts | X |
| Principal author | Checked by | Verified by |
| Signed by: Papantoni, Maria | Signed by: Watts, Oliver | Signed by: Kumari, Kavita |

# Executive Summary

In accordance with the Camden Council's planning requirements and the GLA's London Plan, the following Energy and Sustainability Statement has been developed for the proposed 18 Park Square East office development, in Marylebone, London.

The proposed development consists of a change of use of building from institutional use (SG) to be used as Offices (Class B1a), extension at roof level to provide new third floor, internal subdivision, infilling, refurbishment and associated works. The total GIA area of the building is 2,878.9 $m^2$.

As per the Camden Planning Guidance on energy efficiency and adaptation (March 2019), for non-residential schemes if the extension is 'small', as defined by the Building Regulations (less than 100$m^2$ or less than 25% of the total useful floor area of the existing building), and subsequently forms part of the refurbishment, then the whole building would be assessed as a refurbishment. However, the new elements should at least meet the limiting values of Part L2B.

In accordance with the GLA Energy Assessment Guidance (October 2018), for these calculations the SAP 10 emission factors have been used to present the results. The energy strategy has been developed by following the energy hierarchy; Be Lean, Be Clean and Be Green.

**Baseline Summary**

As this is a major refurbishment, the $CO_2$ emission baseline performance of the un-refurbished condition of the existing building has been estimated using approved dynamic simulation software IES Virtual Environment 2018. For the purpose of this assessment, the Target Emissions Rate of the refurbishment has been based on the SBEM default values for retained thermal elements and the date of construction of the building. The TER of the new 3rd floor extension is based on the Part L2B minimum standards for new thermal elements. The 'Baseline' BRUKL document's front page can be found in Appendix A.

**Be Lean Summary**

As this is a listed building, the existing building's envelope has not been altered or modified to avoid causing harm to the special architectural and historic interest of the building. However, a layer of insulated plasterboard will be added internally on the existing external walls and secondary glazing is proposed to the existing windows to improve building's energy performance and occupant thermal comfort. The new extension's building envelope will be designed to perform significantly better than the Building Regulation standards with low U-values, g-values and a low air permeability.

Passive solar considerations have formed an integral part of the design for the proposed development. Analysis has been carried out to optimise the new extension facade so that the solar gains and associated cooling loads are reduced, providing a more comfortable internal environment for occupants. The area-weighted U-value of the new extension is less than that of an extension of the same size that complies with the Part L2B requirements.

For the purpose of this assessment and in accordance with the GLA's 'Guidance on Preparing Energy Statements October 2018, the 'Be Lean' scenario utilises a centralised gas-fired boiler system to deliver the space heating and domestic hot water requirements. Cooling will be provided by an electric chiller. Heating to the basement shower areas will be provided by gas fired radiators. Heating and domestic hot water will be provided by gas-fired boilers in all toilets and basement showers.

Ventilation to office and reception areas will be provided via central Air Handling Units. In the basement showers and plant rooms, fresh air ventilation will be provided via a local Mechanical Ventilation Heat Recovery (MVHR) units. All AHU and MVHR units will incorporate heat recovery with at least the minimum Energy Related Products 2018 efficiencies to reduce space heating loads and will utilise low specific fan powers with variable speed drives.

The energy efficiency measures employed in the occupied spaces include highly efficient Light Emitting Diode lighting coupled with daylight dimming at all perimeter office and reception areas. All display lighting in the reception areas will be high efficacy. Offices, toilets, changing rooms and circulation areas will benefit from occupancy PIR detection. Electrical and mechanical systems will be tightly metered and controlled with a Building Management System. This will enable energy use to be tracked and opportunities for efficiency improvements to be made.

The application of passive and active design measures allows the refurbishment to achieve a 35% reduction over the baseline TER. The 'Be Lean' BRUKL document's front page can be found in Appendix B.

**Be Clean Summary**

An investigation into the feasibility of connecting to an existing or proposed district network as per the Policy 5.6 of the London Plan indicates that there are no existing district heating networks within a feasibly distance. However, future proofing of a connection to a district network has been considered. Combined Heat & Power is also unfeasible due to the low heating loads and high spatial requirements of such a system. In addition, gas-fired CHPs are no longer offering high carbon savings because of the new SAP10 emission factors. Therefore, no decentralised system is included in the energy strategy.

**Be Green Summary**

An analysis of a range of Low and Zero Carbon technologies has been conducted to determine which offer feasible carbon emissions savings. The analysis found that air source heat pumps offer the highest potential for savings. This system could reduce $CO_2$ emissions by 32.7% for the refurbishment over a conventional HVAC configuration. Space heating and cooling will be provided by electric Air Source Heat Pumps to the office and reception areas, circulated through a CAM-V under floor air conditioning system. In the ground floor reception and atrium, heating and cooling will be provided by electric Air Source Heat Pumps through a 4-pipe Fain Coil Unit system. Basement heating will be provided by electric heaters. Domestic hot water will be generated by gas-fired boilers in all toilets and basement showers. The 'Be Green' BRUKL document's front page can be found in Appendix C.

**Results**

The analysis indicates that the proposed development is performing significantly better than the minimum requirements of Part L2B 2013 of the Building Regulations and achieves an improvement of 67.7% over the Building Regulations Part L 2013 Target Emission Rate as highlighted below.

| Regulated Carbon Dioxide Savings for the Refurbished Building | (Tonnes $CO_2$ per annum) | (%) |
|---|---|---|
| Savings from energy demand reduction | 34.9 | 35.0 |
| Savings from decentralised energy | 0.0 | 0.0 |
| Savings from renewable energy | 32.7 | 32.7 |
| Total Cumulative Savings | 67.5 | 67.7 |

*Table 1: Regulated carbon dioxide savings for the development*

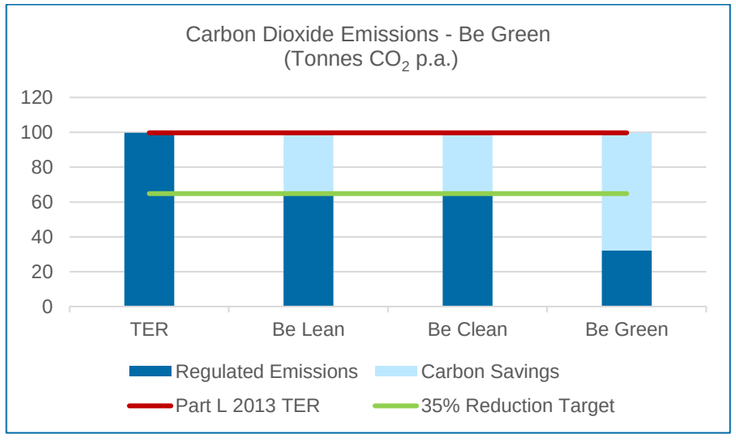



*Figure 1: Regulated carbon dioxide emissions for the refurbishment*

**Sustainability**

The development has been registered and assessed against Refurbishment and Fit Out 2014. The scheme considers the broad environmental concerns of climate change, pollution, impact on occupants and the wider community. The preliminary BREEAM assessment indicates that the development is currently likely to achieve 'Very Good' rating.

Several sustainable features have been considered for the development:

- Building materials, where possible, will be sourced locally to reduce transportation pollution and support the local economy;
- Retaining the original façade and reusing the existing building structure will limit the embodied carbon associated with procuring virgin material for building;
- All timber will be procured from responsible forest sources;
- The construction site will be managed in an environmentally sound manner in terms of resource use, storage, waste management, pollution. A compliant resource management plan covering the waste arisings from the refurbishment will be developed and implemented that complies with the requirements of current legislation and BREEAM;
- Recycling facilities will be provided on site for construction and operational waste;
- Water use will be minimised by the specification of water efficient taps, dual flush toilets and low water use appliances;
- Water metering will be installed to monitor and minimise wastage;
- Reduction of the impact of the development on the immediate environment;
- Increasing the biodiversity and enhancing the ecology of the site by increasing the amounts of the planting in the roof terrace areas;
- The site benefits from excellent transport links, reducing reliance on personal cars;
- Secure cycling storage space and changing facilities will be allocated on site to encourage the occupants to use this carbon-free mode of transport;
- A Travel Plan will be developed to encourage the use of sustainable modes of transport of people during the building's operation and use.

# Contents

# 1.0

# Introduction

# 1.0 Introduction

This Energy Statement has been prepared in support of the planning application for the 18 Park Square East office development, located in Marylebone, London. It responds to the energy and climate change requirements of the London Borough of Camden and the Greater London Authority (GLA).

The format of the statement is intended to reflect and respond to the issues raised in the GLA's 'Spatial Development Strategy for Greater London' - the 'London Plan'. The principal objectives are to reduce the site's contribution to the causes of climate change by reducing the site's needs for energy, by minimising the emissions of $CO_2$, by providing some of the requirement by renewable/sustainable means. The format of this report is based on the GLA's Energy Assessment Guidance, October 2018 document.

## 1.1 Existing Site

The existing site is located at 18 Park Square East NW1 in the London Borough of Camden. The site consists of a 5-storey building arranged over basement, and ground to third floors. The existing building was built in 1823s and it has undergone extensive changes and alterations over the centuries, including changes of use. The building is located within the Camden Conservation Area and it is a listed building.


*Figure 2: Heritage and Archaeological Sites, Camden Local Plan*

## 1.2 Proposed Development

The existing building will be refurbished with an intention to upgrade the existing systems to modern standards whilst retain the existing building fabric to avoid causing harm to the special architectural and historic interest of the building. The proposed development consists of a change of use of building from institutional use (SG) to be used as Offices (Class B1a), extension at roof level to provide new third floor, internal subdivision, infilling, refurbishment and associated works. The total GIA area of the building is 2,878.9 $m^2$.

| Level | GIA Floor Area ($m^2$) | | NIA Floor Area - Proposed ($m^2$) | |
|---|---|---|---|---|
| | Existing Building | Total Proposed | Existing | Proposed |
| Basement | 105.2 | 208.9 | 44.6 | 44.2 |
| Ground Floor | 688.5 | 742.7 | 408.5 | 434.5 |
| 1 Floor | 664.3 | 687.4 | 430.4 | 554.2 |
| 2 Floor | 581.2 | 639.4 | 434.1 | 508.0 |
| 3 Floor | 102.9 | 600.5 | 60.1 | 532.8 |
| **Total** | **2142.1** | **2878.9** | **1377.7** | **2073.7** |

*Table 2: Existing and Proposed GIA and NIA ($m^2$) of the development*


*Figure 3: Site location, 18 Park Square East, Marylebone, London*

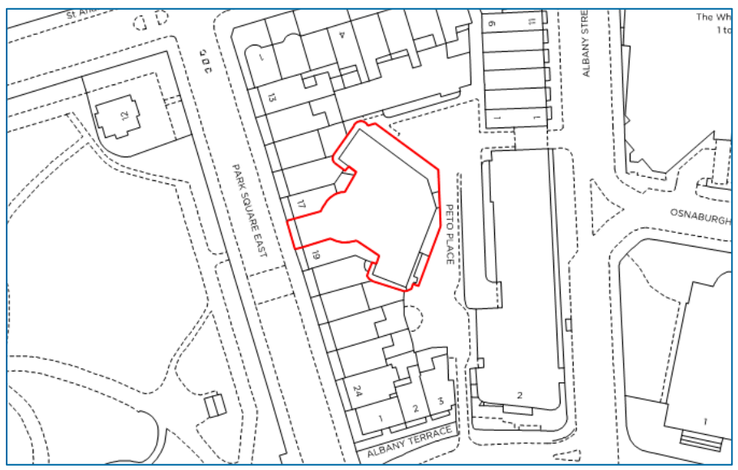



*Figure 4: 18 Park Square East development, site outlined in red*

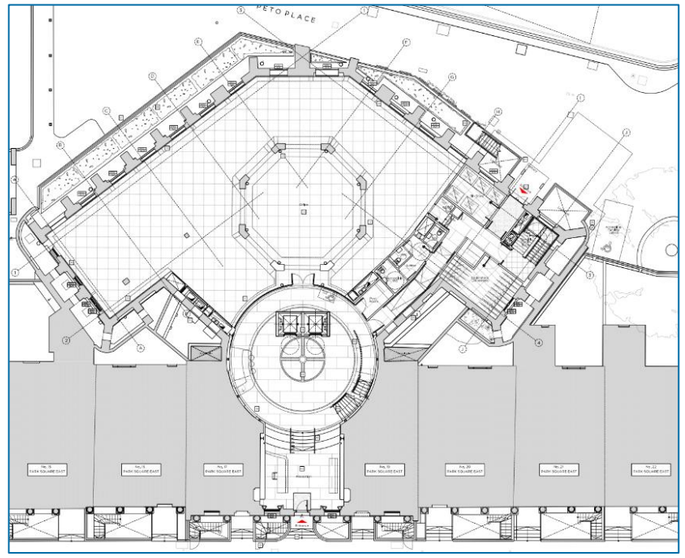



*Figure 5: Proposed ground floor refurbishment*

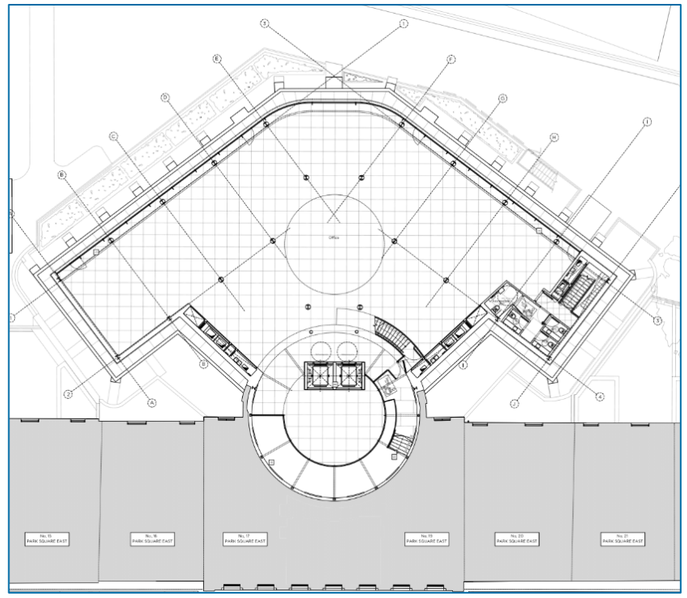


*Figure 6: Proposed third floor new extension*

# 2.0

# Planning Policy

# 2.0 Planning Policy

### 2.1 National Policy

The revised National Planning Policy Framework (NPPF) was published in February 2019 (with correction made in June 2019) and sets out the government's planning policies for England and states a clear presumption in favour of sustainable development. The revised Framework replaces the previous NPPF published in March 2012.

