ENERGY & SUSTAINABILITY STATEMENT

ORT House

Produced by XCO2 for World ORT Trust

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EXECUTIVE SUMMARY

The energy strategy for the ORT House development has been developed in line with the energy policies of the London Plan and of the Borough of Camden Local Plan. The three-step Energy Hierarchy has been considered and the estimated regulated CO_2 savings on site is 36.1% for the refurbishment development, against the existing baseline.

This report assesses the predicted energy performance and carbon dioxide emissions of the proposed development of ORT House, located in the London Borough of Camden.

The proposed development comprises new installation of services, new plant and technical spaces, refurbishment of spaces to create open plan office areas, and a new double height reception.

This document is divided into three parts:

- Planning policies
- Proposed sustainability measures to be incorporated into the scheme
- Energy Strategy

The Planning Policy section provides an overview of the site and planning policies applicable to this development in accordance with the London Borough of Camden Local Plan as wells as the London Plan.

The second section on proposed sustainability measures section outlines the sustainability measures that have been adopted in the team's aim to maximise sustainability within the site.

The third section describes the predicted energy performance and carbon dioxide emissions of the proposed development at ORT House. The development will be compared to an existing baseline.

Figure 1 summarises the regulated CO_2 savings achieved by the proposed development in comparison to the baseline building at each stage of the energy hierarchy. In total, the development is expected to achieve regulated CO_2 savings of 36.1%. This reduction reflects regulated energy use only, as unregulated energy use (e.g. plug-in appliances) is not taken into account in Part L of the Building Regulations.

The regulated CO_2 saving has been achieved by maximising fabric efficiency. The team aims to improve the building fabric in line with Building Regulations Part L2B baseline through the incorporation of efficient fabric with improved U values.

The London Plan (2016) does not set specific CO_2 reduction targets for refurbishment developments such as that at ORT House. However, CO_2 emissions have been reduced as far as is feasible. The reduction in regulated CO_2 emissions exceeds Part L building regulations compliance through adopting energy efficiency measures alone. This is a notable achievement for a development of this nature, and demonstrates the client and design team's commitment in adopting a range of sustainability measures for the life-cycle of the development.

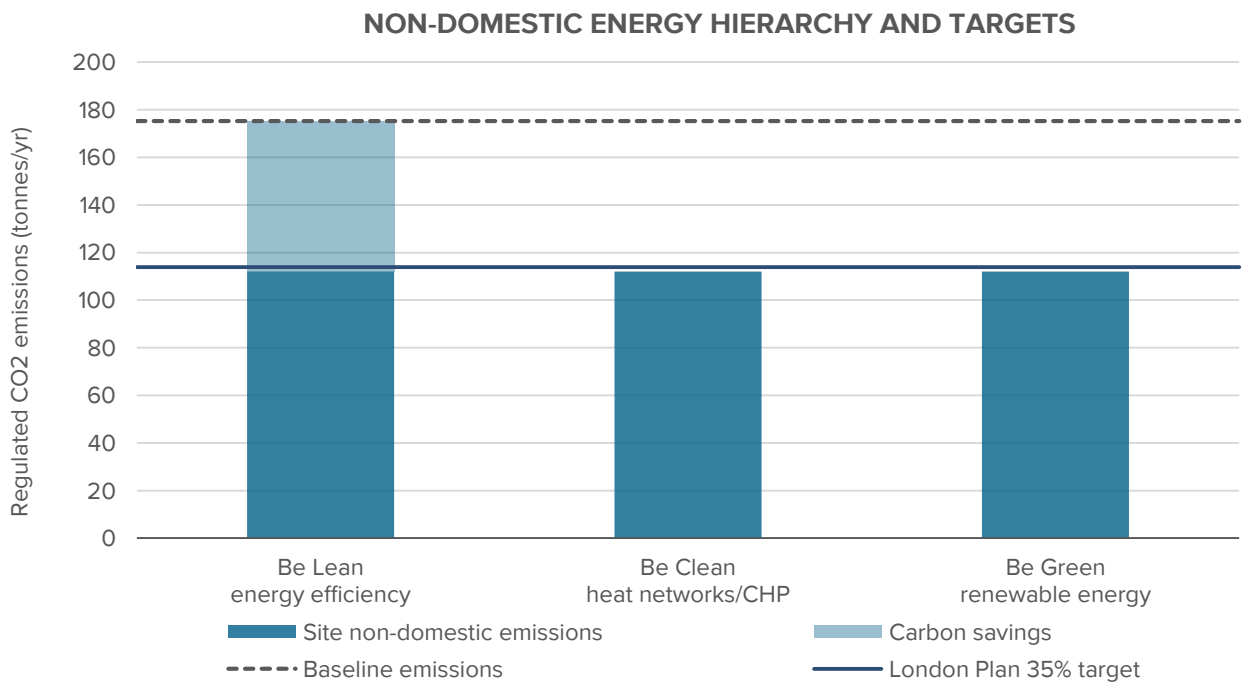


Figure 1: Energy Hierarchy

INTRODUCTION

This Chapter presents the description of the site and of the development proposal, the energy policy framework and the methodology employed for the energy assessment.

SITE & PROPOSAL

The building is set on a 0.53 acre site at 120-126 Albert Street, located between Albert Street and Arlington Road within the London Borough of Camden.

The proposed scheme consists of the refurbishment of an existing office complex to provide a building with open plan office spaces. The proposed scheme also includes new installation of services, new plant and technical spaces, and a provision of more natural light from light wells and glazing.

