24 Redington Gardens LLP

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Energy and Sustainability Statement

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		Signature	CI	CT	RP

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1. Executive Summary

Low environmental impact will be an essential feature of the design of the proposed 24 Redington Gardens redevelopment. This Energy and Sustainability Statement outlines the development's approach to sustainability, energy efficiency and renewable energy strategies in order to meet the targets set out in the guidance from Camden Council.

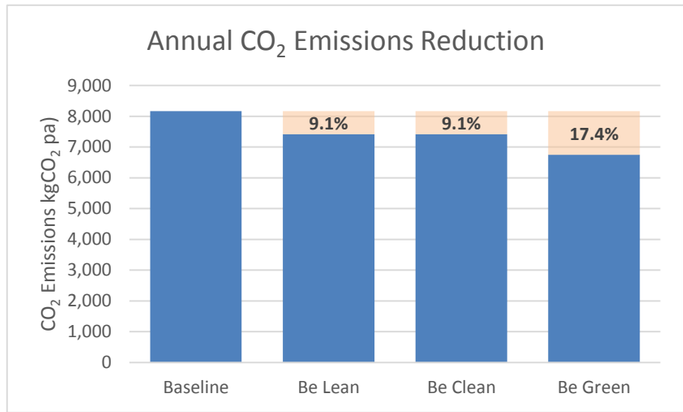
The development is located in the Redington Conservation Area and as such is subject to special consideration under Camden Planning Guidance 3 (CPG3).

To benchmark the design process, the Code for Sustainable Homes methodology has been applied[1]. It considers the broad environmental concerns of climate change, pollution, impact on occupants and the wider community. It balances these with the need for a high quality, safe and healthy internal environment. These standards go beyond the requirements of the Building Regulations. As a minor development, 24 Redington Gardens is not required to achieve any level of Code for Sustainable Homes standards, however the method was adopted as guidance in order to create high quality dwelling.

Good practice sustainability measures have been incorporated in the design, including:

- Thermal insulation levels for all building elements will be increased beyond the Building Regulation requirements, thereby substantially reducing the building's heat losses;
- Mechanical Ventilation with Heat Recovery will be provided to reduce the heating loads associated with providing fresh air;
- High efficiency gas boiler will provide the heating and domestic hot water;
- Waste water heat recovery can provide additional energy savings by allowing discharged shower water to be recovered and used to heat the incoming cold mains into the shower inlet.
- All light fittings will be low energy fittings;
- All energy supplies will be metered using smart meters, with energy display devices located in a visible place to enable the homeowner to monitor and therefore take actions to reduce their CO_2 emissions;
- The combination of proposed energy efficient measures (Be Lean) result in a reduction in CO_2 emissions of 9.1%;
- The London heat map indicates that there is currently no opportunities to connected to an existing or proposed district heating network;
- The limited size of the development's thermal load and the mismatch with its electrical profile suggest that CHP is not viable for this development (Be Clean);
- An extensive range of low and zero carbon technologies have been considered in terms of providing a proportion of the development's energy demand in line with planning policy (Be Green);
- The analysis indicates that a Photovoltaic array of approx. 1.5kWp could be accommodated, which could provide a further 8.3% reduction in the site's CO_2 emissions;
- All timber used on site will be purchased from responsible sources such as FSC approved vendors;
- New materials will be selected to take into account their overall environmental impacts and that they follow the Redington Conservation Area guidelines to preserve the look of the area;
- Recycling facilities will be provided for the home owner to reduce waste during operation;
- Water use will be minimised by the specification of water efficient taps, shower heads and dual flush toilets;
- All construction on site will be managed in an environmentally sound manner in terms of resource use, storage, waste management, and potential sources of nuisance or pollution.

The combination of the measures outlined could potentially provide a 17.4% reduction over the Building Regulations CO_2 emissions targets.



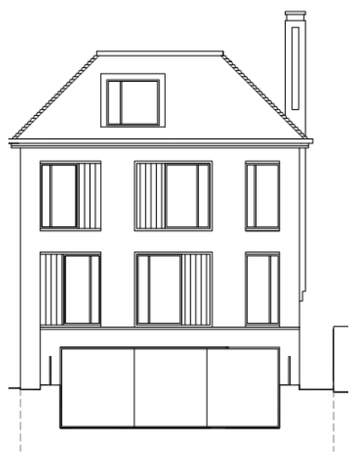
	Carbon dioxide emissions (tonnes CO_2 per annum)	Cumulative Reduction (tonnes CO2 per annum)	Cumulative % Reduction
Baseline	8.17	-	-
Be Lean	7.42	0.75	9.1%
Be Clean	7.42	0.75	9.1%
Be Green	6.75	1.42	17.4%

Carbon Emission Reduction for 24 Redington Gardens

[1] ***NOTE:*** *As part of the Government's response to the Housing Standards Review it has been confirmed that the Code for Sustainable Homes (CfSH) will be wound down, with many of its requirements consolidated into the Building Regulations. Whilst this means that a formal certification of the scheme may not be possible, the methodology and targets are still a useful tool in benchmarking the sustainable design of residential development. As such, the CfSH methodology has been used to guide and benchmark the design.*

Proposed Site Location

Proposed Front Elevation



Proposed Rear Elevation

2. Introduction

The London Borough of Camden set out their approach to sustainable development through their Local Plan.