The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourages the reuse of existing resources, including conversion of existing buildings, and encourages the use of renewable resources.

The NPPF, Section 14 outlines its energy and climate change policies. New development should be planned for in ways that:

- avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
- can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

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

- Plan for development in 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.

The NPPF states that in determining planning applications, local planning authorities should expect new development to:

- comply with any development 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.

When determining planning applications for renewable and low carbon development, local planning authorities should:

- not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and
- approve the application if its impacts are (or can be made) acceptable49. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

The key focus of the NPPF is to support local and regional planning authorities.

### 2.1 Regional Policy Requirements

The Greater London Authority (GLA) London Plan 2016 and the GLA's Energy Assessments Guidance October 2018 document are the benchmark for London planning regulation. Together they provide a useful tool to undertake energy and sustainability assessments.

#### 2.1.1 The London Plan

The London Plan (March 2016) sets out a number of core policies for major developments with regards to reducing $CO_2$ emissions and providing energy in a sustainable manner.

***Policy 5.2: Minimizing Carbon Dioxide Emissions*** – requires that major non-residential developments, received after 6th April 2014, achieve a 35% improvement over the 2013 Building Regulation $CO_2$ Emission Target.

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

- Be lean: use less energy;
- Be clean: supply energy efficiently;
- Be green: use renewable energy.

**Policy 5.4: Retrofitting** – Existing developments should reduce carbon dioxide emissions, improve the efficiency of resource use (such as water) and minimise the generation of pollution and waste from existing building stock.

***Policy 5.4A: Electricity and Gas Supply*** – Developers, especially of major schemes, should engage at an early stage with relevant boroughs and energy companies to identify the gas and electricity requirements arising from their development proposals.

***Policy 5.6: Decentralised Energy*** – requires major developments to evaluate the feasibility of connecting to existing or proposed district heating networks, and where none exists, to consider a site wide Combined Heat and Power (CHP) system.

***Policy 5.7: Renewable Energy*** – requires that all major developments seek to reduce their $CO_2$ emissions by at least 20% using onsite renewable energy generation, wherever feasible.

***Policy 5.9: Cooling and Overheating*** – requires developments to reduce potential overheating and reliance on conditioning systems via a range of measures.

***Policy 5.12: Flood Risk Management*** – Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF and the associated technical Guidance on flood risk over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 and Catchment Flood Management Plans.

***Policy 5.13: Sustainable Drainage*** – Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.

***Policy 5.15: Water Use and Supplies*** – Development should minimise the use of mains water by*:*

*a.* incorporating water saving measures and equipment;

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

***Policy 5.17: Waste Capacity*** – Proposals for waste management should be evaluated against the following criteria:

a. locational suitability;
b. proximity to the source of waste;
c. the nature of activity proposed and its scale;
d. minimising waste and achieving high reuse and recycling performance;
e. achieving a positive carbon outcome of waste treatment methods and technologies (including the transportation of waste, recycles and waste derived products) resulting in greenhouse gas savings.

***Policy 6.9: Cycling –*** Developments should:

a. provide secure, integrated, convenient and accessible cycle parking facilities in line with the minimum standards set out in Table 6.3 and the guidance set out in the London Cycle Design Standards (or subsequent revisions);
b. provide on-site changing facilities and showers for cyclists;
c. contribute positively to an integrated cycling network for London by providing infrastructure that is safe, comfortable, attractive, coherent, direct and adaptable and in line with the guidance set out in the London Cycle Design Standards (or subsequent revisions);
d. provide links to existing and planned cycle infrastructure projects including Cycle Superhighways, Quietways, the Central London Grid and the 'mini-Hollands';
e. facilitate the Mayor's cycle hire scheme through provision of land and/or planning obligations where relevant, to ensure the provision of sufficient capacity.

***Policy 7.19: Biodiversity and Access to Nature*** – Development Proposals should, wherever possible, make a positive contribution to the protection, enhancement, creation and management of biodiversity.

#### 2.1.2 Draft New London Plan

In December 2017 the Mayor released a draft new London Plan. The Plan is currently under the Examination in Public and as such has not been formally adopted. It is not clear when the Plan will be adopted, however it is not likely to be until the end of 2019. In relation to energy and sustainability the Plan looks to further push the requirements on referable developments.

#### 2.1.3 GLA Energy Assessment Guidance (October 2018)

The GLA Energy Assessment Guidance (October 2018) looks to standardise how energy assessments for developments within London are presented and reported. As part of the this process the guidance from January 2019 referable developments are encouraged to use the updated SAP 10 emissions factors while continuing to use the current Building Regulation methodology.

### 2.2 Local Policy – Camden

The Camden's Local Plan (2017) and the Camden's Planning Guidance (CPG) on energy efficiency and adaptation (March 2019) are the main documents to support the planning decisions for developments within the London Borough of Camden.

### 2.2.1 Camden Local Plan

The Camden's Local Plan, adopted in 2017, sets out the Council's planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010). The Local Plan covers the period from 2016-2031 and includes the following policies regarding sustainable development:

***Policy CC1 Climate change mitigation –*** The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. Developments are required to:

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

***Policy CC2: Adapting to climate change –*** The Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as:

a. the protection of existing green spaces and promoting new appropriate green infrastructure;
b. not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;
c. incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and
d. measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement. The Council will promote and measure sustainable design and construction by:

e. ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;
f. encourage new build residential development to use the Home Quality Mark and Passivhaus design standards;
g. encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and
h. expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.

***Policy CC3: Water and flooding –*** The Council will seek to ensure that development does not increase flood risk and reduces the risk of flooding where possible. Developments are required to:

a. incorporate water efficiency measures;
b. avoid harm to the water environment and improve water quality;
c. consider the impact of development in areas at risk of flooding (including drainage);
d. incorporate flood resilient measures in areas prone to flooding;
e. utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and
f. not locate vulnerable development in flood-prone areas.

Where an assessment of flood risk is required, developments should consider surface water flooding in detail and groundwater flooding where applicable.

***Policy CC4: Air quality –*** The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough. The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan. Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact. Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

***Policy CC5: Waste –*** The Council will seek to make Camden a low waste borough. Developments are required to:

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

***Policy T1: Prioritising walking, cycling and public transport –*** The Council will promote sustainable transport by prioritising walking, cycling and public transport in the borough.
In order to promote walking in the borough and improve the pedestrian environment, we will seek to ensure that developments:

a. improve the pedestrian environment by supporting high quality public realm improvement works;
b. make improvements to the pedestrian environment including the provision of high quality safe road crossings where needed, seating, signage and landscaping;
c. are easy and safe to walk through ('permeable');
d. are adequately lit;
e. provide high quality footpaths and pavements that are wide enough for the number of people expected to use them. Features should also be included to assist vulnerable road users where appropriate; and
f. contribute towards bridges and water crossings where appropriate.

In order to promote cycling in the borough and ensure a safe and accessible environment for cyclists, the Council will seek to ensure that development:

g. provides for and makes contributions towards connected, high quality, convenient and safe cycle routes, in line or exceeding London Cycle Design Standards, including the implementation of the Central London Grid, Quietways Network, Cycle Super Highways and;
h. provides for accessible, secure cycle parking facilities exceeding minimum standards outlined within the London Plan (Table 6.3) and design requirements outlined within our supplementary planning document Camden Planning Guidance on transport. Higher levels of provision may also be required in areas well served by cycle route infrastructure, taking into account the size and location of the development;
i. makes provision for high quality facilities that promote cycle usage including changing rooms, showers, dryers and lockers;
j. is easy and safe to cycle through ('permeable'); and
k. contribute towards bridges and water crossings suitable for cycle use where appropriate.

In order to safeguard and promote the provision of public transport in the borough we will seek to ensure that development contributes towards improvements to bus network infrastructure including access to bus stops, shelters, passenger seating, waiting areas, signage and timetable information. Contributions will be sought where the demand for bus services generated by the development is likely to exceed existing capacity. Contributions may also be sought towards the improvement of other forms of public transport in major developments where appropriate.
Where appropriate, development will also be required to provide for interchanging between different modes of transport including facilities to make interchange easy and convenient for all users and maintain passenger comfort.

### 2.2.2 Camden Planning Guidance

The Council has prepared the Camden Planning Guidance (CPG) on energy efficiency and adaptation (March 2019) to support the policies in the Camden Local Plan 2017.

| Energy Reduction Targets, Non-domestic | |
|---|---|
| Development should comply with these standards/ provide this information | Non-domestic Refurbishment (assessed under L2B) |
| | **Major** |
| | (>1,000 $m^2$) |
| Energy Statement required (Local Plan CC1, London Plan 5.2, 5.3) follow GLA Guidance on Preparing Energy Assessments | Required |
| Overall carbon reduction targets | Greatest possible reduction, meeting Part L2B for retained thermal elements (London Plan 5.4, Local Plan CC1) |
| Reduction in $CO_2$ from onsite renewables (after all energy measures have been incorporated) | 20% (London Plan 5.4, 5.7, Local Plan CC1 |

*Table 3: Energy Reduction Targets for Non-Domestic Buildings, Camden Planning Guidance*

As per the Camden Planning Guidance, for non-residential schemes, if the extension is 'small', as defined by the Building Regulations (less than 100m$^2$ or less than 25% of the total useful floor area of the existing building), and subsequently forms part of the refurbishment, then the whole building would be assessed as a refurbishment. However, the new elements should at least meet the limiting values of Part L2B.

### 2.3 Planning Policy Summary

In support of the planning submission this standalone energy statement has been produced to demonstrate how the 18 Park Square East development proposal addresses the following policies and standards:

- National Planning Policy Framework (July 2018);
- Building Regulations Part L2B 2013;
- GLA London Plan 2016 (& supporting guidance);
- GLA Energy Assessment Guidance (October 2018);
- Camden's Local Plan (2017);
- Camden Planning Guidance (CPG) on energy efficiency and adaptation (March 2019)

The planning report does not directly address the draft New London Plan; however, it does embrace the key themes of the draft document.

# 3.0

# Baseline

# 3.0 Baseline

In accordance with the GLA's Energy Assessment Guidance, October 2018 document, for all major refurbishments, developers are required to provide an estimate of the $CO_2$ savings from the refurbishment of the building. To provide this, the $CO_2$ emissions baseline performance of the un-refurbished condition of the existing building were estimated using Building Regulations approved compliance software.

## 3.1 Refurbishment

As this is a major refurbishment, the energy performance of the baseline building has been estimated using approved dynamic simulation software IES Virtual Environment 2018.

### 3.1.1 Fabric Performance

The Target Emission Rate (TER) for the refurbishment was calculated based on the building fabric parameters of the existing building. The existing elements are based on the SBEM default values for retained thermal elements and the date of construction of the building.

| Elements | Baseline Values for Existing Elements |
|---|---|
| Floor average area weighted U-value (W/m$^2$K) | 0.58 |
| Roof/ terrace U-value (W/m$^2$K) | 0.28 |
| External wall average area weighted U-value (including curtain walling) (W/m$^2$K) | 1.70 |
| External window (including frame) average area weighted U-value (W/m$^2$K) | 5.75 |
| External glazing g-value | 0.85 |
| External glazing VLT | 0.90 |
| Pedestrian doors U-value (W/m$^2$K) | 3.00 |
| Air permeability @ 50 Pascals (m$^3$/(hr.m$^2$)) | 25.0 |

*Table 4: Existing Elements Fabric Performance for the Baseline Model*

### 3.1.2 Fixed Building Services

The minimum assumed HVAC efficiencies of the refurbishment have been based upon the minimum energy efficiency standards for existing buildings as per the non-domestic compliance guide.