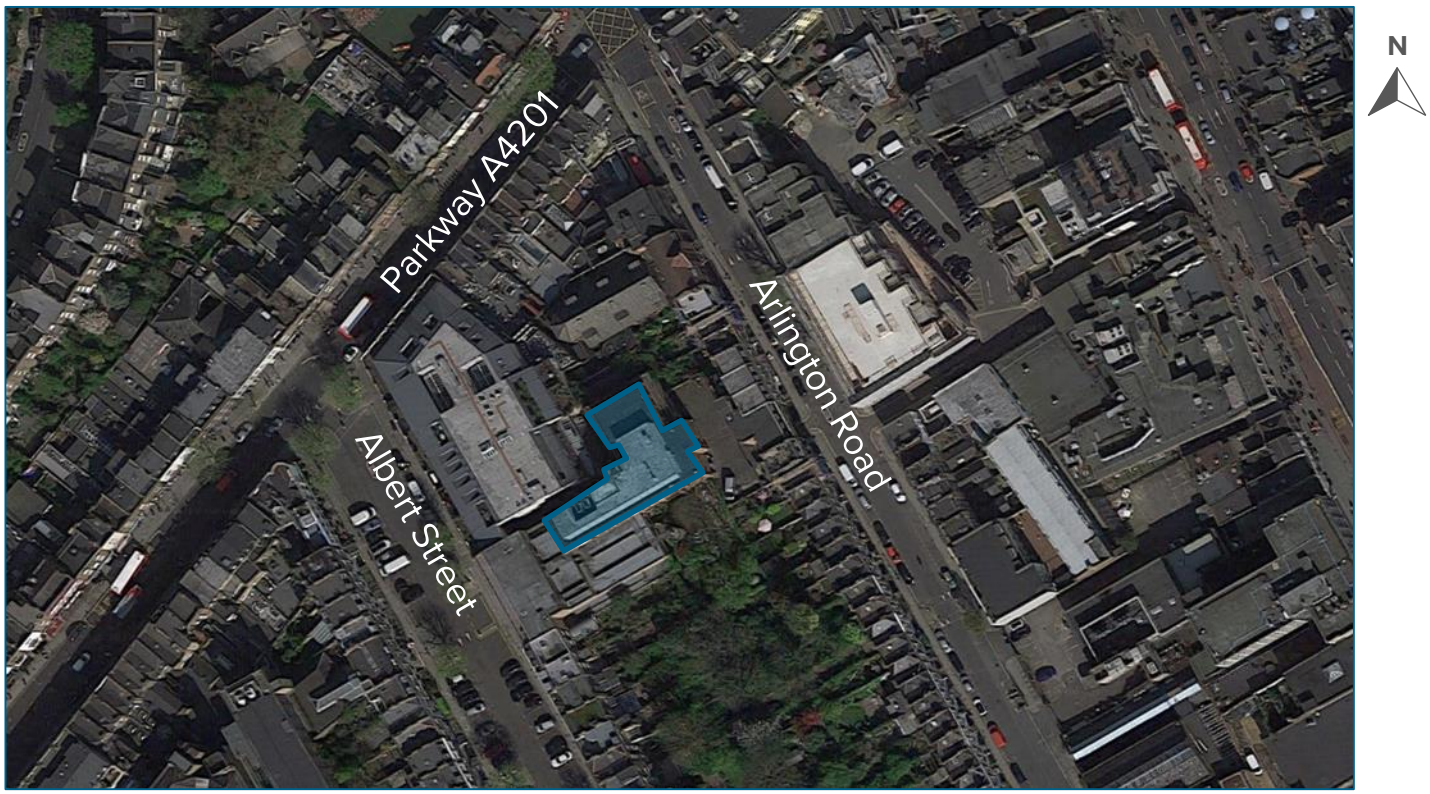


Figure 2: Location of the application site.

PLANNING POLICIES

The proposal will seek to respond to the energy and sustainability policies of the London Plan (2016) and of the policies within the London Borough of Camden's Local Plan (2017).

The most relevant applicable energy policies in the context of the proposed development are presented below.

THE LONDON PLAN

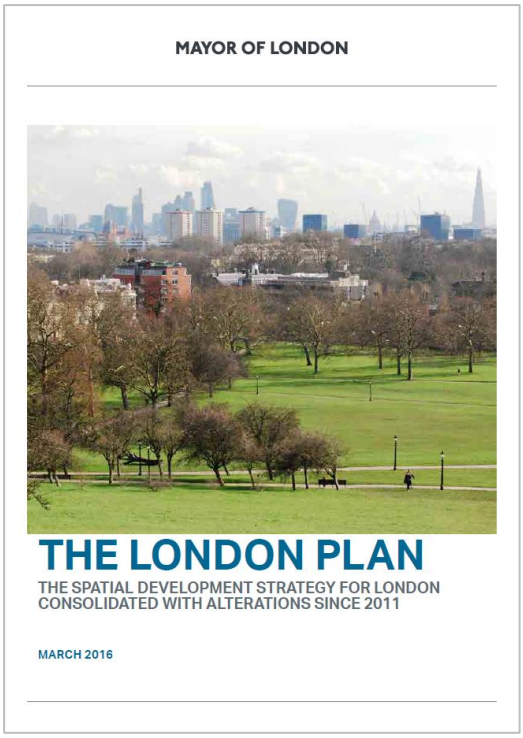
The London Plan (2016) is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years.