This report outlines the proposed sustainability and energy strategy for the proposed residential development at 24 Redington Gardens. Each of the proposed initiatives has been assessed on the relative sustainability potential, in addition to a “rule of thumb” financial pay back implication. The principal objectives are to reduce the site’s contribution to the cause of climate change by minimising the emissions of CO_2, by reducing the site’s needs for energy and by providing some of the requirement by renewable/sustainable means. Issues such as water and waste, biodiversity, etc. have also been addressed in the present study. This Energy and Sustainability Statement will aim to address the aspirations of both the London Borough of Camden’s Local Plan and the Greater London Authority (GLA).

The GLA London Plan and GLA Energy Strategy are considered to be the benchmark for local planning regulation. Together they provide a useful tool against which to undertake energy and sustainability assessment. They have been used in an advisory nature secondary to the requirements of the London Borough of Camden, to help incorporate a number of energy efficiency measures into the proposed development.

This Energy and Sustainability Statement forms a checklist of the sustainable initiatives considered for the proposed development. Each of the proposed initiatives is assessed on the relative sustainability potential, in addition to a “rule of thumb” financial/pay back implication, and suitability to this particular site.

2.1 Description of Development

The proposals for the redevelopment of 24 Redington Gardens will provide a new five bedroom detached house.

The site is located in Hampstead, North London just to the south of West Heath and falls within the Redington Conservation Area, a protected area that aims to retain the look and quality of the local area.

The following accommodation schedule has been used as the basis for the energy assessment:

Floor	House (m^2)
Basement	157
Lower Ground	130
Upper Ground	101
First Floor	101
Second Floor	60
Total	**549**

Area Schedule

3. Planning Policy

The National Planning Policy Framework (NPPF) was published in March 2012, which states a clear presumption in favour of sustainable development. The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourages the use of renewable resources.

The NPPF replaces PPS22 and in Section 10 outlines its energy and climate change policies. To support the move to a low carbon future, local planning authorities should:

- Plan for new development in locations and ways which reduce greenhouse gas emissions;
- Actively support energy efficiency improvements to existing buildings; and
- When setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards.

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

- comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption;
- have a positive strategy to promote energy from renewable and low carbon sources;
- consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources;
- Identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

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

3.1 The London Plan

The GLA London Plan 2011, London Plan REMA October 2013 and GLA's Guidance on Preparing Energy Assessments April 2015 document are considered to be the benchmark for local planning regulation. Together they provide a useful tool against which to undertake energy and sustainability assessments. As the development does not qualify as 'major' the London Plan targets are not technically applicable and therefore they have been used in an advisory way secondary to the requirements of the Borough of Camden, to help incorporate a number of energy efficiency measures into the proposed development.

The London Plan sets out a number of core policies for major developments with regards reducing CO_2 emissions and providing energy in a sustainable manner. As this is not classified as a major development is does not technically have to comply with these requirements, but the design team have used them as guidance and sought to achieve them, where possible within the limitations of the existing constrained site.

Policy 5.2 - requires that major developments 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 5.6 - requires all major developments to evaluate the feasibility of connecting to existing or proposed district heating networks and where no opportunity existing consider a site wide Combined Heat and Power (CHP) systems.

Policy 5.7 - 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. Individual development proposals will also help to achieve these targets by applying the energy hierarchy in Policy 5.2.

3.2 London Borough of Camden

The London Borough of Camden set out their approach to sustainable development through their Core Strategy, Development Policies and Supplementary Planning Documents. Core Strategy Policy 13 sets out the overarching approach to sustainability in the borough, with the aims of mitigating and adapting to climate change, promoting local energy generation, managing water resources and reducing carbon dioxide emissions.

The Development Policies provide further detail as to how the Core Strategy policies can be achieved. In this instance *"Development Policy 22 – Promoting Sustainable Design and Construction*" provides the details as to how the targets of CS13 will be meet and states:

"The council will require development to incorporate sustainable design and construction measures. Schemes must:

- Demonstrate how sustainable development principles, including relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation; and
- Incorporate green or brown roofs and green walls wherever suitable."

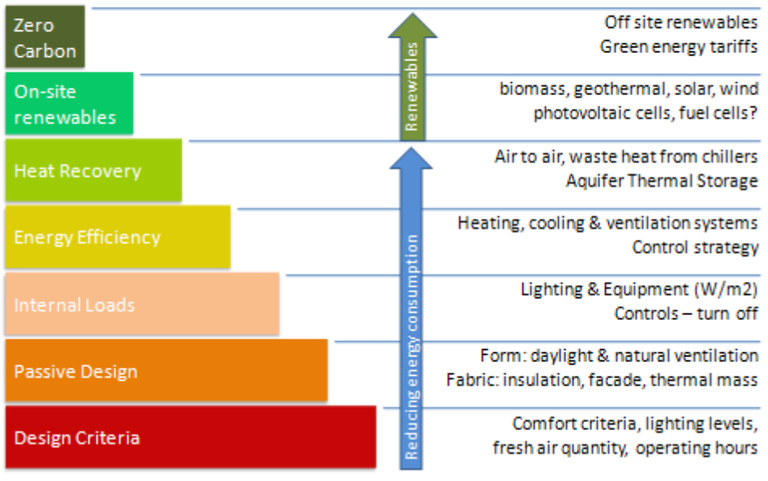
The council will promote and measure the sustainable design and construction by:

- Expecting non-domestic developments of 500sq m of floor space or above to achieve *"very good"* in BREEAM assessments and *"excellent"* from 2016 and encouraging zero carbon from 2019.