Heating and cooling to the main building spaces is provided by a Fan Coil Unit (FCU) system using gas fired boilers and a chiller, respectively. Circulation, storage, changing, showers and WC areas are served through Low Temperature Hot Water (LTHW) radiators. Domestic hot water is produced by gas fired boilers for all toilets and basement showers. Mechanical ventilation with heat recovery is supplied to all offices, reception, toilets and basement showers. The table below provides a summary of the inputs for the baseline model:

| System Detail | Baseline Values |
|---|---|
| **Ventilation:** | |
| Ventilation type – offices, reception | Central AHU |
| AHU SFP central (W/l/s) | 1.9 |
| Ventilation type – basement changing rooms and showers | Local MVHR |
| MVHR SFP local (W/l/s) | 1.9 |
| FCU SFP terminal (W/l/s) | 0.5 |
| AHU and MVHR heat recovery type | Plate Heat Exchanger |
| AHU and MVHR heat recovery efficiency (%) | 50.0 |
| Plant and store rooms extract SFP (W/l/s) | 1.50 |
| Plant and store rooms extract flow rate (ach) | 6.00 |
| AHU leakage classification | Class L2 |
| Ductwork leakage classification | Class A |
| **Space Heating:** | |
| Space heating type | Boilers |
| Space heating emitters | FCUs |
| Space heating fuel | Natural gas |
| Space heating seasonal efficiency (%) | 82.0 |
| **Space Cooling:** | |
| Space cooling type | Chillers |
| Space cooling emitters | FCUs |
| Space cooling fuel | Electricity |
| Space cooling seasonal efficiency (SEER) | 2.6 |
| **Domestic Hot Water (DHW):** | |
| DHW heating type | Boilers |
| DHW heating fuel | Natural gas |
| DHW heating seasonal efficiency (%) | 82.0 |
| DHW heating delivery efficiency (%) | 100.0 |
| DHW heating storage volume (L) | 740 |
| DHW heating storage losses (kWh/(lday)) | 0.00581 |
| DHW secondary circulation | Yes |
| **Lighting:** | |
| Luminaire efficacies (Llm/cW) – offices, reception | 80 |
| Luminaire display efficacies (Llm/cW) - reception | 22 |
| Luminaire efficacies (Llm/cW) - other | 60 |
| Lighting controls - offices, circ, toilets, chng rms, cycle str, bin str | None |
| Daylight dimming (applied to perimeter zones 6.0m deep) - offices | None |
| Time Switch (photoelectric / occupancy) | No |
| **Other:** | |
| Pump speed | Constant Speed |
| HVAC systems metering | No |
| HVAC systems out of range warning | No |
| Lighting systems metering | No |
| Lighting systems out of range warning | No |
| Power factor correction | <0.90 |

*Table 5: Refurbishment Building Services Performance for the Baseline Model*

## 3.2 New Extension

As per the Camden Planning Guidance on energy efficiency and adaptation (March 2019), this is a 'small' extension with total useful floor area less than 25% of the existing building, therefore, the whole building would be assessed as a refurbishment. However, the new extension elements should at least meet the limiting values of Part L2B.

For the purposes of this energy assessment, the TER of the new 3rd floor extension was calculated based on the Part L2B minimum specifications for new thermal elements and the minimum energy efficiency standards for new buildings as per the non-domestic compliance guide.

| Elements | Part L2B Minimum Standards for New Thermal Elements |
|---|---|
| Floor average area weighted U-value (W/m$^2$K) | 0.22 |
| Roof/ terrace U-value (W/m$^2$K) | 0.18 |
| External wall average area weighted U-value (including curtain walling) (W/m$^2$K) | 0.28 |
| External window (including frame) average area weighted U-value (W/m$^2$K) | 1.80 |
| External glazing g-value | 0.68 |
| External glazing VLT | 0.71 |
| Pedestrian doors U-value (W/m$^2$K) | 1.80 |
| Air permeability @ 50 Pascals (m$^3$/(hr.m$^2$)) | 10.0 |

*Table 6: New Extension Elements Fabric Performance for the Baseline Model*

# 4.0

# Demand Reduction – ‘Be Lean’

# 4.0 Demand Reduction – 'Be Lean'

The design of the proposed 18 Park Square East development has been developed to reduce its annual energy consumption, provide energy in an environmentally friendly way, and to minimize its annual $CO_2$ footprint. To achieve this, a "Steps to low carbon" methodology has been applied.

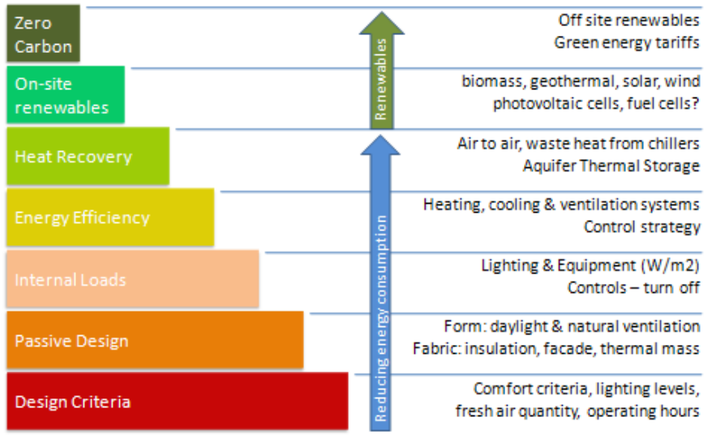



*Figure 7: Steps to low carbon methodology*

## 4.1 Passive Design

Substantial reductions in energy usage for the scheme, together with improved occupancy comfort, will be achieved through consideration of the passive elements of the design. As this is a listed building, the existing building's envelope has not been altered or modified to avoid causing harm to the special architectural and historic interest of the building. However, a layer of insulated plasterboard will be added internally on the existing external walls and secondary glazing is proposed to the existing windows to improve building's energy performance and occupant thermal comfort.

The design team have looked to implement passive design measures in the new extension through optimising the passive solar design and building envelope performance as described in the following sections.

### 4.1.1 Passive Solar Design

Maintaining adequate levels of natural light but at the same time limiting the solar heat gains inside the building, has been an essential part of the project's design philosophy. As this is a listed building, the existing windows have been retained and secondary glazing has been proposed to reduce solar gains.

The new extension glazing has been specified with a low solar transmission (g-value) of 40% but a high visible light transmission (VLT) of 60% to achieve effective daylighting of occupied spaces. The specified g-value means that solar gains into the spaces are limited, reducing the cooling demand required to keep the zones within acceptable comfort levels and limiting the risk of overheating.

The glazing ratio of the building is presented in the next table. This is based on the total façade area including the back of house areas.

| | Glazing Percentage (%) |
|---|---|
| Proposed Development | 17.4% |

*Table 7: Glazing percentage of the proposed development*

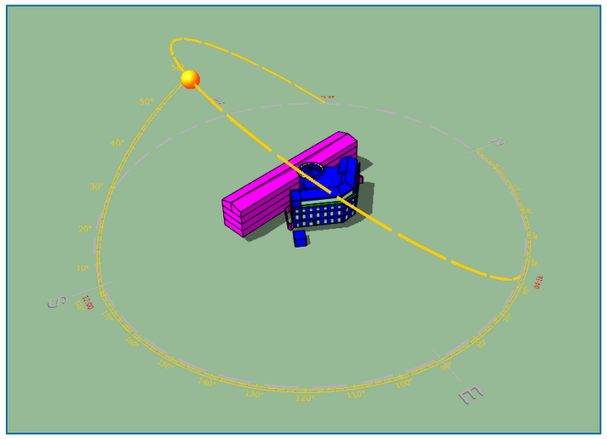


*Figure 8: Sun path analysis conducted in the energy modelling software*

### 4.1.2 Building Fabric

Improving the thermal insulation standards beyond the Building Regulation standards will help to reduce the annual $CO_2$ emissions associated with the building's heating and cooling systems, by limiting the heat loss though the building's fabric.

As this is a listed building, the existing building's envelope has not been altered or modified to avoid causing harm to the special architectural and historic interest of the building. However, a layer of insulated plasterboard will be added internally on the existing external walls and secondary glazing is proposed to the existing windows. The Building Emission Rate (BER) of the refurbished building was based on the SBEM default values for the retained thermal elements and the improved values for upgrading retained thermal elements in accordance with the Part L2B standards.

| Retained Thermal Elements | Part L2B Threshold Standards | Retained Elements |
|---|---|---|
| Floor average area weighted U-value (W/m$^2$K) | 0.70 | 0.58 |
| Roof/ terrace U-value (W/m$^2$K) | 0.35 | 0.28 |
| External wall average area weighted U-value (including curtain walling) (W/m$^2$K) | 0.70 | 1.70 |
| Upgraded external wall average area weighted U-value (including curtain walling) (W/m$^2$K) | 0.30* | 0.30* |
| External windows with secondary glazing (including frame) average area weighted U-value (W/m$^2$K) | 1.80 | 2.97 |
| External glazing g-value | 0.68 | 0.76 |
| External glazing VLT | 0.71 | 0.80 |
| Pedestrian doors U-value (W/m$^2$K) | 1.80 | 3.00 |
| * Part L2B improved value for upgrading retained thermal elements | | |

*Table 8: Building fabric performance for the retained elements of the refurbishment*

As this is a small extension with a total useful floor area lower than 25% of the total useful floor area of the existing building, the newly constructed thermal elements should meet the minimum standards set out in Table 4 of the Approved Document L2B. The BER of the new extension elements is based on the proposed fabric values as follows:

| New Thermal Elements | Part L2B Minimum Standards | Proposed New |
|---|---|---|
| Floor average area weighted U-value (W/m$^2$K) | 0.22 | 0.18 |
| Roof/ terrace U-value (W/m$^2$K) | 0.18 | 0.14 |
| External wall average area weighted U-value (including curtain walling) (W/m$^2$K) | 0.28 | 0.22 |
| External window (including frame) average area weighted U-value (W/m$^2$K) | 1.80 | 1.40 |
| External glazing g-value | 0.68 | 0.40 |
| External glazing VLT | 0.71 | 0.60 |
| Pedestrian doors U-value (W/m$^2$K) | 1.80 | 1.80 |

*Table 9: Building fabric performance for the new extension*

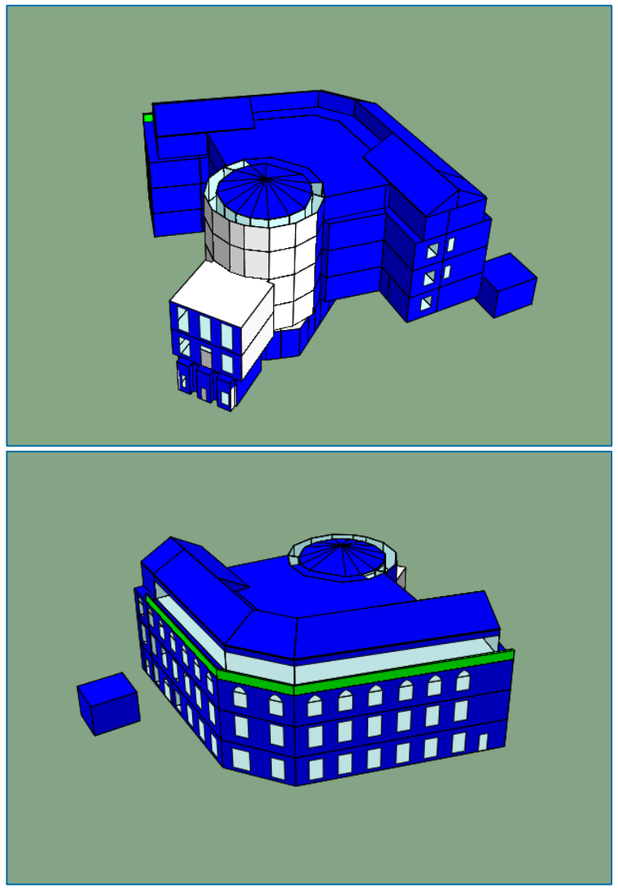


*Figure 9: Perspective images of the 18 Park Square East energy model*

### 4.1.3 Air Permeability

An air leakage rate of 3m³/hr/m² at 50Pa should be targeted for the new office extension in comparison with the Building Regulation minimum standards of 10m³/hr/m² at 50Pa. Good air tightness could be achieved by prefabrication of a number of key building components under factory conditions, robust detailing of junctions and good building practices on site. An air leakage rate of 25 m³/(hr.m²) has been assumed for the existing development. An area-weighted air permeability of 19m³/hr/m² at 50Pa has been used for the whole office refurbishment.

## 4.2 Energy Efficient Systems

After assessing the contribution of the passive elements to the overall energy balance, the aim is to further reduce $CO_2$ emissions by selecting efficient mechanical, electrical and control systems to manage the energy use during operation. On the basis of good practice, the following principles will be adopted throughout the proposed development where possible.

### 4.2.1 Low-energy Lighting

Installing efficient low energy light fittings internally and externally can significantly reduce a building's overall lighting load hence lowering its annual $CO_2$ emissions. The development will reduce the energy consumption by the specification of low energy, high efficacy, LED luminaires in all office areas and within display areas. Where possible, office areas with access to daylight will be equipped with daylight dimming.

### 4.2.2 Heating and Cooling

For the purpose of this assessment and in accordance with the GLA's guidance, the 'Be Lean' scenario utilises a centralised gas-fired boiler system to deliver the space heating and domestic hot water requirements to the offices and reception areas. Cooling will be provided by an electric chiller. Heating to the basement changing rooms and showers will be provided via local electric water heater.

Domestic hot water is produced by gas fired boilers for all toilets and basement showers.