The overarching energy policies of the London Plan are included in Chapter Five *London's Response to Climate Change* and include Policies 5.2 to 5.9, and 5.15:

- Policy 5.2: Minimising carbon dioxide emissions;
- Policy 5.3: Sustainable Design and Construction;
- Policy 5.4: Retrofitting;
- Policy 5.5: Decentralised energy networks;
- Policy 5.6: Decentralised energy in development proposals;
- Policy 5.7: Renewable energy;
- Policy 5.8: Innovative energy technologies, and,
- Policy 5.9: Overheating and cooling.
- Policy 5.15: Water Use and Supplies.

Extracts of Policies 5.2, 5.6, 5.7 and 5.9 are presented below as these are considered most relevant to the proposed scheme.

The London Plan also consists of a suite of guidance documents, most relevant of which are the Sustainable Design and Construction SPG (April 2014) & Energy Planning – GLA Guidance on preparing energy assessments (March 2016).



POLICY 5.2 MINIMISING CARBON DIOXIDE EMISSIONS

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

Be lean: use less energy
Be clean: supply energy efficiently
Be green: use renewable energy

B. The Mayor will work with boroughs and developers to ensure major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential

buildings from 2016 and zero carbon non-domestic buildings from 2019.

Table 1: CO_2 emissions improvement targets against the current Building Regulations

Residential Buildings	
Year	**Minimum improvement over Building Regulations 2013**
2016 - 2031	Zero Carbon
Non-domestic Buildings	
Year	**Minimum improvement over Building Regulations 2013**
2016 - 2019	35%
2019 - 2031	Zero Carbon

POLICY 5.3 SUSTAINABLE DESIGN AND CONSTRUCTION

"Planning decisions:
B. Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.
C. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

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

POLICY 5.4 RETROFITTING

The environmental impact of existing urban areas should be reduced through policies and programmes that bring existing buildings up to the Mayor's standards on sustainable design and construction. In particular, programmes 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 5.5 DECENTRALISED ENERGY NETWORKS

The Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. In order to achieve this target the Mayor prioritises the development of decentralised heating and cooling networks at the development and area wide levels, including larger scale heat transmission networks.

POLICY 5.6 DECENTRALISED ENERGY IN DEVELOPMENT PROPOSALS

A. Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.
B. Major development proposals should select energy systems in accordance with the following hierarchy:

Connection to existing heating or cooling networks;
Site wide CHP network;
Communal heating and cooling.

C. Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are

identified, proposals should be designed to connect to these networks.

POLICY 5.7 RENEWABLE ENERGY

B. Within the framework of the energy hierarchy (see Policy 5.2), major proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.
D. All renewable energy systems should be located and designed to minimise any potential adverse impacts on biodiversity, the natural environment and historical assets, and to avoid any adverse impacts on air quality.

POLICY 5.9 OVERHEATING AND COOLING

B. Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

1. *Minimise internal heat generation through energy efficient design*
2. *Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls*
3. *Manage the heat within the building through exposed internal thermal mass and high ceilings*
4. *Passive ventilation*
5. *Mechanical ventilation*
6. *Active cooling systems (ensuring they are the lowest carbon options).*

POLICY 5.8 INNOVATIVE ENERGY TECHNOLOGIES

A The Mayor supports and encourages the more widespread use of innovative energy technologies to reduce use of fossil fuels and carbon dioxide emissions. In particular the Mayor will seek to work with boroughs and other partners in this respect, for example by stimulating:

a. *the uptake of electric and hydrogen fuel cell vehicles*
b. *hydrogen supply and distribution infrastructure*
c. *the uptake of advanced conversion technologies such as anaerobic digestion, gasification and pyrolysis for the treatment of waste.*

POLICY 5.15 WATER USE AND SUPPLIES

"...setting an upper limit of daily domestic water consumption to 105 litres/head for residential developments (excluding a maximum allowance of 5 litres/head/day for external water consumption)."

GLA GUIDANCE ON PREPARING ENERGY ASSESSMENTS

This document (last updated in March 2016) provides guidance on preparing energy assessments to accompany strategic planning applications; it contains clarifications on Policy 5.2 carbon reduction targets in the context of zero carbon policy, as well as detailed guidelines on the content of the Energy Assessments undertaken for planning.

The guidance document specifies the emission reduction targets the GLA will apply to applications as follows:

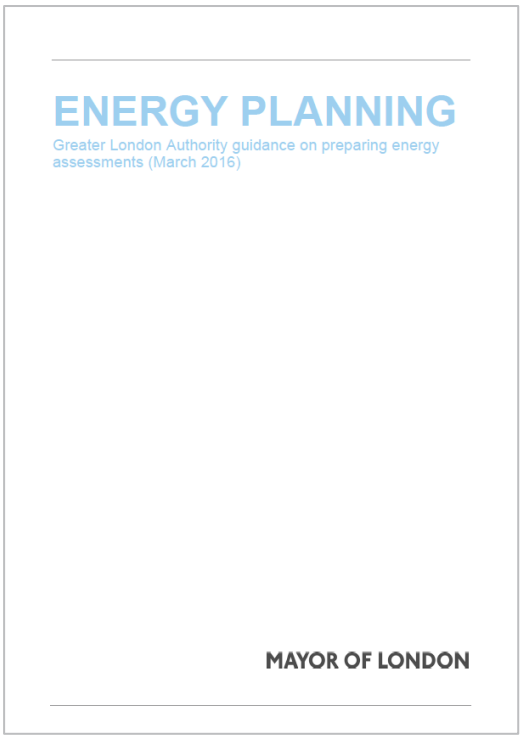
> *Stage 1 schemes received by the Mayor on or after the 1st October 2016: Zero carbon for residential development and 35% below Part L 2013 for commercial development.*

The definition of zero carbon homes is provided in section 5.3 of the guidance:

> *'Zero carbon' homes are homes forming part of major development applications where the residential element of the application achieves at least a 35 per cent reduction in regulated carbon dioxide emissions (beyond Part L 2013) on-site. The remaining regulated carbon dioxide emissions, to 100 per cent, are to be offset through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.*

The new guidance also includes changes to technical requirements relating to presenting carbon information separately for domestic and non-domestic elements of developments and the provision for cooling demand data where active cooling is required.