The council will require developments to be resilient to climate change by ensuring scheme include appropriate climate change adaption measures, such as:

- Summer shading and planting;
- Limiting run-off;
- Reducing water consumption;
- Reducing air pollution;
- No locating vulnerable uses in basements in floor-prone areas.

In addition to this policy, the Supplementary Planning Document *"Camden Planning Guidance 3 – Sustainability"* provides greater detail on the targets for developments and the approach that should be adopted in meeting these targets.



Steps to Low Carbon

4. Energy Strategy

The application proposes the redevelopment of the site to provide a new five bedroom detached house. The new development will integrate with the London Borough of Camden's Sustainability guidance for the design.

The design of the proposed house has been developed to reduce its annual energy consumption, whilst providing energy in the most environmentally friendly way to reduce the annual CO_2 footprints. In order to achieve this, a "Steps to Low Carbon" methodology has been applied.

4.1 Passive Design

Substantial reductions in energy usage for the scheme will be achieved by enhancing passive building elements.

4.1.1 Building Envelope

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

All new thermal elements will therefore be specified to achieve an improvement over the minimum standards of the Building Regulations. The targeted area weighted u-values match or exceed the performance guidance given in CPG 3 and are shown in the table below.

Building Element	Target U-values
Ground Floor	0.12 W/m^{2}K
Roofs	0.12 W/m^{2}K
External Walls	0.20 W/m^{2}K
Glazing	1.40 W/m^{2}K
Doors	1.40 W/m^{2}K

4.1.2 Accredited Construction Details

All new architectural details will ideally be assessed with their thermal bridging Ψ values calculated. Where this is not possible, all architectural details should be in accordance with the enhanced construction details listed on the Energy Trust's website or as an absolute minimum as per the requirements of the Accredited Construction Details document.

Accredited Construction Details (ACD's) have been developed to assist the construction industry to comply with the performance standards in Part L of the Building Regulations. They focus on issues concerning insulation continuity and airtightness and suggest a common approach to design, construction and testing methodology, and general improvements of the process.

4.1.3 Waste Water Heat Recovery

The showers in the house will can be specified with waste water heat recovery units that allow a proportion of the heat that is usually lost along with the discharged shower water to be recovered and used to heat the incoming cold mains into the shower inlet. This can be integrated into the shower tray or in the stack from the shower.

This reduces the amount of hot water produced by the boiler required for each shower, reducing the energy consumption of the hot water boiler.

4.1.4 Air Permeability

An air leakage rate of 3m^3/hr/m^2 at 50Pa is being targeted for the new house, in comparison with the Building Regulation minimum standards of 10m^3/hr/m^2 at 50Pa. This also matches the performance guidance in CPG 3. With these improved air tightness levels, it is important that all of the ventilation systems are sized and installed correctly.

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.

4.2 Ventilation - MVHR

The house will be provided with mechanical ventilation with heat recovery, which will substantially reduce its heating requirements. The mechanical ventilation system will incorporate high efficiency heat recovery with a target efficiency of 87%, minimising the heating and cooling loads associated with conditioning the supply air. It should be noted that the MVHR system should be sized to provide the fresh air requirement and NOT to maintain internal temperatures in summer, which will be achieved with comfort cooling.

4.3 Energy Efficient Systems & Appliances

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 and electrical systems and efficient controls to manage the energy used during operation.

4.3.1 Eco-Labelled Goods

As lights and appliances account for about a third of the CO_2 emissions in dwellings, where domestic appliances are installed energy efficient units will be incorporated, including A and A+ rated appliances.

4.3.2 Low-Energy Lighting

To reduce the energy consumption associated with artificial lighting, 100% of all internal lighting fittings will be energy efficient light fittings that have a luminous efficacy in excess of 60 lumens/circuit Watt. The fixing must be permanently fitted to the ceiling or wall and can contain one or more lamps.

4.3.3 HVAC Plant Efficiencies

The design will include plant that meets or exceeds the minimum requirements of the Domestic Building Services Compliance Guide. It provides guidance on the means of complying with the requirements of Part L1A of the Building Regulations for conventional space heating systems, hot water systems, ventilation and cooling systems.

4.3.4 Variable speed pumps and drives

All fans and pumps will be specified with variable-speed drives, where appropriate, which will reduce their energy consumption by more than two-thirds compared with equivalent non variable speed alternatives, by only supplying the required flow rate to meet the demand.

4.3.5 Energy metering

Metering of the energy uses within the house will help identify areas of increased consumption and highlight potential energy-saving measures for the future, hence reducing the associated annual CO_2 emissions from these systems. All gas and electrical supplies will be metered using smart meters to enable the homeowner to be responsible for their own consumption and hence CO_2 emissions. There will be a central display for the house providing live and historic energy consumption data.

4.4 Estimated Annual Energy Consumption

In accordance with the NPPF and London Borough of Camden, the estimated energy consumption for the development has been based on the National Calculation Methodology (NCM).

The energy assessment has been carried out for the proposed scheme using the approved software Elmhurst Energy SAP 2012, with the aforementioned passive and energy efficient measures.

The analysis indicates that the proposed house will perform better than the minimum requirements of the Building Regulations, achieving an improvement of 9.1% and 13.6%.

In order to improve further the CO2 emissions, a proportion of the development's energy requirements will need to be meet by on-site energy generation and/or renewable energy technologies.