### 4.2.3 Ventilation

Ventilation to office and reception spaces will be provided by central Air Handling Units (AHUs) located on the roof. In the basement changing rooms and showers, fresh air ventilation will be provided via local Mechanical Ventilation Heat Recovery (MVHR) unit. All AHU and MVHR units will incorporate heat recovery with at least the minimum Energy Related Products (ErP) 2018 efficiencies to reduce space heating loads and will utilise low specific fan powers with variable speed drives.

### 4.2.4 HVAC Plant Efficiencies

The design team will specify all equipment and plant to exceed the minimum requirements of the Non-domestic Building Services Compliance Guide. This document provides guidance on the means of complying with the requirements of Part L of the Building Regulations for conventional space heating/ cooling systems, hot water systems and ventilation systems.

### 4.2.5 Variable Speed Pumps and Drives

All fans and pumps will be specified with variable-speed drives, which will reduce their energy consumption by more than two-thirds compared with equivalent constant speed alternatives, by only supplying the required flow rate to meet the demand. Variable speed with multiple pressure sensors will control the speed of the systems.

### 4.2.6 Controls

The heating and cooling systems for both the refurbishment and new extension shall be appropriately zoned, with local fast responding controls. Appropriate lighting controls, including timers, occupancy controls, and daylight sensors and dimming shall be specified where applicable for all internal and external lighting.

### 4.2.7 Building Energy Management System (BEMS)

Where appropriate Building Energy Management System (BEMS) will be used to promote and facilitate a system that supports the energy demand management for commercial buildings (e.g. a system that recognises real-time room conditions in buildings by temperature sensors and/or the optimal operation of lighting and air-conditioning responding to the room condition). A combination of energy saving control techniques, such as optimum start with communication and information systems will allow active management of the building services and the capability to achieve and maintain a high level of energy efficiency.

A full BEMS system will be installed for the development and linked to central control systems. The systems will be easily accessible by the onsite team with automatic monitoring, targeting and automatic alarms for out of range values.

### 4.2.8 Commissioning

Commissioning is a systematic process, which configures a building's HVAC system and integrated control systems to operate at peak performance. Commissioning building systems can provide significant benefits such as improving occupant comfort, reducing energy cost, improving indoor air quality, enhancing building operations and extending equipment life. Hence, an extensive commissioning exercise will be incorporated in the project programme, with time allowed for reconfiguring plant and equipment if needed.

### 4.2.9 Energy Metering

Separate metering systems of the energy uses within the development will help the building users identify areas of excessive consumption and highlight potential energy-saving measures for the future. This will enable on-going reduction of annual $CO_2$ emissions from these systems.

### 4.2.10 Fixed Building Services

Several improvements over the Building Regulation's 'notional' building have been incorporated in order to reduce the $CO_2$ emissions of the development and hence comply with the Building Regulations. The table below provides a summary of the fixed building services inputs for the 'Be Lean' scenario.

| System Detail | 'Be Lean' Design |
|---|---|
| **Ventilation:** | |
| Ventilation type – offices, reception | Central AHU |
| AHU SFP central (W/l/s) | 1.6 |
| Ventilation type – basement changing rooms and showers | Local MVHR |
| MVHR SFP local (W/l/s) | 1.6 |
| FCU SFP terminal (W/l/s) | 0.25 |
| AHU and MVHR heat recovery type | Plate Heat Exchanger |
| AHU and MVHR heat recovery efficiency (%) | 75.0 |
| Plant and store rooms extract SFP (W/l/s) | 0.50 |
| Plant and store rooms extract flow rate (ach) | 6.00 |
| AHU leakage classification | Class L2 |
| Ductwork leakage classification | Class A |
| **Space Heating:** | |
| Space heating type – offices, reception | Boilers |
| Space heating emitters | FCUs |
| Space heating fuel | Natural gas |
| Space heating seasonal efficiency (%) (existing / new) | 82.0 / 91.0* |
| *Part L notional value used for the boiler efficiency of the new extension | |
| **Space Cooling:** | |
| Space cooling type - offices | Chillers |
| Space cooling emitters | FCUs |
| Space cooling fuel | Electricity |
| Space cooling seasonal efficiency (SEER) (existing / new) | 2.6 / 4.5* |
| Space cooling seasonal efficiency (EER) (existing / new) | 2.6 / 4.5* |
| *Part L notional value used for the chiller efficiency of the new extension | |
| **Domestic Hot Water (DHW):** | |
| DHW heating type | Boilers |
| DHW heating fuel | Natural gas |
| DHW heating seasonal efficiency (%) (existing / new) | 82.0 / 91.0* |
| DHW heating delivery efficiency (%) | 100.0 |
| DHW heating storage volume (L) | 740.0 |
| DHW heating storage losses (kWh/(lday)) | 0.00581 |
| DHW secondary circulation | Yes |
| *Part L notional value used for the boiler efficiency of the new extension | |
| **Lighting:** | |
| Luminaire efficacies (Llm/cW) – offices, reception | 120 |
| Luminaire display efficacies (Llm/cW) – reception | 30 |
| Luminaire efficacies (Llm/cW) - other | 80 |
| Lighting controls - offices, circ, toilets, chng rms, cycle str, bin str | Auto on / auto off |
| Daylight dimming (applied to perimeter zones 6.0m deep) - offices | Yes |
| Time Switch (photoelectric / occupancy) | Yes / Yes |
| Parasitic power (photoelectric / occupancy) | 0.10 / 0.10 |
| **Other:** | |
| Pump speed | Variable Speed - Multiple pressure sensors |
| HVAC systems metering | Yes |
| HVAC systems out of range warning | Yes |
| Lighting systems metering | Yes |
| Lighting systems out of range warning | Yes |
| Power factor correction | >0.95 |

*Table 10: Building services performance of 'Be Lean' model*

### 4.3 'Be Lean' Part L Performance Results

In accordance with the London Borough of Camden and the Mayor's Energy Hierarchy, an energy assessment has been carried out for the entire development with the aforementioned passive design and energy efficiency measures. As per the Camden Planning Guidance on energy efficiency and adaptation (March 2019) for non-residential schemes, if the extension is 'small', as defined by the Building Regulations (less than 100m$^2$ or less than 25% of the total useful floor area of the existing building), and subsequently forms part of the refurbishment, then the whole building would be assessed as a refurbishment. However, the new elements should at least meet the limiting values of Part L2B.

The preliminary energy assessment for the proposed office refurbishment is based on the requirements of Part L2B (2013). The analysis indicates that the proposed baseline development is performing significantly better than the minimum requirements of Part L2B 2013 of the Building Regulations and achieves an improvement of 35% as highlighted below. The 'Baseline' and 'Be Lean' BRUKL documents' front page can be found in Appendices A and B, respectively. The complete BRUKL documents can be provided upon request.

| Part L2B 2013 End-uses Breakdown (kgCO$_2$/m$^2$) | | |
|---|---|---|
| End-use | TER | BER |
| Heating | 19.6 | 13.1 |
| DHW | 2.5 | 2.5 |
| Cooling | 1.3 | 0.8 |
| Auxiliary | 5.5 | 3.1 |
| Lighting | 4.6 | 2.1 |
| Renewables | 0.0 | 0.0 |
| Total | 33.4 | 21.7 |
| **Improvement over TER** | | **35.0%** |
| **Part L Status (BER<TER)** | | **Pass** |

*Table 11 : 'Be Lean' Part L2B 2013 End-uses breakdown for the development*

| Carbon Dioxide Emissions for the Refurbished Building (Tonnes $CO_2$ per annum) | Regulated | Unregulated |
|---|---|---|
| Baseline: Part L 2013 of the Building Regulations Compliant Development | 99.7 | 29.9 |
| After energy demand reduction | 64.8 | 29.9 |

*Table 12: Carbon dioxide emissions after energy demand reduction for the development*

| Regulated Carbon Dioxide Savings for the Refurbished Building | (Tonnes $CO_2$ per annum) | (%) |
|---|---|---|
| Savings from energy demand reduction | 34.9 | 35.0 |

*Table 13: Regulated carbon dioxide savings after energy demand reduction for the development*

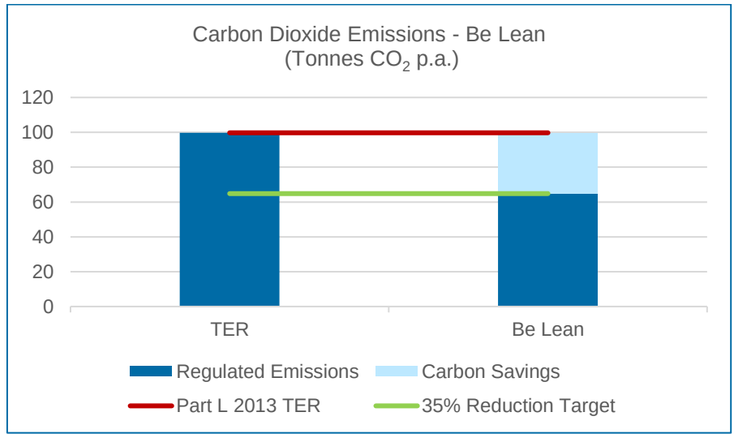



*Figure 10: Be Lean' Regulated Carbon Dioxide emissions for the development*

### 4.4 Energy Demand

The development's energy demand has been calculated and presented in the following table. The estimated annual regulated energy demand is expected to be 301.6MWh/year.

| Total Energy Demand | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Energy demand following energy efficiency measures (MWh/year) | | | | | | |
| Building Elements | Space Heating | Hot Water | Lighting | Cooling | Auxiliary | Unregulated electricity | Unregulated gas |
| Refurbishment | 187.6 | 24.0 | 27.2 | 22.8 | 40.0 | 128.1 | - |

*Table 14: Energy Demand of the development*

# 5.0

# Cooling and Overheating

# 5.0 Cooling and Overheating

The proposed development has been designed to minimise its use of energy intensive cooling systems through passive and energy efficient measures.

## 5.1 GLA Cooling Hierarchy

To reduce the need for cooling and reduce the risk of overheating, the following measures have been taken in accordance with Policy 5.9 of the GLA's Cooling Hierarchy.

### 5.1.1 Minimising internal heat generation

Plug-loads and occupant densities associated with office activities cannot be altered beyond the client's brief. Therefore, the only area that can be targeted is the lighting. Low energy, high efficacy, Light Emitting Diode (LED) lighting will be used through-out the development to minimize internal heat gains.

### 5.1.2 Reducing the amount of heat entering the building

As this is a listed building, the existing windows have been retained and secondary glazing has been proposed to reduce solar gains.

The new extension facades have undergone extensive design review to control the amount of solar gain entering internal spaces. The new façade elements have been specified with a low solar transmission (g-value) of 40%.

Under Part L2B of the building regulations, the area-weighted U-value of all elements in the new extension is no greater than that of an extension of the same size and shape that complies with the U-value standards referred to Part L2B. Therefore, reasonable provision has been made for the extension to meet the Part L2B requirements.

### 5.1.3 Use of thermal mass and high ceiling to manage heat

Due to the listed nature and aesthetic preference of the development, as well as the construction techniques being used, it is not possible to incorporate thermal mass to provide a thermal benefit. The thermal mass of new basement walls may contribute towards slowing the thermal inertia within basement level spaces.

### 5.1.4 Passive ventilation

It is the aspiration of the client for the development to provide a high level of internal environmental control. For this reason, natural ventilation and passive cooling techniques are not appropriate for the development.

### 5.1.5 Mechanical ventilation and active cooling systems

To deliver the high-performance internal environment required by the client/tenant, a mechanical ventilation and cooling strategy has been recommended. All fresh air will be delivered by AHUs in the office and reception areas. On the basement showers and plant rooms, fresh air ventilation will be provided via local MVHRs. Cooling will be provided by air source heat pumps in the office floors, reception and atrium. Efficiency values of these systems will exceed the requirements of the 'Non-Domestic Building Services Compliance Guide'.

## 5.2 Active Cooling

The Part L assessment also provides a quantification of the energy demand likely to be expected of the cooling system. This is compared to the notional building benchmark demand to demonstrate compliance. The table below shows that the cooling demand for the office units is only 77MJ/m$^2$, compared to 172 MJ/m$^2$ for the Notional building. Therefore, the proposed design meets the cooling reduction requirements of Policy 5.9 of the London Plan.

| | Area weighted average non-domestic buildings' cooling demand (MJ/m$^2$) | Area weighted average non-domestic buildings' cooling demand (MJ/year) |
|---|---|---|
| Actual Building | 77 | 230,634 |
| Notional Building | 172 | 513,712 |

*Table 15: Cooling demand for the development*

# 6.0

# Heating Infrastructure – ‘Be Clean’

# 6.0 Heating Infrastructure – 'Be Clean'

## 6.1 District Heating Networks

A district heating network can be utilised to provide low carbon heat to both water-based systems: space heating and domestic hot water supplies. In a development with high heating and DHW loads – such as residential or leisure centre developments – a heating network can deliver significant $CO_2$ savings potential. In an office-based development, where heating requirements are relatively minimal, the heating network carbon savings potential is not as significant.

The feasibility of connecting to an existing district network has been investigated for the site in accordance with Policy 5.6 of the London Plan. An analysis of the London Heat Map (www.londonheatmap.org) indicates that there are no existing or proposed district heating networks within 500m of the site, therefore connection to an existing network is not feasible.