The structure of this report and the presentation of the carbon emission information for the development follows the guidance in this document.



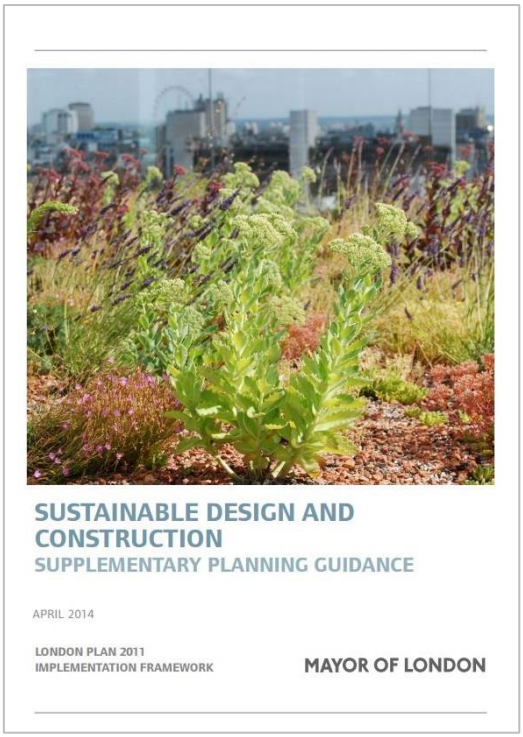
SUSTAINABLE DESIGN AND CONSTRUCTION SPG

The Sustainable Design and Construction SPG, adopted in April 2014, provides additional information and guidance to support the implementation of the Mayor's London Plan. The SPG does not set new policy, but explains how policies in the London Plan should be carried through into action.

It is applicable to all major developments and building uses so it is not technically applicable to this development, however in line with the developer's intention to implement the requirements of the London Plan it has been used to guide the design. It covers the following areas:

- Resource Management
- Adapting to Climate Change and Greening the City
- Pollution Management

This SPG provides a basis for sustainable design in London and is used as the overarching structure of this report. Where additional local policies are addressed by these areas this has also been indicated.



CAMDEN LOCAL PLAN -2017

The Camden Local Plan sets out the Council's planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010). The Local Plan in particular will help deliver the objectives of creating the conditions for harnessing the benefits of economic growth, reducing inequality and securing sustainable neighbourhoods.

The policies relevant to energy and sustainability are outline below:

Policy CC1 Climate change mitigation

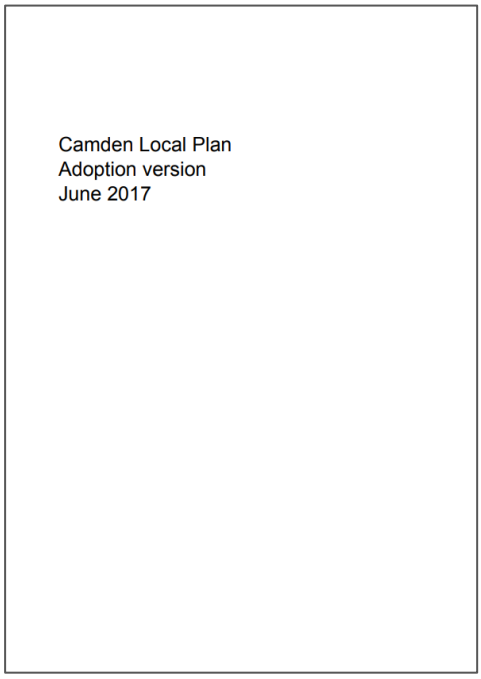
The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

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 the 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.*

For decentralised energy networks, we will promote decentralised energy by:

g. *working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;*
h. *protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and*
i. *requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network. To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.*



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.

Sustainable design and construction measures

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.

We will require development 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.

The Council will protect the borough's existing drinking water and foul water infrastructure, including the reservoirs at Barrow Hill, Hampstead Heath, Highgate and Kidderpore.

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.

We will:

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.*

CAMDEN PLANNING GUIDANCE - SUSTAINABILITY CPG3 - 2013

It is expected that this Guidance would be updated since the new Local Plan has been adopted in June 2017.

The Camden Planning Guidance support the policies set out in the Local Development Framework (LDF). While the Camden LDF contains policies relating to sustainability in their Core Strategy and Development Policies documents, the Council also has a separate planning guidance specific to sustainability. The sections that will be covered by the following sections of this Sustainability Statement are listed below:

The energy hierarchy

All new developments are to be designed to minimise carbon dioxide emissions by being as energy efficient as is feasible and viable.

Energy efficiency: new buildings

All new developments are to be designed to minimise carbon dioxide emissions by being as energy efficient as is feasible and viable.