Building Fabric Performance

Detail	Design
Ground floor average U-value	0.12 W/m^{2}K
External wall average U-value	0.20 W/m^{2}K
Roof average U-value	0.12 W/m^{2}K
Window U-value (including frame)	1.40 W/m^{2}K
Glazing total solar transmission	60%
Door U-value	1.40 W/m^{2}K
Air permeability @ 50 Pascals	3.0 m^3/hr/m^2

Fixed Building Services

Detail	Design
Heating type	Individual Boilers
Heating fuel	Natural gas
Gross boiler seasonal efficiency	90.3%
Heating Emitters	Underfloor
Boiler Compensator	Weather
Heating system controls	Time and Temperature Zone Control
Ventilation	Mechanical Ventilation with Heat Recovery
Specific Fan Power	0.90
Heat recovery efficiency	87%
Hot water pipework insulated	Yes
Cooling SEER	3.5
Low energy light fittings	100%
Hot water daily usage	< 125 l/p/day

Results

Results	Be Lean	
	Absolute (kgCO^2)	Per sqm (kgCO$_2$/m^2)
Target Emission Rate (TER)	8,165	14.89
Dwelling Emission Rate (DER)	7,419	13.53
Percentage Improvement	**9.1%**	

4.5 Decentralised Energy Networks

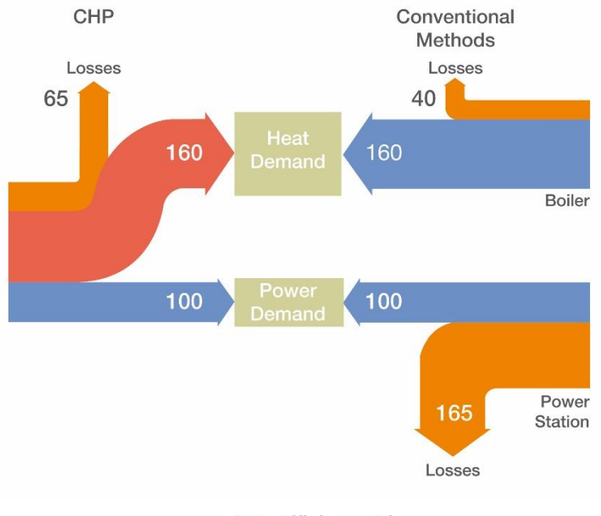
The feasibility of connecting to an existing or proposed district network has been investigated for the site in accordance with Policy 5.6 of the London Plan.

The London Heat Map indicates that there are no existing or potential district heat networks planned in the vicinity of the site. Therefore, it is not viable to connect to a district network at this moment.

District Heating Networks in Proximity to the site (yellow = potential, red = installed)

4.6 Combined Heat & Power (CHP)

In accordance with the Decentralised Energy Hierarchy in Policy 5.6 (Be Clean) the feasibility of a CHP network has been investigated. However, the size of the development and its predicted energy demands are insufficient to support the efficient operation of a CHP unit.



CHP Efficiency Diagram

The Domestic Hot Water (DHW), which normally provides the base load for a CHP, is a relatively small proportion of the overall heat load with heating being the predominate requirement. This is to be expected given the size and form of the house. As such the heat load of the house with be more variable, which is not necessarily suited to the efficient operation of CHP units.

Therefore, CHP is not considered viable for the proposed development.

4.7 Low and Zero Carbon Energy Sources

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. Despite this not being a major development, the following technologies have been investigated to determine the feasibility of delivering a reduction in the CO_2 emissions through renewables. 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.

A 20% reduction target in CO_2 emissions equates to approximately 1.5 tonnes of CO_2 annually.

	Annual CO_2 Emissions	
Grid Supplied Electricity	1,512	$kgCO_2/yr$
Natural Gas	5,376	$kgCO_2/yr$
Site Total	7,419	$kgCO_2/yr$
20% Renewable Target	1,484	$kgCO_2/yr$

20% Renewable Target

4.7.1 ASHP (Air Source Heat Pump)

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 are inherently linked to the ambient air temperatures.

Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pumps can supply as much as 3kW of heat output for just 1kW of electrical energy input. They can also be used to provide cooling, however the development has been designed to be natural ventilated in summer negating the requirement for cooling on site.

They are most efficient when they work at lower temperatures, typically around 40°C. As the output temperature increases above this the efficiency of the system drops off. Therefore, as DHW is required at 60-65°C, two systems would need to be installed if a heat pump system was considered; a conventional Low Temperature Hot Water (LTHW) system for the DHW and either an under floor heating system

for space heating or a heating coil on the MVHR feed off the heat pumps.

There are also limitations on locating the external heat pump units within the site. Therefore, ASHPs are not considered a viable technology for this development.

4.7.2 GSHP (Ground Source Heat Pumps)

Ground sourced 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.

The site has an imbalance in the heating and cooling requirements meaning that a large ground collector array would be required to meet the annual heating load without depleting the resource available. A ground collector of the size required is not viable given the scale of the of the development.

4.7.3 Wind Turbines

The output from wind turbines are 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.

The location of the site in a conservation area, coupled with the likely reduced output available due to turbulent wind flow across the site means that wind turbines are not considered appropriate for this development.

4.7.4 Solar Thermal

Solar thermal collectors utilises solar radiation to heat water for use in water heating of a building. 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 these usually equates to 60-70% of the total DHW annual load, with the natural gas-fired boilers meeting the remainder of the load.

However, as previously stated the DHW load only constitutes a small proportion of the heat requirements of the development so the application of other LZC technologies have the potential to offer greater CO_2 savings. As such it is not proposed to include solar thermal collectors.