To facilitate future connection, space will be earmarked at the basement level to host a plate heat exchanger, pump and calorifier should a district energy network be commissioned at a later date.

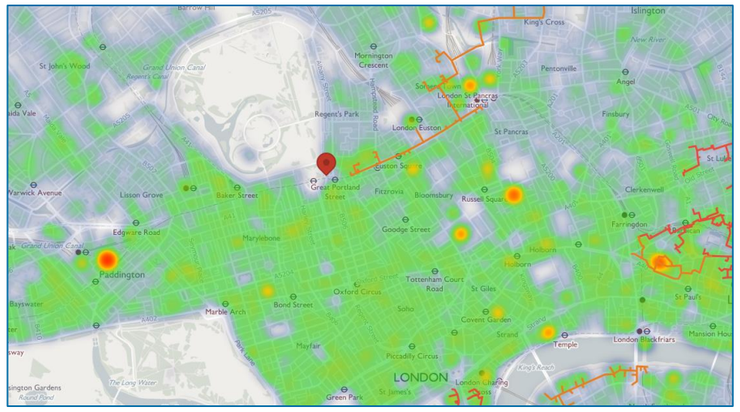



*Figure 11: London Heat Map illustrating the heat density of the area surrounding 18 Park Square East. Red networks are installed, orange networks are proposed routes.*

## 6.2 Combined Heat and Power (CHP)

In accordance with the NPPF, the potential to integrate a new decentralised heating network utilising a combined heat and power unit was investigated.

As with a district heating network, a CHP system can provide significant carbon savings in high heating demand buildings. Where heating demands are low, CHP has the added benefit of electricity generation. In an office building, CHP can be programmed to be 'electrically led', meaning operation is programmed to prioritize the production of electrical energy, rather than thermal. Unfortunately, the efficiency of a CHP system depends on consistent, around-the-clock operation. As office units have an electricity demand that differs dramatically between day and night, it cannot operate with a high level of effectiveness or with high levels of utilisation.

The proposed 18 Park Square East office development has a low heating and domestic hot water demand, which means that any CHP unit would require a large thermal store to modulate out the loads and achieve sufficient run hours. As CHP units can only operate down to half of their peak output, the load needs to be constant to prevent the unit cutting out. A CHP unit will also require extensive exhaust gas treatment to limit the NOx emissions from combustion. There will also be issues with routing the required flues from the basement plant rooms through to the roof of the development.

Further to the above, when utilising the SAP 10 emissions factors as required by the GLA's energy guidance CHP systems no longer result in any $CO_2$ savings

For these reasons, a combined heat and power unit is not considered feasible for the 18 Park Square East development.

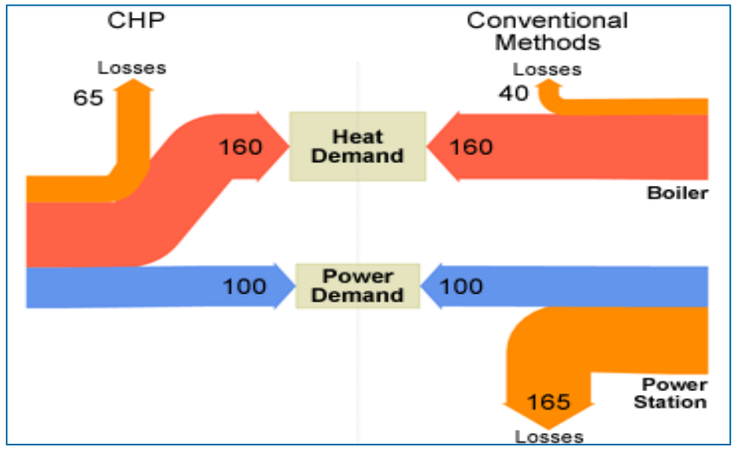



*Figure 12: Sankey diagram illustrating the energy flows and benefits of CHP vs boiler heating.*

## 6.3 'Be Clean' Part L Performance Results

A new decentralised source of heat and power is not compatible with the proposed 18 Park Square East development, but an allowance has been made for the future connection to a district system.

| Carbon Dioxide Emissions for the Refurbished Building (Tonnes $CO_2$ per annum) | Regulated | Unregulated |
|---|---|---|
| Baseline: Part L 2013 of the Building Regulations Compliant Development | 99.7 | 29.9 |
| After energy demand reduction | 64.8 | 29.9 |
| After decentralised energy | 64.8 | 29.9 |

*Table 16: Carbon dioxide emissions after decentralised energy for the development*

| Regulated Carbon Dioxide Savings for the Refurbished Building | (Tonnes $CO_2$ per annum) | (%) |
|---|---|---|
| Savings from energy demand reduction | 34.9 | 35.0 |
| Savings from decentralised energy | 0.0 | 0.0 |

*Table 17: Regulated carbon dioxide savings from decentralised energy for the development*

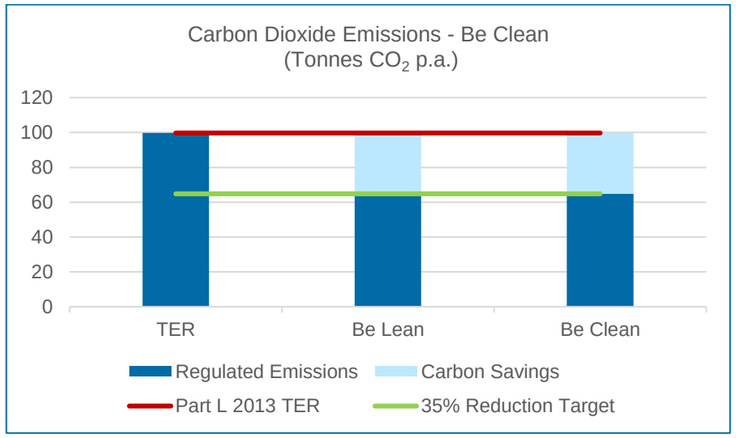



*Figure 13: 'Be Clean' Regulated Carbon Dioxide emissions for the development*

# 7.0

## Renewable Energy – ‘Be Green’

# 7.0 Renewable Energy – 'Be Green'

Policy 5.7 of the London Plan requires that all major developments seek to reduce their $CO_2$ emissions by at least 20% through the use of onsite renewable energy generation, wherever feasible. The latest GLA Energy Assessment Guidance (October 2018) now desires maximisation of onsite renewable energy generation.

The following technologies have been considered for supplying a portion of each development's energy demand. The feasibility of each of the energy sources listed has been assessed with regard to the potential contribution each could make to supply a proportion of the development's delivered energy requirement, whilst considering the technical, planning, land use and financial issues.

## 7.1 Biomass Heating

Biomass in the form of logs, wood chips and wood pellets are classified as a renewable source of energy since the carbon dioxide emitted when the biomass is burned has been taken out of the atmosphere by the growing plants. Even allowing for emissions of carbon dioxide in planting, harvesting, processing and transporting the fuel they will typically reduce net $CO_2$ emissions by over 90%.

The proposed development has a minor heating demand due to the specification of a high-performance building envelope. Biomass boilers require comprehensive maintenance policies to ensure smooth operation and supply chains to be set up to supply the boilers with a constant stream of fuel. They are ill suited to meeting the minor heat demand of the site and their associated NOx emissions would impact local air quality. They also require significant space for storage and delivery of fuel.

Therefore, biomass boilers are not considered to be appropriate for the 18 Park Square East development.

## 7.2 Solar Hot Water Collectors

Solar thermal collectors utilise solar radiation to heat water for use in buildings. The optimum orientation for a solar collector in the UK is a south-facing surface, tilted at an angle of 30º from the horizontal.

Solar collectors are typically designed to meet a development's base heat load, associated with its domestic hot water requirements. For residential development, this usually equates to 60-70% of the total DHW annual load, with the natural gas-fired boilers meeting the remainder of the load. For office developments, the hot water demand is usually a lower proportion of the overall heating demand, unless there are comprehensive changing facilities with showers. Therefore, the advantages of solar thermal collectors are limited for this type of developments as the domestic hot water load is limited.

As the 18 Park Square East development has an office usage, the domestic hot water load is minor component of the energy consumption. Furthermore, there is limited riser space available to route the required flow and return pipework from the roof of the development to the basement floors. For this reason, solar thermal collectors are not considered viable for the 18 Park Square East office development.

## 7.3 Air Source Heat Pumps (AHSP)

Air source heat pumps exchange heat between the outside air and a building to provide space heating in winter and cooling in the summer months. The efficiency of these systems is inherently linked to the ambient air temperatures.

Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pump systems can supply as much as 4kW of heat output for just 1kW of electrical energy input.

The main type of air source heat pump system is the Variable Refrigerant Flow (VRF). VRF systems transfer heat from one location to another using refrigerant. The volume or flow rate of refrigerant is accurately matched to the required heating or cooling loads, thereby saving energy and providing more accurate control of temperatures and energy consumption.

VRF heat pumps demonstrate an improvement in efficiency over conventional air-cooled chillers when in cooling mode, and they can recover heat when in heating mode, further improving their efficiency.

Analysis indicates that using an air source heat pump system for space heating and space cooling in the development could reduce $CO_2$ emissions by 32.7% for the refurbishment over a conventional HVAC configuration. Therefore, ASHPs are included in the development.

The following assumptions have been used for the ASHPs:

- The ASHPs could provide around 53,000 kWh of heating and cooling energy to the development and the electricity consumption would be around 17,000 kWh for this purpose.
- The Seasonal Coefficient of Performance (SCOP) and Seasonal Energy Efficiency ratio (SEER) are presented in Table 27.
- The ASHPs should comply with the minimum performance standards as set out in the Enhanced Capital Allowances (ECA) product criteria and the relevant issues as outlined in the Microgeneration Certification Scheme Heat Pump Product Certification.
- The $CO_2$ savings associated with this system are around 23.0 tonnes $CO_2$ per annum for the development.
- The expected cost to the occupants is estimated to be £1,600 and it has been reduced by around 82% through energy efficient design.
- A full BEMS system and metering systems of the energy uses within the development will be included to supply end-users with regular information to control and operate the system. The performance of the ASHP system will be monitored at post-construction to ensure it is achieving the expected performance.
- As this is an air-cooled refrigerant based system is expected to be much more efficient than a traditional water-cooled system. The difference between the heat source temperature and heat distribution temperature is expected to be minimised.

| Detail | 'Be Green' Design values |
|---|---|
| Heating and Cooling | |
| Heating and Cooling Type | Air source heat pump |
| Heating efficiency (SCOP) | 3.00 |
| Cooling efficiency (SEER) | 4.50 |

*Table 18: Heating and Cooling Efficiency of ASHPs*

## 7.4 Ground Source Heat Pumps (GHSP)

Ground source heat pumps differ from air source heat pumps in that they extract heat from the ground and pump it into a building to provide space heating and to pre-heat domestic hot water. In the summer months, this process can be reversed, rejecting heat to the ground, to meet the cooling requirements of a building.

GSHPs rely on the stable temperature of the ground of between 10-14ºC. In winter when the ambient air temperatures are below this ground source heat pumps have higher CoPs than air source heat pumps (as there is more thermal energy in the ground).

A GSHP is not considered a viable solution in this development as it does not have balanced cooling and heating load. In addition, as the proposed development is located on a constrained site and with limited ground space it would not be possible to install any ground coupled system and hence GSHP have been discounted from this assessment.

For these reasons, ground source heat pumps are not considered viable for the 18 Park Square East development.

## 7.5 Wind Turbines

The output from wind turbines is highly sensitive to wind speed. Hence it is essential that turbines should be sited away from obstructions, with a clear exposure, or fetch, for the prevailing wind.

In urban environments, it is difficult to achieve high wind speeds that would make the operation of turbines viable. Turbines would need to be located at a site where wind is channelled and is of a consistently high speed and laminar flow. The most likely option for this is on top of a tall building, clear of the urban canopy layer, where obstructions and surrounding buildings would not interfere with the wind flow.

The location of the 18 Park Square East site within a densely built-up urban environment would result in a turbulent flow regime across the site, which would reduce the potential electrical output from wind turbines. It is also unlikely to be acceptable in townscape terms and for a listed building, and as such it is not proposed to include wind turbines as part of the development.

For these reasons, wind turbines are not considered a feasible LZC solution for the site.

## 7.6 Photovoltaics (PV)

Photovoltaic solar cells convert solar energy directly into electricity. The cells consist of two layers of silicon with a chemical layer between. The incoming solar energy charges the electrons held within the chemical. The energised electrons move through the cell into a wire creating an electrical current.

The advantage of photovoltaic cells is once they are installed they require minimal maintenance over their operational life and have no primary fuel requirements.

The proposed roof area/design is allocated as amenity area offering the occupants vital outdoor space. Therefore, there is no space to accommodate a PV system. In addition, the use of PVs will not be accepted by the planners for a listed building. The use of air source heat pumps provides the required emissions reduction in accordance with Policy 5.7 of the London Plan. Therefore, the installation of PVs in the roof of the development is not proposed for the scheme.

### 7.7 'Be Green' Part L Performance Results

In accordance with Policy 5.7 of the London Plan, investigations into providing a proportion of the site's energy requirements through renewables was undertaken.

Variable refrigerant flow air source heat pumps are proposed to provide the cooling and heating to the building's main spaces.