Decentralised energy networks and combined heat and power

Development should follow the Energy Hierarchy

1. use less energy
2. *supply energy efficiently*
3. *use renewable energy*

Renewable Energy

All developments are to target at least a 20% reduction in carbon dioxide emissions through the installation of on-site renewable energy technologies. Special consideration will be given to heritage buildings and features to ensure that their historic and architectural features are preserved.

Water Efficiency

The Council expects all developments to be designed to be water efficient by minimising water use and maximising the re-use of water. This includes new and existing buildings.

Sustainable use of materials

Major developments are anticipated to be able to achieve 15-20% of the total value of materials used to be derived from recycled and reused sources.

Sustainability assessment tools

Developments are anticipated to be able to achieve BREEAM 'Excellent' from 2013 onwards and at least 60% of Energy and Water credits and 40% of Materials credits.

Brown roofs, green roofs and green walls

The Council will expect all developments to incorporate brown roofs, green roofs and green walls unless it is demonstrated this is not possible or appropriate. This includes new and existing buildings. Special consideration will be given to historic buildings to ensure historic and architectural features are preserved.

Flooding

Developments must not increase the risk of flooding, and are required to put in place mitigation measures where there is known to be a risk of flooding.

Adapting to climate change

All development is expected to consider the impact of climate change and be designed to cope with the anticipated conditions

PROPOSED SUSTAINABILITY MEASURES

The proposed development will comprise minimal increase in floor area. The changes proposed by the team entail an addition of 41m^2 of area to the existing space, which is just over 1% of the total area of the existing building.

Due to marginal increase in floor area, consultation with Sustainability Officer implies that a BREEAM assessment will not be required for the proposed development at the Ort House. Sustainability measures proposed for the scheme will be in line with the Local Plan Policies CC1 to CC5, and the recommendations presented in Camden's Planning Guidance Part 3 on Sustainability.

The following issues are taken into account in the discussion of sustainable measures implemented into the project:

1. Management
2. Responsible Construction Practices
3. Health and Wellbeing
4. Energy
5. Materials
6. Waste
7. Land Use
8. Pollution

MANAGEMENT

RESPONSIBLE CONSTRUCTION PRACTICES

All timber used in the project will be 'legally harvested and traded' timber.

The principal contractor will be required to achieve compliance with the Considerate Constructors Scheme. Energy use and water consumption from on-site construction processes will be monitored and recorded where feasible.

AFTERCARE SUPPORT

There will be operational infrastructure and resources in place to provide aftercare support to the building occupier(s), which will include among others, an initial occupation meeting, on-site facilities management training, initial and long-term aftercare support services where feasible.

HEALTH & WELLBEING

VISUAL COMFORT

General glazed areas have been incorporated into the design to enable good daylight levels and aesthetically pleasing views to all occupied spaces, and enhance health and wellbeing of the occupants.

All lighting will be designed to give occupants the flexibility in achieving desired illuminance levels without excessive energy use. Appropriately maintained illuminance levels will be achieved in line with industry standards.

Internal Lighting should be zoned to allow for occupant control.

THERMAL COMFORT

In terms of thermal comfort, the appropriate CIBSE guides and models will be considered to ensure tenants and occupiers of the building are thermally comfortable. Consideration of changes in climate change will be made while implementing building features and design.

ENERGY

REDUCTION OF ENERGY USE AND CARBON EMISSIONS

An SBEM calculation was carried out to determine the energy demand and CO_2 emissions for the existing baseline and proposed refurbishment building. Significant savings were found to be achievable through the incorporation of passive and active strategies as presented in the Energy section of this report.

ENERGY MONITORING

Energy sub-meters with pulsed output will be implemented where possible to enable estimating annual energy consumption and monitoring and reporting of energy consumption figures.

EXTERNAL LIGHTING

All external luminaries will be energy efficient and all light fittings are to be controlled for the presence of daylight where feasible. Daylight sensors will help to ensure that artificial lights are not used when daylight levels are sufficient.

TRANSPORT

PUBLIC TRANSPORT ACCESSIBILITY

The proposed development will be accessible by public transport, being served by London buses (including night time services), and national and underground rail services. The PTAL rating is 6b which is the maximum (best) rating level.

PROXIMITY TO AMENITIES

There are restaurants, cash points and food outlets located in proximity to the building site.

CAR PARKING

Car parking on the premises will remain as prior to the refurbishment, and is sufficient for the office in the building.

WATER

WATER CONSUMPTION

Water efficient sanitary fittings within the development will be specified and installed where possible to minimise water consumption at the proposed development.

WATER MONITORING

A water meter with a pulsed or other open protocol output will be provided on the mains water supply to accurately monitor the building's water usage.

MATERIALS

LIFE CYCLE IMPACTS

The proposed scheme will retain the majority of the existing building fabric and structural elements, and all external landscaped areas, in order to maximise reuse of materials on site. Any new materials specified for the extension elements will have a low environmental impact, with Green Guide ratings of between A+ and C where possible.

RESPONSIBLE SOURCING

New building materials will be 'responsibly sourced' with a documented Sustainable Procurement plan in place where possible. All timber and timber based products specified will be legally harvested and traded timber.

INSULATION

All insulation specified for the development will have a low embodied environmental impact relative to its thermal properties. Insulation specified for use on external walls, ground floor, roof and building services will have a low global warming potential to minimise impact to the environment.

DESIGNING FOR DURABILITY AND RESILIENCE

Suitable durability and protection measures or designed features will be incorporated into the building to prevent damage to vulnerable parts where feasible.