4.7.5 Biomass Heating

The development's thermal load profile suggests that a biomass boiler could potentially be installed with gas-fired boilers provided to meet peak loads. However, biomass boilers require significant space for the storage and delivery of the fuel, coupled to this is the higher particulate emissions associated with their use which can be a concern given the air quality issues in London and Camden, in particular.

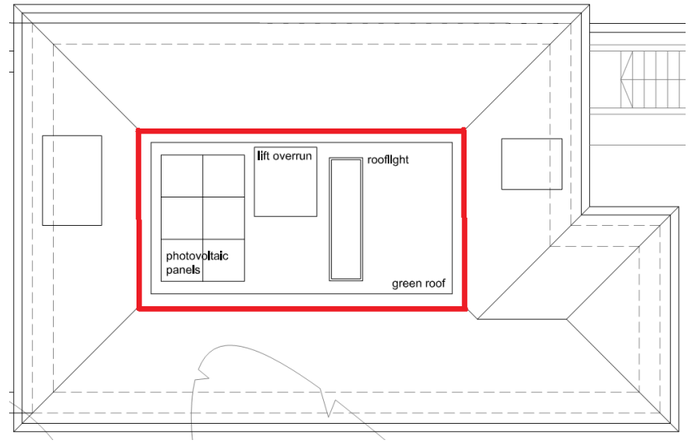
Therefore biomass boilers have not be considered feasible for the proposed development.

4.7.1 Photovoltaics

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.

A study into the feasibility of onsite electric generation using south facing photovoltaic panels on the roof of the development to meet a proportion of the residential development's electricity demand has been undertaken. This indicates that the roof area could accommodate a small PV array on the roof. The image opposite shows where this could potentially be located.

Therefore it is proposed that a PV array of approximately 1.5 kWp is installed which could provide a further 8.3% reduction in the site's CO_2 emissions from the 'Be Clean' case. This would provide a total improvement over the Part L1A (2013) baseline of 17.4%.



Roof Diagram

4.8 Proposed Energy Strategy

Although the proposed development is not a major development, we have followed the methodology of the Mayor's Energy Hierarchy and the London Borough of Camden's policy, with the estimated energy consumption for the development based on the National Calculation Methodology (NCM) calculated with the approved software Elmhurst Energy SAP 2012.

Energy Strategy

The house will be well insulated ensuring heat losses are kept to a minimum with enhanced fabric U-values and improved detailing making the development significantly more air tight. Energy efficient lighting and metering will be used to ensure that the tenants will be informed on the performance of the development.

High efficiency individual gas boilers will provide each dwelling with heat and domestic hot water.

The combination of passive and energy efficiency measures result in the residential development achieving an area weighted improvement of **17.4%** over the Building Regulations target (Baseline).

Renewable Energy Strategy

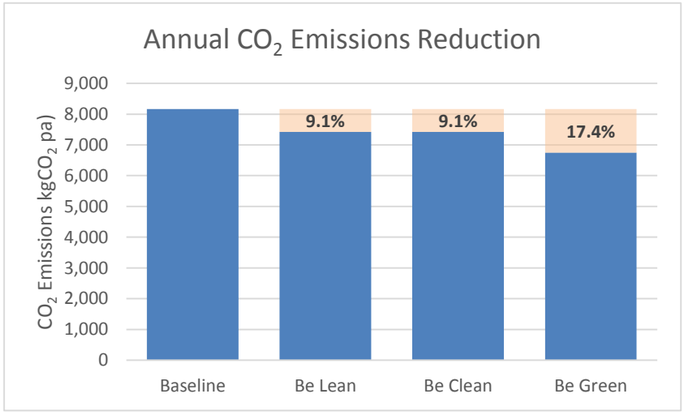
In accordance with the Decentralised Energy Hierarchy in Policy 5.6 (Be Clean) the feasibility of a site wide CHP network has been investigated. The development's predicted energy demands are insufficient to support the operation of a CHP unit, so any installation would be classed as 'Poor Quality'. As such is it not proposed to install one.

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

The feasibility study indicates that PV panels are the most appropriate technology for the site and that a 1.5kWp system could provide a further **8.3%** reduction in the site's CO_2 emissions.

The combination of the measures identified in this report could provide an overall reduction of **17.4%** of the Building Regulations 2013 requirements, as shown in the graph and table below.

The proposed energy strategy has maximised the emission reduction possible for the site given the size and constraints of the development. The proposed PV array achieves a significant reduction in CO_2 emissions but does fall short of GLA Policy 5.7 target.



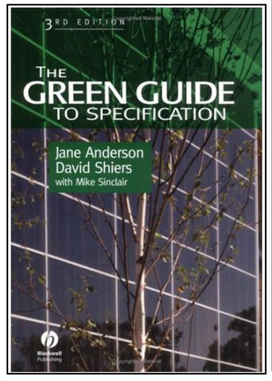
	Carbon dioxide emissions (kgCO_2 per annum)	Cumulative Reduction (kgCO2 per annum)	Cumulative % Reduction
Baseline	8,165	-	-
Be Lean	7,419	746	9.1%
Be Clean	7,419	746	9.1%
Be Green	6,745	1,420	17.4%

5. Materials

The aim for the proposed 24 Redington Gardens development will be for its overall environmental impact to be minimised through the specification of sustainable materials. The demolition of the existing building will identify those materials that can usefully be reused in the proposed development to minimise the environmental impact of the demolition.