The tables below give the $CO_2$ emissions of the site at each stage of the energy hierarchy. The unregulated emissions remain the same throughout each stage of the hierarchy, as savings from energy efficiency measures and renewables are applied to the regulated emissions only.

The analysis indicates that the proposed development is achieving a 67.7% improvement over the Building Regulations Part L 2013 Target Emission Rate. The 'Be Green' BRUKL document's front page can be found in Appendix C. The complete BRUKL document can be provided upon request.

| Carbon Dioxide Emissions for the Refurbished Building (Tonnes $CO_2$ per annum) | Regulated | Unregulated |
|---|---|---|
| Baseline: Part L 2013 of the Building Regulations Compliant Development | 99.7 | 29.9 |
| After energy demand reduction | 64.8 | 29.9 |
| After decentralised energy | 64.8 | 29.9 |
| After renewable energy | 32.2 | 29.9 |

*Table 19: Carbon dioxide emissions after renewable energy for the development*

| Regulated Carbon Dioxide Savings for the Refurbished Building | (Tonnes $CO_2$ per annum) | (%) |
|---|---|---|
| Savings from energy demand reduction | 34.9 | 35.0 |
| Savings from decentralised energy | 0.0 | 0.0 |
| Savings from renewable energy | 32.7 | 32.7 |
| Total Cumulative Savings | 67.5 | 67.7 |

*Table 20: Regulated carbon dioxide savings from renewable energy for the development*

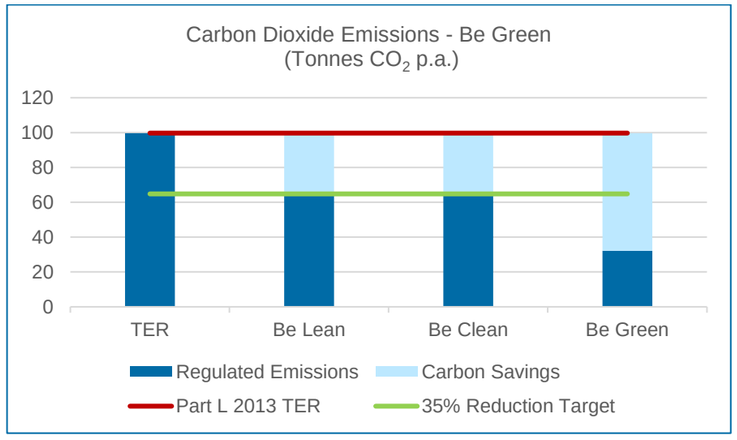



*Figure 14: Regulated carbon dioxide emissions from each stage of the energy hierarchy for the development*

# 8.0

# Proposed Energy Strategy

# 8.0 Proposed Energy Strategy

In accordance with the Camden Council's planning requirements and the GLA's London Plan, the following Energy Statement has been developed for the proposed 18 Park Square East development, in Marylebone, London.

The proposed development consists of a change of use of building from institutional use (SG) to be used as Offices (Class B1a), extension at roof level to provide new third floor, internal subdivision, infilling, refurbishment and associated works. The total GIA area of the building is 2,878.9 $m^2$.

As per the Camden Planning Guidance on energy efficiency and adaptation (March 2019), for non-residential schemes if the extension is 'small', as defined by the Building Regulations (less than 100$m^2$ or less than 25% of the total useful floor area of the existing building), and subsequently forms part of the refurbishment, then the whole building would be assessed as a refurbishment. However, the new elements should at least meet the limiting values of Part L2B.

In accordance with the GLA Energy Assessment Guidance (October 2018), for these calculations the SAP 10 emission factors have been used to present the results. The energy strategy has been developed by following the energy hierarchy; Be Lean, Be Clean and Be Green.

**Baseline Summary**

As this is a major refurbishment, the $CO_2$ emission baseline performance of the un-refurbished condition of the existing building has been estimated using approved dynamic simulation software IES Virtual Environment 2018.. The Target Emissions Rate of the refurbishment has been based on the SBEM default values for retained thermal elements and the date of construction of the building. The TER of the new 3rd floor extension is based on the Part L2B minimum standards for new thermal elements. The 'Baseline' BRUKL document's front page can be found in Appendix A.

**Be Lean Summary**

As this is a listed building, the existing building's envelope has not been altered or modified to avoid causing harm to the special architectural and historic interest of the building. However, a layer of insulated plasterboard will be added internally on the existing external walls and secondary glazing is proposed to the existing windows to improve building's energy performance and occupant thermal comfort. The new extension's building envelope will be designed to perform significantly better than the Building Regulation standards with low U-values, g-values and a low air permeability.

Passive solar considerations have formed an integral part of the design for the proposed development. Analysis has been carried out to optimise the new extension facade so that the solar gains and associated cooling loads are reduced, providing a more comfortable internal environment for occupants. The area-weighted U-value of the new extension is less than that of an extension of the same size that complies with the Part L2B requirements.

For the purpose of this assessment and in accordance with the GLA's 'Guidance on Preparing Energy Statements October 2018, the 'Be Lean' scenario utilises a centralised gas-fired boiler system to deliver the space heating and domestic hot water requirements. Cooling will be provided by an electric chiller. Heating to the basement shower areas will be provided by gas fired radiators. Heating and domestic hot water will be provided by gas-fired boilers in all toilets and basement showers.

Ventilation to office and reception areas will be provided via central Air Handling Units. In the basement showers and plant rooms, fresh air ventilation will be provided via a local Mechanical Ventilation Heat Recovery unit. All AHU and MVHR units will incorporate heat recovery with at least the minimum Energy Related Products 2018 efficiencies to reduce space heating loads and will utilise low specific fan powers with variable speed drives.

The energy efficiency measures employed in the occupied spaces include highly efficient Light Emitting Diode lighting coupled with daylight dimming at all perimeter office and reception areas. All display lighting in the reception areas will be high efficacy. Offices, toilets, changing rooms and circulation areas will benefit from occupancy PIR detection. Electrical and mechanical systems will be tightly metered and controlled with a Building Management System. This will enable energy use to be tracked and opportunities for efficiency improvements to be made.

The application of passive and active design measures allows the refurbishment to achieve a 35% reduction over the baseline TER. The 'Be Lean' BRUKL document's front page can be found in Appendix B.

**Be Clean Summary**

An investigation into the feasibility of connecting to an existing or proposed district network as per the Policy 5.6 of the London Plan indicates that there are no existing district heating networks within a feasibly distance. However, future proofing of a connection to a district network has been considered. Combined Heat & Power is also unfeasible due to the low heating loads and high spatial requirements of such a system. In addition, gas-fired CHPs are no longer offering high carbon savings because of the new SAP10 emission factors. Therefore, no decentralised system is included in the energy strategy.

**Be Green Summary**

An analysis of a range of Low and Zero Carbon technologies has been conducted to determine which offer feasible carbon emissions savings. The analysis found that air source heat pumps offer the highest potential for savings. This system could reduce $CO_2$ emissions by 32.7% for the refurbishment over a conventional HVAC configuration. Space heating and cooling will be provided by electric Air Source Heat Pumps to the office and reception areas, circulated through a CAM-V under floor air conditioning system. In the ground floor reception and atrium, heating and cooling will be provided by electric Air Source Heat Pumps through a 4-pipe Fain Coil Unit system. Basement heating will be provided by electric heaters. Domestic hot water will be generated by gas-fired boilers in all toilets and basement showers. The 'Be Green' BRUKL document's front page can be found in Appendix C.

**Results**

The analysis indicates that the proposed development is performing significantly better than the minimum requirements of Part L2B 2013 of the Building Regulations and achieves an improvement of 67.7% over the Building Regulations Part L 2013 Target Emission Rate as highlighted below.

| Regulated Carbon Dioxide Savings for the Refurbished Building | (Tonnes $CO_2$ per annum) | (%) |
|---|---|---|
| Savings from energy demand reduction | 34.9 | 35.0 |
| Savings from decentralised energy | 0.0 | 0.0 |
| Savings from renewable energy | 32.7 | 32.7 |
| Total Cumulative Savings | 67.5 | 67.7 |

*Table 21: Regulated carbon dioxide savings for the development*

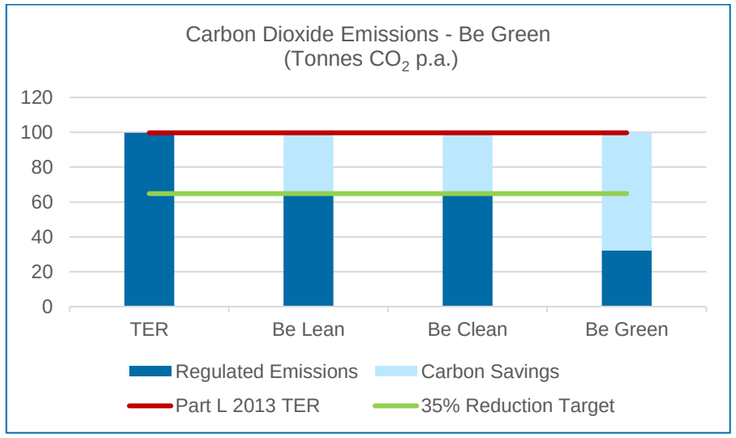



*Figure 15: Regulated carbon dioxide emissions for the development*

# 9.0

# Sustainability Strategy

# 9.0 Sustainability Strategy

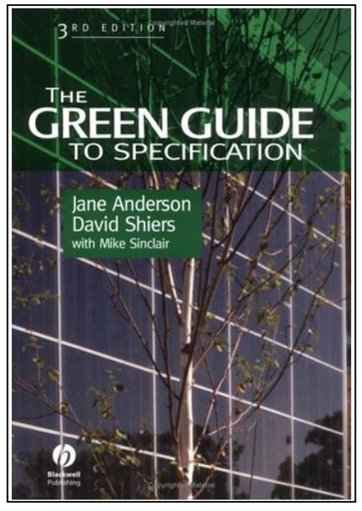
## 9.1 Materials

Building and construction activities worldwide consume 3 billion tonnes of raw material each year, which account for approximately 50% of total global consumption. Using green/sustainable building materials and products promotes conservation of dwindling non-renewable resources. In addition, integrating sustainable building materials into building projects can help reduce the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these source materials.

The 18 Park Square office development can reduce site-wide embodied carbon emissions through reuse of the existing site materials and structure and careful selection of new building materials. The opportunity to reuse certain elements means that $CO_2$ emissions associated with the procurement, manufacture and transportation of new materials can be reduced.

### 9.1.1 Environmental Impact of Materials

Materials with low overall environmental impact will be chosen and advice from the Green Guide to Specification will be taken into consideration for the selection. The Green Guide rates the environmental impact of different materials and components, considering factors like toxicity, ozone depletion, ease of recycling, and waste disposal (core issues marked with an asterisk under Environmental Issue). Where viable, at least 80% (by area) of the main elements in the building, fabric & building services insulation should be specified to achieve the best performing "A" and "A+" ratings from the Green Guide.




| Environmental Issue |
|---|
| Climate Change* |
| Water extraction |
| Mineral extraction |
| Stratospheric ozone depletion* |
| Human toxicity |
| Ecotoxicity to freshwater |
| Higher level nuclear waste |
| Ecotoxicity to land |
| Waste disposal |
| Fossil fuel depletion |
| Eutrophication* |
| Photochemical ozone creation* |
| Acidification* |

*Figure 16: Green Guide to Specification, to be included in the Green Fit-Out Guide*

### 9.1.2 Sustainable Timber

All timber used for basic or finishing building elements in the scheme will be sourced from responsibly managed and sustainable forests or plantations. Such timber products are the only truly renewable construction material in common use and the responsible management of forests for timber helps to lock in $CO_2$.

By maximising the use of timber for structural or finishing purposes the embodied carbon impact of the development can be reduced.

### 9.1.3 Locally Sourced Materials

A building that is truly sustainable must be constructed using locally sourced, sustainable materials i.e. materials that can be supplied without any adverse effect on the environment. Therefore, where practical, materials should be sourced from local suppliers, reducing the environment impacts and $CO_2$ emissions associated with transportation to the site.

### 9.1.4 Recycled Materials

Scope for increased recycling will be incorporated by specifying recycled materials where possible and ensuring that even where new materials are used, as much as possible can be recycled at the end of the building's life.

Specifying materials with a high-recycled content is also another method of saving processing or manufacturing energy. The recycled content of a material can be described as either post-consumer or post-industrial to indicate at what point in the life cycle a material is reclaimed.

### 9.1.5 Ozone Depletion and Global Warming

CFCs and HCFCs, compounds commonly used in insulation materials and refrigerants, can cause long-term damage to the Earth's stratospheric ozone layer, exposing living organisms to harmful radiation from the sun. They also significantly increase global-warming if they leak into the atmosphere. Following the Montreal Protocol, production and use of CFCs is no longer permitted. However, products that replaced these gases are often still potent global warming contributors.

All insulation materials specified for the proposed scheme will have zero Ozone Depleting Potential and low Global Warming Potential, (GWP<5) in either manufacture or composition. This will include insulation for building elements (ceiling, internal & external walls, and floor – including foundations) as well as insulation for hot water vessels and pipe or duct work.

### 9.1.6 Relevant Policy

It is anticipated that the above contributes to the requirements for:

- London Plan Policy 5.17 Waste Capacity;
- Camden Policy CC5 Waste.