WASTE

CONSTRUCTION WASTE MANAGEMENT

Site waste generated during the construction works will be minimised at the proposed scheme. Any waste produced will be diverted from landfill through reuse on site where feasible and recycling offsite.

OPERATIONAL WASTE

There will be dedicated space to cater for the segregation and storage of operational recyclable waste volumes generated by the assessed building/unit, its occupant(s) and activities.

FUNCTIONAL ADAPTABILITY

The shell and core nature of the project delivers a predominantly open-plan office establishment, which entails a flexibility in purpose.

LAND USE AND ECOLOGY

MINIMISING IMPACT ON EXISTING SITE ECOLOGY

As the development is replacing an existing development with no notable change in the external landscaped areas, no negative change in plant species richness is expected. The refurbishment will ensure that no features of ecological value in proximity to the site will be affected by the construction work.

ENHANCING SITE ECOLOGY

Ecological enhancements will be considered at detailed design stage. The current refurbishment project calls for the addition of a courtyard and a new landscaped area on site. Planting of native species will be carried out at these spaces where feasible.

AIR QUALITY

The development will have no combustion plant on site, and therefore no impact to local air quality is expected.

SURFACE WATER RUN OFF

The Environmental Agency Flood Map shows that the development is located in an area with a low probability of flooding as it is in Flood Zone 1 (Refer to Figure 3). The proposed scheme will not increase flood risk on site and in the surrounding area.

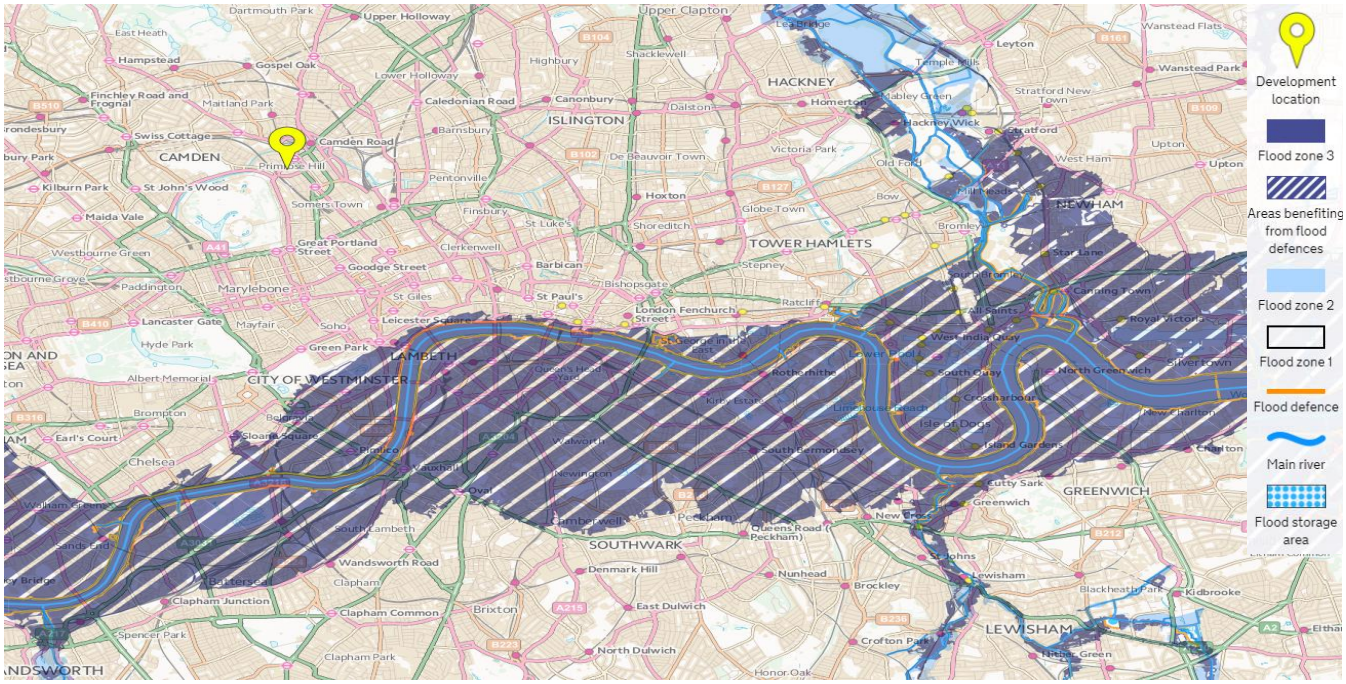


Figure 3: Location of site on Flood Map (EA Flood Maps)

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ENERGY STRATEGY SUMMARY

This section describes the predicted energy performance and carbon dioxide emissions of the proposed ORT House development based on the information provided by the design team.

METHODOLOGY - BE LEAN, BE CLEAN, BE GREEN

The methodology used to determine CO_2 emissions is in accordance with the London Plan's three-step Energy Hierarchy (Policy 5.2A) outlined below. The building will be compared to the existing baseline.

The reductions made through each step have been outlined here:

BE LEAN - USE LESS ENERGY

The first step addresses reduction in energy demand, through the adoption of passive and active design measures.

The proposed energy efficiency measures include improved levels of insulation to meet Building Regulation requirements, efficient lighting as well as energy saving controls for space conditioning and lighting.

By means of energy efficiency measures alone, regulated CO_2 emissions are shown to reduce by 36.1% (63 tonnes per annum) for the refurbishment.

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

The application site is located in an area where district heating is not expected to be implemented in the future.

A site heat network has not been found to be feasible or viable for a development of this scale due to the low hot water demand.