5.1 Environmental Impact of Materials

New 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, taking into account factors like toxicity, ozone depletion, ease of recycling, waste disposal etc. Where viable, at least 80% (by area) of the new 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*

The 13 Environmental Issues assessed by the Green Guide

5.2 Sustainable Timber

All timber used for basic or finishing building elements 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 growing trees also absorb and fix CO_2. Forests can also provide the habitat for a wide variety of plant and animal life, preserving important ecology and promoting biodiversity.

5.3 Locally Sustainable Materials

The GLA’s SPG states that 50% of timber and timber products are to be sourced from Forest Stewardship Council (FSC) approved timber and balance from a known temperate source. The design team will commit to at least 50% FSC approved timber and 100% legally sourced timber for the proposed development. Where practicable, materials should be sourced from local suppliers, reducing the environmental impacts and CO_2 emissions associated with transportation to the site.

5.4 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 buildings’ life.

The design team will also commit to minimising the use of new aggregates thus complying with the Mayor’s Essential Standards.

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.

5.5 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 and EC regulations will require phasing out of HCFCs by 2015. However, products that replace 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 in line with the CfSH requirements. This will include insulation for building elements (roof, internal & external walls, floor – including foundations) as well as insulation for hot water vessels and pipe or duct work.

6. 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.

6.1 Demand Reduction and Water Efficiency

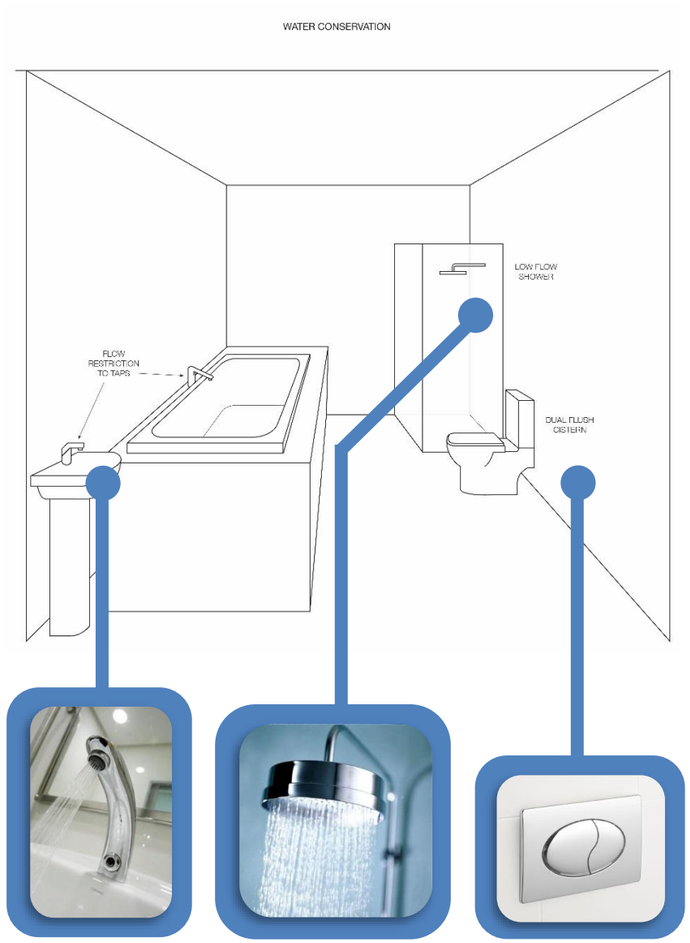
The aim is to minimise internal and external potable water use within the development. Good water management can contribute to reducing the overall level of water consumption maintaining a vital resource and having environmental as well as cost benefits in the life-cycle of the building. The following water saving measures are being considered for a range of areas in line with the CfSH requirements:

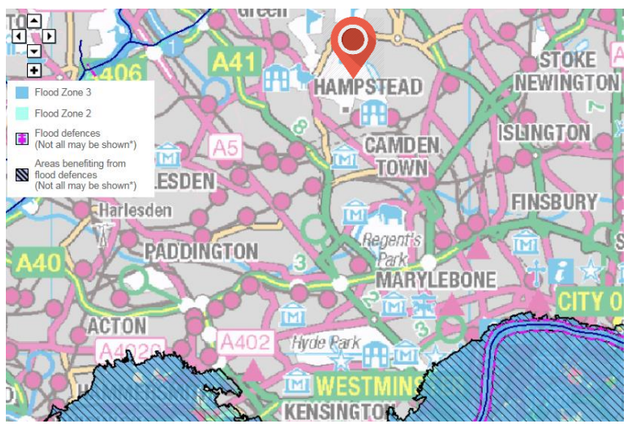
Dual Flush Cisterns on WC's - These units have the ability to provide a single flush of 4L and/or a full flush of 6L.

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.

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/ min without compromising on water pressure and hence should be considered.

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.





24 Redington Garden – EA Flood Map

7. Sustainable Urban Drainage

The site's drainage strategy will aim to reduce the impact of the development on the natural drainage patterns, by retaining water on site by the incorporation of Sustainable Urban Drainage techniques (SUDs).

The Environment Agency's Flood Map opposite shows that the site is located within Flood Zone 1, which indicates that land is being assessed as having less than 0.1% annual probability of river or sea flooding.