## 9.2 Water Conservation

Water consumption in the UK has risen by 70% over the last 30 years. Trying to meet the increasing demand by locating new sources of water supply is both expensive and damaging to the environment. Therefore, the design team have focused on reducing the demand for water and managing the existing resources.

### 9.2.1 Water Demand Reduction and Water Efficiency

The aim is to minimise internal and external potable water use within the development. Good water management can contribute to reducing the overall level of water consumption maintaining a vital resource and having environmental as well as cost benefits in the life-cycle of the building. The following water saving measures are being considered for a range of areas following the BREEAM guidance and will be included within the tenant's Green Fit-out Guide:

***Dual Flush Cisterns on WC's*** - These units have the ability to provide a single flush of 3L and/or a full flush of 6L. It is proposed that these are used throughout the development in order to minimise water consumption.

***Flow Restrictors to Taps*** - Flow restrictors reduce the volume of water discharging from the tap. Spray taps have a similar effect and are recommended to reduce both hot and cold-water consumption. Low flow taps in one of the above forms will be installed in all of areas so as to comply with the BREEAM mandatory requirements.

***Low Flow Showers -*** The average shower uses 15 litres of water a minute, by restricting the output of the showers in the development to a maximum of 9 litres/ min a 40% water saving can be achieved. Flow rate can be reduced down to 6 litres/ minute without compromising on water pressure and hence will be considered as the design develops.

***Water Meters*** - In 1995 approximately 33,200 million litres of water a day were extracted in England and Wales, this increased to 44,130 million litres/day in 2001, and much of this was for domestic water supply. To reduce this figure, accurate information on usage is required for management of a building's consumption. Water meters will be specified on the main supply and sub-metering in line with the BREEAM requirements.

### 9.2.2 Sustainable Urban Drainage

The Environment Agency's Flood Map indicates that the site is in Flood Zone 1. This means that the development does not require a flood risk assessment as there is a low probability of flooding – less than a 1 in 1,000 annual probability of river or sea flooding.

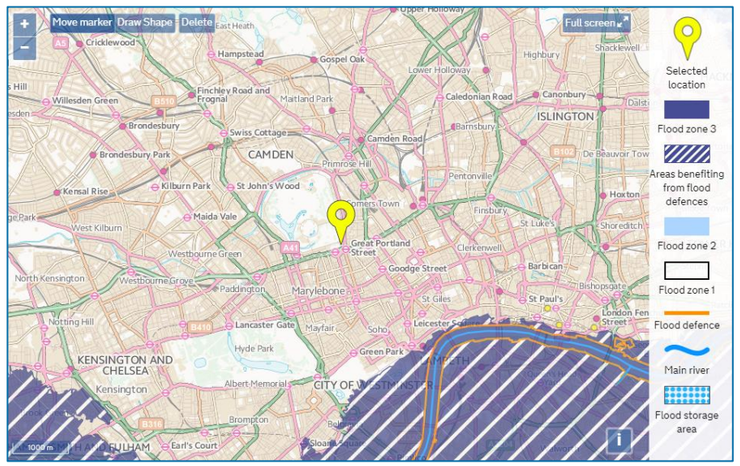



*Figure 17. Flood Map of 18 Park Square East development, marking the site in a low-risk area*

The site is currently completely impermeable with hard landscaping and building areas. The main aim of the drainage strategy is to make surface water run-off no worse than it was previously.

### 9.2.3 Relevant Policy

It is anticipated that the above contributes to the requirements for:

- London Plan Policy 5.12 Flood Risk Management, Policy 5.13 Sustainable Drainage, Policy 5.15 Water Use and Supplies;
- Camden Policy CC3 Water and flooding.

## 9.3 Waste Management

Buildings and building sites produce a significant amount of waste per year. Most of the waste produced in the UK is disposed of in landfill sites and only a small percentage of it is recycled or reused.

### 9.3.1 Waste Targets

Under EU legislation the UK will have to ensure that less than a third of its waste is sent for burial in landfill sites by 2020 and the figure at present is about 80%. To achieve this target several measures are implemented, including landfill tax, aiming to discourage disposal of waste to landfill. Good waste management is a key component of sustainable development and is an important means of:

- Reducing unnecessary expenditure;
- Reducing the amount of natural resources for production of new materials;
- Reducing energy for waste disposal;
- Reducing levels of contamination and pollution arising from waste disposal.

### 9.3.2 Demolition and Construction

During the construction phase a large amount of waste material will be generated through the strip out and refurbishment procedures. In building construction, the primary waste products in descending percentages are wood, asphalt/concrete/masonry, drywall, roofing, metals, and paper products.

An appropriate pre-refurbishment audit should be carried out at the Concept Design Stage (equivalent to RIBA stage 2) prior to strip-out or demolition works. A compliant resource management plan covering the waste arisings from the refurbishment should be developed and implemented that complies with the requirements of current legislation and BREEAM. This plan will identify the local waste haulers and recyclers, determine the local salvage material market, identify and clearly label site spaces for various waste material storage and require a reporting system that will quantify the results and set targets. As a minimum, the resource plan will contain:

a. The target benchmark for resource efficiency is 11.3m$^3$ or 3.5 tonnes per 100m$^2$ of GIA;

b. Procedures and commitments for minimising non-hazardous waste in line with the benchmark;

c. Procedures for minimising hazardous waste;

d. Procedures for monitoring, measuring and reporting hazardous and non-hazardous site waste;

e. Procedures for sorting/ reusing/ recycling construction waste into defined waste groups either on site or through a licensed external contractor;

f. The name/ job title of the individual responsible for implementing the above.

As the proposed 18 Park Square office development constitutes a major refurbishment, there is the potential for using waste materials from the existing buildings and hard paved areas. Bricks and concrete could possibly be reused as hard-core materials etc. Opportunities for introducing more reused or reusable materials/ components will be explored during detailed design.

### 9.3.3 Waste Management and Reporting in Operation

The detailed design phases will identify the potential waste streams that the development will produce. As a minimum, plans will be formulated to handle the separation, collection, and storage of common recyclable materials such as paper, glass, plastics, and metals. The collection points will be easily accessible to all users.

The main aim will be to recycle as much waste as possible, this will be achieved by making sure that waste recycling facilities are strategically placed in convenient locations.

Dedicated storage space for recyclable materials generated by the site during occupation, will include the following:

- Be clearly labelled for recycling;
- Be placed within accessible reach of the buildings;
- Be in a location with good vehicular access to facilitate collections.

At key ground floor and basement locations there will be several colour coded waste recycling collection points, which will be emptied on a regular basis. The split recycling streams will then be directed to an accessible refuse area, where the separate streams can be stored until collected by the Westminster City Council.


*Figure 18: Recycling Waste Streams*

The split recycling streams will then be directed to an accessible refuse area, where the separate streams can be stored until collected by the City of Westminster.

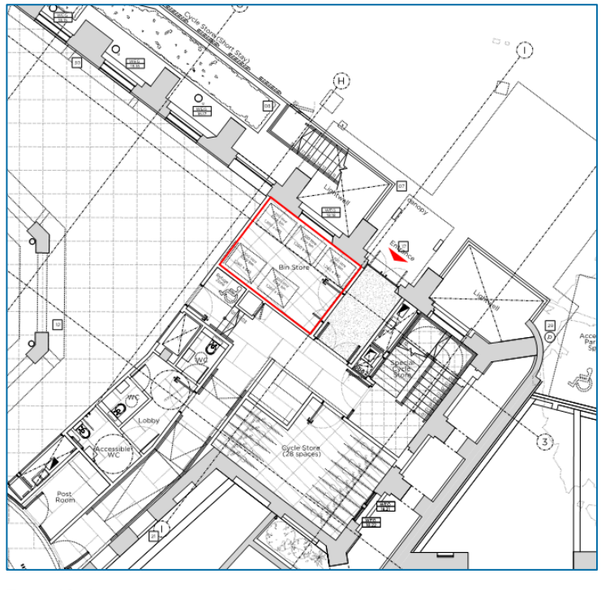



*Figure 19: Accessible bin store at ground floor*

### 9.3.4 Construction Environmental Management

Construction sites are responsible for significant impacts, especially at a local level. These arise from noise, potential sources of pollution, waste and other disturbances. Impacts such as increased energy and water use are also significant. Therefore, attention is being given to site-related parameters with the aim to protect and enhance the existing site & its ecology.

The aim is to have a construction site managed in an environmentally sound manner in terms of resource use, storage, waste management, pollution and good neighbourliness.

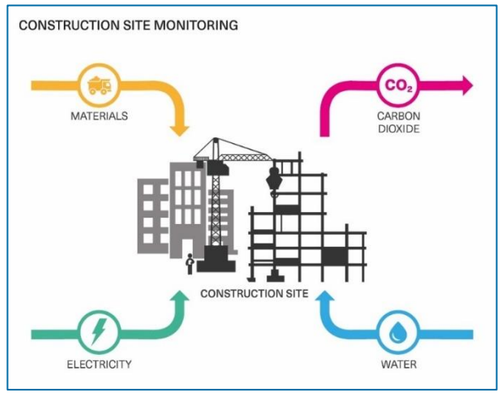



*Figure 20: Considerate Construction Scheme*

To achieve this, there will be a commitment to comply with the Considerate Constructors Scheme and achieve formal certification under the scheme in line with the BREEAM requirements. As a minimum, a score of greater than 35 out of 50 will be achieved, with no individual section achieving a score of less than 7.

Areas that can be taken into consideration in order to minimise the impact of the construction site on its surroundings and the global environment as outlined in the BREEAM methodology are:

- Monitor, report and set targets for $CO_2$ or energy usage from site activities;
- Monitor, report and set targets for $CO_2$ or energy usage arising from transport to and from site;
- Monitor, report and set targets for water consumption from site activities;
- Monitor construction waste on site, sorting and recycling construction waste where applicable;
- Adopt best practice policies in respect of air and water pollution arising from site activities;
- Operates an Environmental Management System;
- Additionally, all timber used on site will be responsibly sourced.

### 9.3.5 Relevant Policy

It is anticipated that the above contributes to the requirements for:

- London Plan Policy 5.17 Waste Capacity;
- Camden Policy CC5 Waste.

## 9.4 Pollution

Global concern for environmental pollution has risen in recent years, as concentrations of harmful pollutants in the atmosphere are increasing. Buildings have the potential to create major pollution both from their construction and operation, largely through pollution to the air (dust emissions, NOx emissions, ozone depletion and global warming) but also through pollution to watercourses and ground water. The proposed development will aim to minimise the above impacts, both at the design stage and onsite.

### 9.4.1 Ozone Depletion

CFCs and HCFCs, compounds commonly used in insulation materials and refrigerants, can cause long-term damage to the Earth's stratospheric ozone layer, exposing living organisms to harmful radiation from the sun. They also significantly increase global-warming if they leak into the atmosphere. Following the Montreal Protocol, production and use of CFCs is no longer permitted. However, products that replaced these gases are often still potent global warming contributors. Where refrigerants are used for air-conditioning and comfort cooling they will be CFC and HCFC-free.

### 9.4.2 Internal pollutants

Volatile organic compounds (VOCs) are emitted as gases (commonly referred to as off-gassing) from certain solids or liquids. VOCs include a variety of chemicals, some of which are known to have short-term and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.

VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials, furnishings, adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling, particleboard, fibreboard) and furniture made with these pressed wood products.

'No' or 'low' VOC paints are available from most standard mainstream paint manufacturers. There 'eco-friendly' paints are made from organic plant sources and also powdered milk-based products.

The design team will seek to select internal finishes and fittings with low or no emissions of VOCs and comply with European best practice levels as a minimum.

An indoor air quality plan will be produced and implemented, with the objective of facilitating a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during the design, construction and occupation of the building.

### 9.4.3 Night Sky Pollution

External lighting encompasses vehicle and pedestrian access lighting, security lighting, facility illumination and general feature lighting. A separate light pollution advice note is being submitted with the planning application but in summary the lighting will be designed on a site wide basis to meet the mandatory requirements and aesthetic considerations. The strategy is to provide a balance between adequate external lighting for safe and secure operation of the site without unnecessary illumination or power consumption.

The intention is to be a good neighbour and not to introduce nuisance glare or light pollution of the night sky from miss directed or unnecessary lighting. Feature lighting, where required, will be focussed to the task/ subject. Where necessary luminaires will be further screened in cases where there may be an issue of close proximity and light spill to the adjacent neighbouring residential areas, although the intention is to avoid this situation arising wherever possible from the outset. The external lighting design will take into consideration the relevant guidance from the British Standards and other recommended documents including the following Standards and Design Guides:

- CIBSE Lighting Guide for the Outdoor Environment;
- CIBSE Lighting Design Guides;
- BS5489 Code of Practice for the Design of Road Lighting;
- BS EN 13201-1 Road Lighting, Selection of Lighting Classes;
- BSEN 13201-2 Road Lighting, Performance requirements;
- Institute of Lighting Engineers Guidance Notes for the Reduction of Obtrusive Light.

### 9.4.4 Relevant Policy

It is anticipated that the above contributes to the requirements for:

- Camden Policy CC4 Air quality.

## 9.5 Land Use Ecology

The site currently comprises of an existing building in Central London. There is no evidence of any local ecology. Increasing the biodiversity and enhancing the ecology of the site has been one of the key aims of the proposed development. The other aim will be to prevent the loss of any further natural habitat.