BE GREEN - USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified that the use of green energy systems such as photovoltaic systems are not feasible to be implemented in this refurbishment project.

CUMULATIVE ON SITE SAVINGS

The overall regulated CO_2 savings *on site* against the existing baseline are therefore 36.1% (63 tonnes per annum) for the non-domestic part of the development.

BE LEAN – USE LESS ENERGY

The proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water and lighting. Measures will also be put in place to reduce the risk of overheating. The regulated carbon saving achieved in this step of the Energy Hierarchy is 36.1% over the site wide baseline level.

PASSIVE DESIGN MEASURES

ENHANCED U-VALUES

The heat loss of different building fabric elements is dependent upon their U-value. A building with low U-values provides better levels of insulation and reduced heating demand during the cooler months.

The proposed development will incorporate improved levels of insulation and glazing, in order to reduce the demand for space conditioning (heating and/or cooling).

The tables to the right demonstrate the improved performance of the proposed building fabric relative to Part L2B of the Building Regulations.

AIR TIGHTNESS IMPROVEMENT

Heat loss may also occur due to air infiltration. Although this cannot be eliminated altogether, good construction detailing and the use of best practice construction techniques can minimise the amount of air infiltration.

The proposed development will aim to reduce the heat loss due to air tightness where possible by adopting best practice construction techniques

Table 2: Thermal Envelope U-values

Non-domestic (U-values in W/m².K)			
Element	**Building Regulations**	**Proposed**	**Improvement**
Walls	0.55	0.55	0%
Floor	0.25	0.25	0%
Roof	0.18	0.18	0%
Windows	2.20	1.8	18.2%

REDUCING THE NEED FOR ARTIFICIAL LIGHTING

The development has been designed to maximise daylight in all spaces as a way of improving the health and wellbeing of its occupants.

All of the open plan office areas will benefit from large areas of glazing to increase the amount of daylight within the internal spaces where possible. This is expected to reduce the need for artificial lighting whilst delivering pleasant, healthy spaces for occupants.

Furthermore, the new design proposed involves the use of light wells that predominantly aim to provide natural lighting in the lower ground floor, where access to large amounts of glazing is restricted.

ACTIVE DESIGN MEASURES

HIGH EFFICACY LIGHTING

The development intends to incorporate low energy lighting fittings throughout. All light fittings will be specified as low energy lighting, and will accommodate LED, compact fluorescent (CFLs) or fluorescent luminaries only.

HEAT RECOVERY VENTILATION

Mechanical ventilation heat recovery (MVHR) is proposed for the development. The mechanical ventilation system will include heat recovery in order to achieve ventilation in the most energy-efficient way.

COMFORT COOLING

Air source heat pumps with high energy efficiency ratios may be used for both heating and cooling, therefore the impact of active cooling in terms of energy use and carbon emissions will be minimised.

CONTROLS

Advanced lighting and space conditioning controls will be incorporated, specifically:

- For the areas of infrequent use, occupant sensors will be fitted for lighting, whereas day lit areas will incorporate daylight sensors where appropriate. This involves potentially adding sensors in stairwells.
- Space conditioning will be controlled by employees of the open-plan office areas or other users of the building.

MONITORING

Apart from the above design measures, the development will incorporate monitoring equipment and systems to enable occupiers to monitor and reduce their energy use.

MINIMISING OVERHEATING

The potential risk of overheating will be mitigated by incorporating passive and active design measures, in line with the London Plan Policy 5.9 and the Cooling Hierarchy, as follows.

THE COOLING HIERARCHY

MINIMISING INTERNAL HEAT GENERATION THROUGH ENERGY EFFICIENT DESIGN

The distribution of heat infrastructure within the the development will be designed to reduce the lateral pipework reducing heat loss.

Heat sources and pipework will be sufficiently insulated (following CIBSE CoP1 guidelines).

REDUCING THE AMOUNT OF HEAT ENTERING THE BUILDING IN SUMMER

Shading techniques (such as blinds or solar control glazing) integrated across the elevations where possible will reduce solar gains into occupied spaces.

USE OF THERMAL MASS AND HIGH CEILINGS TO MANAGE THE HEAT WITHIN THE BUILDING

During peak summer periods the thermal mass of the building will absorb and store excess heat. The building will release its heat in the cooler evenings when the building is likely to be unoccupied to allow for cooler internal spaces dampening the peak diurnal weather conditions.

MECHANICAL VENTILATION

The MVHR will be capable of operating in summer bypass mode allowing for the dissipation of any heat build-up during peak summer conditions.

OVERHEATING RISK ASSESSMENT

The potential risk of overheating was assessed via the Part L Building Regulation SBEM compliance tool.

All non-domestic areas were found to pass Criterion 3 ‘Limiting Solar Gains’ of Part L.

ACTIVE COOLING PROPOSALS

Based on the above, active cooling will only be used in occupied spaces such as the open plan office areas within the refurbishment.

The following tables present the cooling demand figures for the development.

Table 8: Non-Domestic Cooling Demand based on SBEM calculations

Area weighted average non-domestic cooling demand (MJ/m^2)	
Actual	91.3
Baseline Existing	106.6

ENERGY USE

The table below shows a breakdown of carbon dioxide emissions associated with the proposed development's fossil fuel and electricity consumption for the different uses. The figures provide a comparison between the baseline condition and the proposed development once energy efficiency measures (Lean) have been applied.