The development will seek to incorporate SUDs techniques following the guidance in London Plan policy 5.13. However, the constrained nature of the site and small scale of development make the installation of some SUDs techniques extremely challenging. The following items have been considered in accordance with the drainage hierarchy of policy 5.13:

- Rainwater storage – water butts are being considered to store run-off from the roof of the development. This will then be used at a later date for use in the gardens
- Infiltration – porous surfaces are being considered for the driveways to reduce surface water run-off. The garden spaces to the rear of the development will also aid in the natural infiltration of the site.
- Attenuation – the use of ponds or open water features discounted due to the constrained nature of the site limiting the external space. Storage tanks have also been discounted due to the small scale of the development.
- Discharge – the reaming surface water run-off will be discharged to the sewer system

8. 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.

8.1 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 a number of measures are implemented, including landfill tax, aiming to discourage disposal of waste to landfill. Good waste management is a key component of sustainable development. Reducing waste is an important means of:

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

The proposed development will minimise the impact of waste in the environment.

8.2 Demolition & Construction

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

Prior to commencement on a Site Waste Management Plan (SWMP) that complies with the requirements of current legislation and CfSH will be prepared. 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 SWMP will contain:

a) The target benchmark for resource efficiency e.g. m^3 of waste per $100m^2$ or tonnes of waste per $100m^2$;
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 and recycling construction waste into defined waste groups either on site or through a licensed external contractor;
f) The name or job title of the individual responsible for implementing the above.

As the proposed development is on land that has previously been built upon, there is the potential for using waste materials from the existing building 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.

8.3 Waste Management & Reporting in Operation

The detailed design phases will identify the potential waste streams that the development will produce. At a minimum, plans will be formulated to handle the separation, collection, and storage of common recyclable materials such as paper, glass, plastics, and metals. A dedicated bin store is provided in the driveway which is:

- Within accessible reach of the house
- In a location with good vehicular access to facilitate collections.

8.3.1 Storage of household waste

The space allocated for waste storage should be able to accommodate containers with at least the minimum volume recommended by British Standard 5906 (British Standards, 2005) based on a maximum collection frequency of once per week. This is 100 litres volume for a single bedroom dwelling, with a further 70 litres volume for each additional bedroom.

Large integrated recycling bin with at least 3 containers for recyclable waste and one general waste will be considered for the house similar to the image opposite:

80 Litre Capacity (2 x 32L & 2 x 8L)
Cabinet size - 600mm

Integrated recycling bins

9. Environmental Management

Construction sites are responsible for significant impacts, especially at a local level. These arise from noise, potential sources of pollution and 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. To achieve this, there will be a commitment to comply with the Considerate Constructors Scheme and get a formal certification under the scheme in line with the CfSH requirements. As a minimum a score of greater than 35 of out 50 will be achieved with an aspiration to exceed 40, 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 CfSH methodology:

- Monitor, report and set targets for CO_2 or energy usage arising 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 arising 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 should be responsibly sourced

10. Land Use and Ecology

The site currently comprises of a mix of existing building, hard landscaping and grass area with some ecological value to the site.

The proposed development will aim to achieve no negative change to the ecology of the site and will target an improvement.

11. 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.

11.1 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 and EC regulations will require phasing out of HCFCs by 2015. However, products that replace 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.

11.2 Internal pollutants

Volatile organic compounds (VOCs) are emitted as gases (commonly referred to as offgassing) 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.

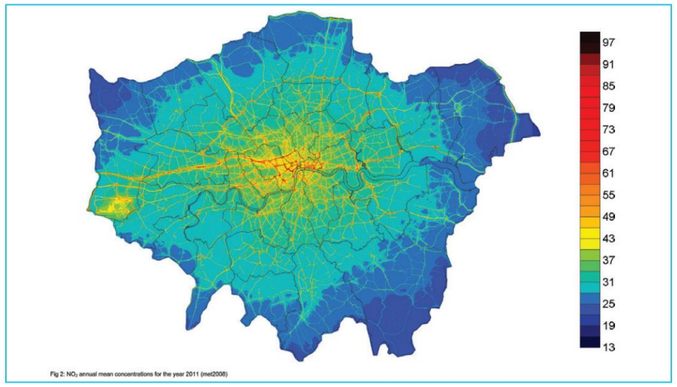
VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials, furnishings, adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling,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

11.3 NOx emissions from boilers

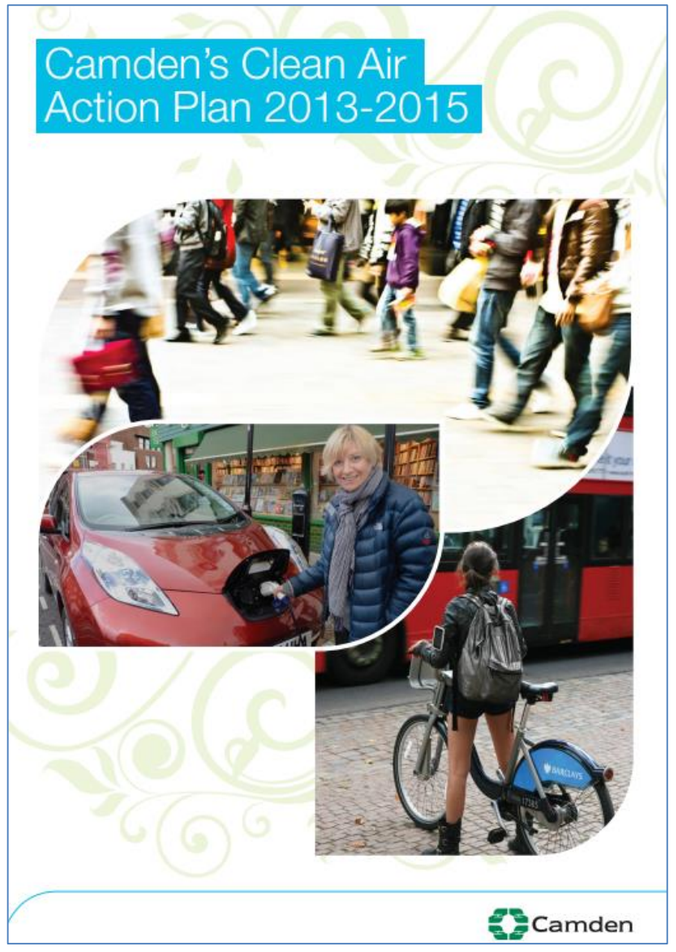
Nitrous oxides (NOx) are emitted from the burning of fossil fuels and contribute to both acid rain and to global warming in the upper atmosphere. At ground level, they react to form ozone, a serious pollutant and irritant at low level. Burners in heating systems are a significant source of low-level NOx, while power stations (and therefore electric heating) are a significant source of NOx in the upper atmosphere.