The landscaping strategy for the development includes increased amounts of the planting in the roof terrace areas to improve ecology and biodiversity of the site compared to the current situation.

### 9.5.1 Relevant Policy

It is anticipated that the above contributes to the requirements for:

- London Plan Policy 7.19 Biodiversity and Access to Nature.

## 9.6 Transport

The transport of people between buildings is the second largest source of $CO_2$ emissions in the UK after energy use in buildings and remains the main source of many local pollutants. Energy use and emissions from transport are growing at 4% per year, while the effects of climate change are becoming more severe.

### 9.6.1 Site Location

The existing site offers multiple public transport options within an easily walkable distance. Reflecting the variety of transport options, the London Public Transport Accessibility Level (PTAL) for the site is 6b, indicating excellent transport links.

The site is located within 3 minutes' walk (160m) of Great Portland Street (Metropolitan and Hammersmith & City lines) and Regent's Park (Bakerloo line) underground stations.

There are also bus stops on Marylebone Road and Albany Street within a 3 minutes' walk (160m), serving bus day routes 18, 27, 205 and 88.

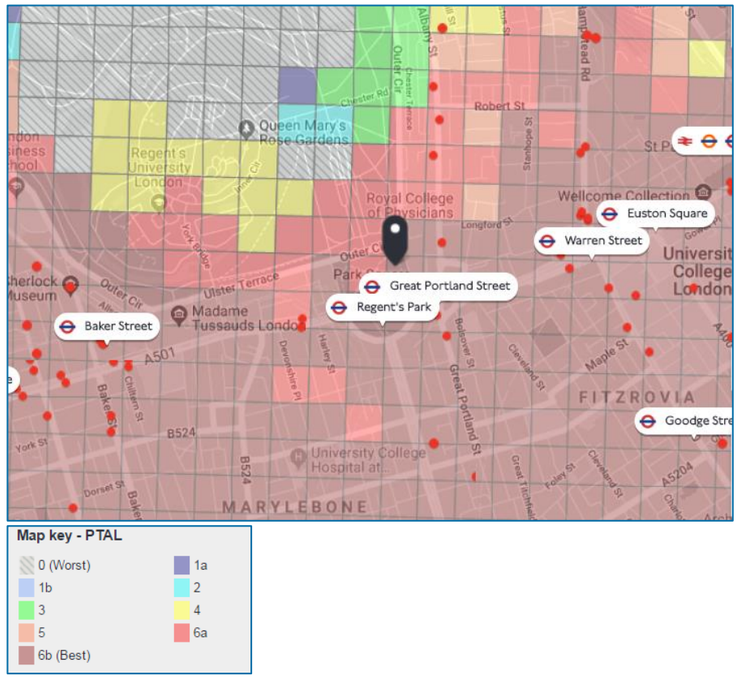



*Figure 21: Public transport availability map for the development*

### 9.6.2 Cycling Facilities

Secure cycling storage space and changing facilities will be allocated on site to encourage the occupants to use this carbon-free mode of transport. The number of spaces is based upon the TfL's currently adopted guidance (London Plan, REMA) and the minimum requirements of BREEAM.

The nearest public cycle hire docking stations (Santander Bikes) is located within 4-minute walk of the site. The Thames path cycle route exists close to the development as well as many other suggested cycle routes around the site.

### 9.6.3 Travel Plan

To improve the connectivity issue with the site, a Travel Plan should be produced as part of the feasibility and design stages and in accordance with BREEAM, which will include a package of measures to encourage the use of sustainable modes of transport and movement of people and goods during the building's operation and use.

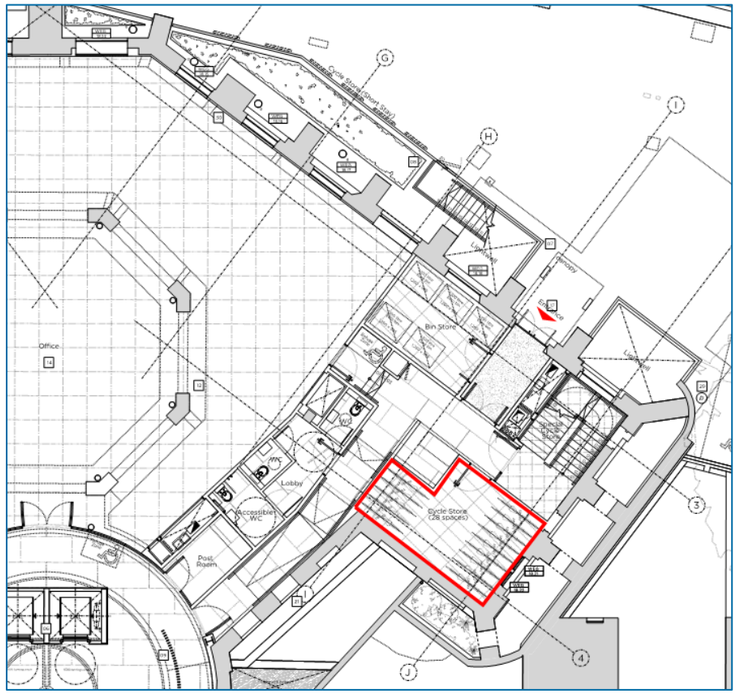



*Figure 22: Cycling storage spaces in the ground floor and short-term cycle store*

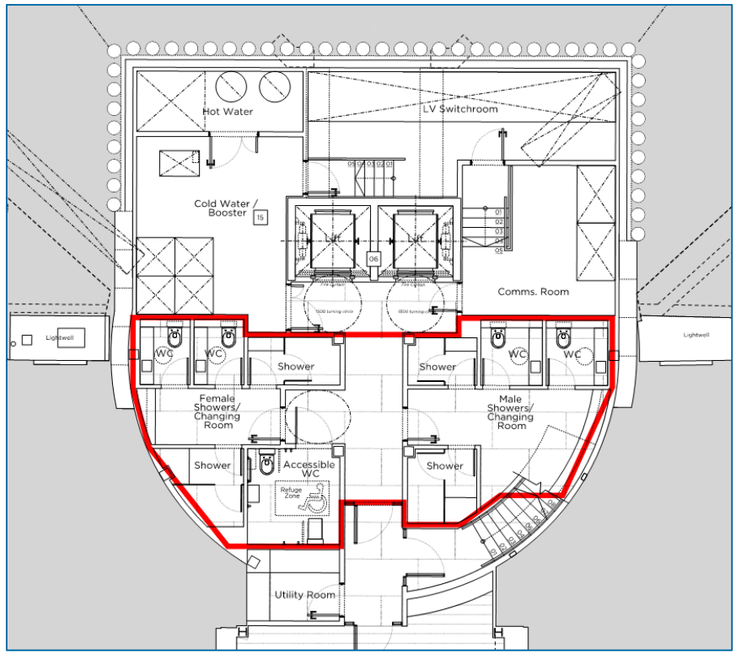



*Figure 23: Changing facilities at the basement*

#### 9.6.3.1 Relevant Policy

It is anticipated that the above contributes to the requirements for:

- London Plan Policy 6.9 Cycling;
- Camden Local Policy T1 Prioritising walking, cycling and public transport.

# Appendices

## 10.0 Appendix A – Baseline BRUKL Output Document

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

**No 18 Park Square East - Baseline** As designed

**Date:** Wed Nov 27 14:42:56 2019

### Administrative information

**Building Details**

**Address:** 18 Park Square East, London,

**Certification tool**

**Calculation engine:** Apache

**Calculation engine version:** 7.0.12

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.12

**BRUKL compliance check version:** v5.6.a.1

**Owner Details**

**Name:**

**Telephone number:**

**Address:** , ,

**Certifier details**

**Name:** Cundall

**Telephone number:** +442074381600

**Address:** One Carter Lane, London, EC4V 5ER

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

The building does not comply with England Building Regulations Part L 2013

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 22.3 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 22.3 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 47.9 |
| Are emissions from the building less than or equal to the target? | BER > TER |
| Are as built details the same as used in the BER calculations? | Separate submission |

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

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

**Building fabric**

| Element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 1.21 | 1.7 | BP000002:Surf[0] |
| Floor | 0.25 | 0.5 | 0.58 | BP000002:Surf[20] |
| Roof | 0.25 | 0.19 | 0.28 | BP000002:Surf[21] |
| Windows***, roof windows, and rooflights | 2.2 | 4.08 | 5.75 | BP000002:Surf[11] |
| Personnel doors | 2.2 | 3 | 3 | BP000002:Surf[18] |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | - | - | No High usage entrance doors in building |

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

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

| Air Permeability | Worst acceptable standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 10 | 21 |

## 11.0 Appendix B – 'Be Lean' BRUKL Output Document

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

**No 18 Park Square East - Be Lean** As designed

**Date:** Tue Nov 26 17:40:53 2019

### Administrative information

**Building Details**

**Address:** 18 Park Square East, London,

**Certification tool**

**Calculation engine:** Apache

**Calculation engine version:** 7.0.12

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.12

**BRUKL compliance check version:** v5.6.a.1

**Owner Details**

**Name:**

**Telephone number:**

**Address:** , ,

**Certifier details**

**Name:** Cundall

**Telephone number:** +442074381600

**Address:** One Carter Lane, London, EC4V 5ER

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

The building does not comply with England Building Regulations Part L 2013

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 22.3 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 22.3 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 29.3 |
| Are emissions from the building less than or equal to the target? | BER > TER |
| Are as built details the same as used in the BER calculations? | Separate submission |

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

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

**Building fabric**

| Element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 0.75 | 1.7 | BP000002:Surf[0] |
| Floor | 0.25 | 0.49 | 0.58 | BP000002:Surf[20] |
| Roof | 0.25 | 0.16 | 0.28 | BP000002:Surf[21] |
| Windows***, roof windows, and rooflights | 2.2 | 2.29 | 2.97 | BP000002:Surf[11] |
| Personnel doors | 2.2 | 3 | 3 | BP000002:Surf[18] |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | - | - | No High usage entrance doors in building |

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

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

| Air Permeability | Worst acceptable standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 10 | 19 |

Page 1 of 9

## 12.0 Appendix C – 'Be Green' BRUKL Output Document

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

**No 18 Park Square East - Be Green** As designed

Date: Mon Dec 02 10:33:18 2019

### Administrative information

**Building Details**

**Address:** 18 Park Square East, London,

**Certification tool**

**Calculation engine:** Apache

**Calculation engine version:** 7.0.12

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.12

**BRUKL compliance check version:** v5.6.a.1

**Owner Details**

**Name:**

**Telephone number:**

**Address:** , ,

**Certifier details**

**Name:** Cundall

**Telephone number:** +442074381600

**Address:** One Carter Lane, London, EC4V 5ER

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

The building does not comply with England Building Regulations Part L 2013

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 18.5 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 18.5 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 23.4 |
| Are emissions from the building less than or equal to the target? | BER > TER |
| Are as built details the same as used in the BER calculations? | Separate submission |

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

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

**Building fabric**

| Element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 0.75 | 1.7 | BP000002:Surf[0] |
| Floor | 0.25 | 0.49 | 0.58 | BP000002:Surf[20] |
| Roof | 0.25 | 0.16 | 0.28 | BP000002:Surf[21] |
| Windows***, roof windows, and rooflights | 2.2 | 2.29 | 2.97 | BP000002:Surf[11] |
| Personnel doors | 2.2 | 3 | 3 | BP000002:Surf[18] |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | - | - | No High usage entrance doors in building |

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

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

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

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

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

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

| Air Permeability | Worst acceptable standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 10 | 19 |

## 13.0 Appendix D – BREEAM RFO 2014 Pre-assessment

BREEAM UK Refurbishment & Fit-out 2014

Pre-assessment : Design Stage : Diorama - Office (Diorama - Office)

BREEAM Rating

| | Credits available | Credits achieved | Credits targeted | % Credits achieved | Weighting | Category score | Target score |
|---|---|---|---|---|---|---|---|
| **Man** | 18.0 | 0.0 | 13.0 | 0.00% | 12.69% | 0.00% | 9.16% |
| **Hea** | 19.0 | 0.0 | 7.0 | 0.00% | 15.98% | 0.00% | 5.88% |
| **Ene** | 24.0 | 0.0 | 16.0 | 0.00% | 17.05% | 0.00% | 11.36% |
| **Tra** | 7.0 | 0.0 | 7.0 | 0.00% | 5.76% | 0.00% | 5.75% |
| **Wat** | 8.0 | 0.0 | 5.0 | 0.00% | 6.58% | 0.00% | 4.11% |
| **Mat** | 13.0 | 0.0 | 6.0 | 0.00% | 15.42% | 0.00% | 7.11% |
| **Wst** | 12.0 | 0.0 | 6.0 | 0.00% | 9.25% | 0.00% | 4.62% |
| **Le** | 2.0 | 0.0 | 1.0 | 0.00% | 4.93% | 0.00% | 2.46% |
| **Pol** | 13.0 | 0.0 | 6.0 | 0.00% | 12.34% | 0.00% | 5.69% |
| **Inn** | 10.0 | 0.0 | 0.0 | 0.00% | 10.00% | 0.00% | 0.00% |
| **Total** | 126.0 | 0.0 | 67.0 | 0.00% | - | 0.00% | 56.19% |
| **Rating** | - | - | - | - | - | Unclassified | Very Good |

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