This table demonstrates the energy savings achieved through energy efficiency measures (Lean stage of the Energy Hierarchy)

Table 3: Breakdown of energy consumption and CO_2 emissions for the baseline and the proposed schemes after 'Lean' measures are implemented

	Baseline			Lean		
	Energy (kWh/yr.)	$kgCO_2$ /yr.	$kgCO_2/m^2$	Energy (kWh/yr.)	$kgCO_2$ /yr.	$kgCO_2/m^2$
Hot Water	12,490	6,320	1.7	8,720	4,410	1.2
Space Heating	69,210	35,020	9.7	17,120	8,660	2.4
Cooling	33,960	17,180	4.7	29,070	14,710	4.1
Auxiliary	90,280	45,690	12.6	73,880	37,390	10.3
Lighting	140,280	70,980	19.6	92,600	46,860	12.9
Equipment	133,830	69,460	19.2	133,830	69,460	19.2
Total Part L	346,220	175,190	48.4	221,390	112,030	30.9
Total (incl. equipment)	480,050	244,650	67.6	355,220	181,490	50.1

BE LEAN CO_2 EMISSIONS & SAVINGS

In conclusion, the amount of emissions that can be reduced due to the implementation of the Be Lean changes, is at a 36.1% level. This complies with the London Plan.

BE GREEN – USE RENEWABLE ENERGY

The renewable energy feasibility study did not identify any suitable renewable technologies for the development. High efficiency building services systems combined with upgrades to the building fabric were found to satisfy the requirements of local policy for this development. Existing Heat Pumps installed recently have already been considered at Be Lean stage.

RENEWABLE TECHNOLOGIES FEASIBILITY STUDY

Methods of generating on-site renewable energy (Green) were assessed, once Lean and Clean measures were taken into account.

The development of ORT House will benefit from an energy efficient building fabric which will reduce the energy consumption of the proposed development in the first instance. A range of renewable technologies were subsequently considered including:

- Biomass;
- Ground/water source heat pumps;
- Air source heat pump;
- Wind energy;
- Photovoltaic panels, and,
- Solar thermal panels.

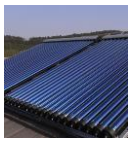
In determining the appropriate renewable technology for the site, the following factors were considered:

- CO_2 savings achieved;
- Site constraints;
- Any potential visual impacts, and,
- Compatibility with the 'Clean' stage proposals where applicable.

RENEWABLE ENERGY APPRAISAL SUMMARY

Table 17 below summarises the factors taken into account in determining the appropriate renewable technologies for this project. This includes estimated capital cost, lifetime, level of maintenance and level of impact on external appearance. The final column indicates the feasibility of the technology in relation to the site conditions (10 being the most feasible and 0 being infeasible). It is important to note that the information provided is indicative and based upon early project stage estimates.

Table 4: Summary of renewable technologies feasibility study

		Comments	Lifetime	Maintenance	Impact on external appearance	Site feasibility
Biomass		Not adopted -burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.	20 yrs.	High	High	1
PV		Not adopted – insufficient roof space; project is refurbishment and can achieve required savings by energy efficiency alone.	25 yrs.	Low	Med	2
Solar thermal		Not adopted - Solar thermal array mounted on the pitched roof would significantly alter the appearance and character of the Listed Building.	25 yrs.	Low	Med	1
GSHP		Not adopted -the installation of ground loops requires significant space, additional time at the beginning of the construction process and very high capital costs.	20 yrs.	Med	Low	1
ASHP		Adopted –These efficient systems are already in place and the savings have been considered at Be Lean Stage	20 yrs.	Med	Med	2
Wind		Not adopted - Wind turbines located at the site will have a significant visual impact on the existing building within the Conservation Area.	25 yrs.	Med	High	1

BE GREEN CO_2 EMISSIONS & SAVINGS

The incorporation of renewable technologies is not implemented in this stage of the project. Therefore there are no emission savings, and the reduction of emissions is still due to the Be Lean stage.

CONCLUSIONS

Following the implementation of the Energy Hierarchy, the cumulative CO_2 savings on site are estimated at 36.1% for the refurbishment project, against the existing building baseline.

SUSTAINABILITY

In summary, the proposed ORT House refurbishment has incorporated sustainability measures in line with Camden and London Plan policies.

ENERGY

By implementing the three step Energy Hierarchy as detailed in the previous sections, the Regulated CO_2 emissions for the development have been reduced against the existing baseline through on site measures alone by 36.1% in the refurbishment of the ORT House.

The proposed development complies with the London Plan CO_2 savings target of 35% reduction.

The tables on the following pages summarise the implementation savings achieved through carbon offset.

Overall, the proposed development has been designed to meet sustainability and energy policies set out by the London Plan and the London Borough of Camden which demonstrates the client and the design team's commitment to enhancing sustainability of the scheme.

NON-DOMESTIC CUMULATIVE SAVINGS

Table 5: CO_2 emissions after each step of the Energy Hierarchy for the development

	Carbon dioxide emissions for non-domestic buildings (tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline	175.2	69.5
After energy demand reduction	112.0	69.5
After heat network/CHP	112.0	69.5
After renewable energy	112.0	69.5

Table 6: Regulated CO_2 savings from each stage of the Energy Hierarchy for the development

	Regulated non-domestic carbon dioxide savings	
	Tonnes CO_2 per annum	% over baseline
Savings from energy demand reduction	63.2	36.1
Savings from heat network/CHP	0.0	0.0
Savings from renewable energy	0.0	0.0
Cumulative on site savings	63.2	36.1

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