NO2 Annual Mean Concentrations

The amount of NOx emissions varies between products. New gas boilers vary from 40 NOx/kW to <70mg NOx/kWh (class 5). The proposed high efficiency gas boilers will be specified to have less than 40 NOx/kWh.

The entire London Borough of Camden was declared an Air Quality Management Area (AQMA) in 2000 and remains an AQMA for both NOx and particulates to the present day. Camden is committed to strict regulation of large new boilers and combined heat and power systems within its boundaries.

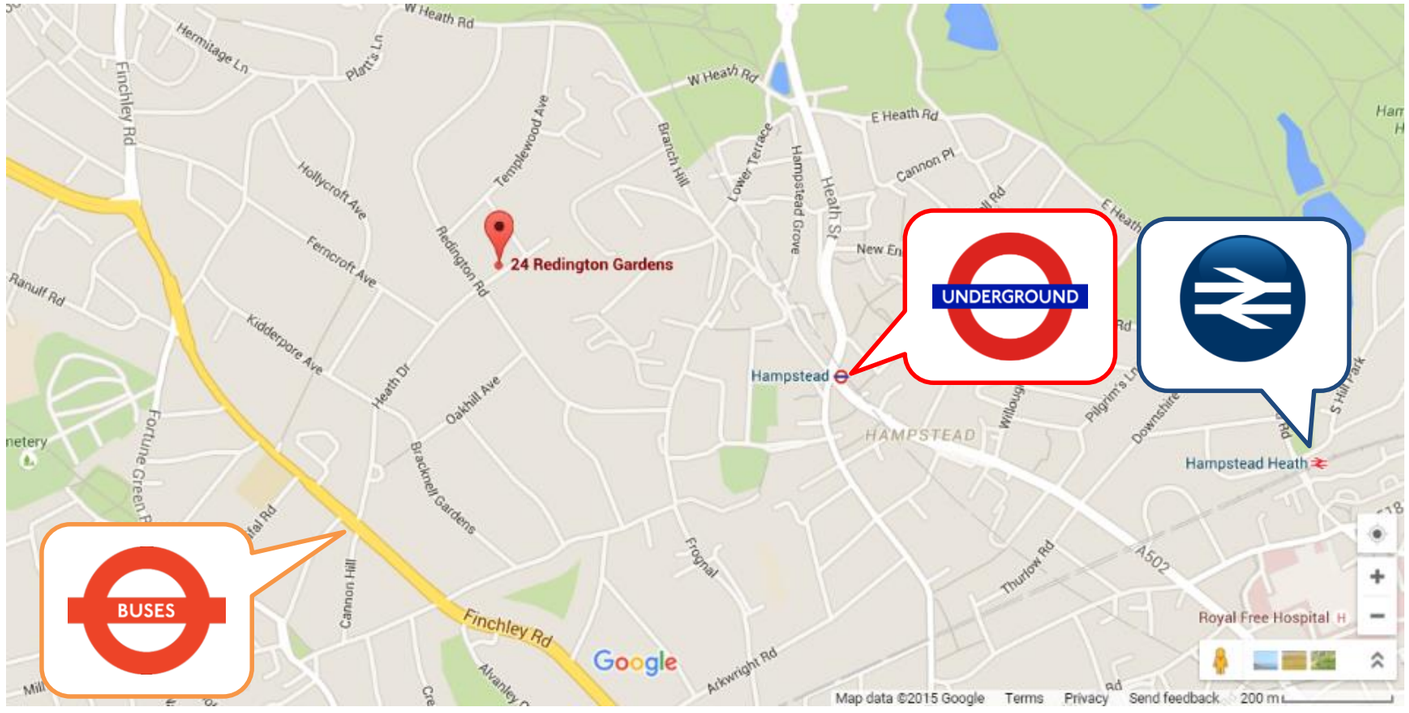


12. Green Transport

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, and at the same time, the effects of climate change are becoming more severe; there will be greater pressure to control CO_2 emissions from transport and sites without good access to public transport will be at much greater risk from these controls.

12.1 Site location

The site for the proposed 24 Redington Gardens development is located in Hampstead, North London, near the A41 (Finchley Road). The site is also approx. 900m from Hampstead Underground station.



12.2 Cycling Facilities

A secure cycling store will be provided for the house in order to encourage the occupants to use this carbon-free mode of transport. Secure, convenient and weather-proof cycle storage areas for use by the home owners will be provided in some form.

12.3 Car Parking Spaces

The proposed development includes space at the entrance to the site to allow for off-street parking for the house.