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DATE
13 OCTOBER 2016

SUSTAINABILITY & ENERGY STATEMENT

16A LYNDHURST GARDENS, LONDON NW3 5NR

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DOCUMENT STATUS

PROJECT
16A Lyndhurst Gardens
London
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PROJECT NO.
208

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REVISION	STATUS	CHECKED	DATE
-	Draft Issue for Comment	Julio Vale	13.10.16
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CONTENTS

EXECUTIVE SUMMARY

This Sustainability & Energy Statement has been prepared by Integration Consultancy Limited in support of the revision of the planning application for the development of the site at 16A Lyndhurst Gardens, in the London Borough of Camden.

This report includes updates and changes from the original Energy Strategy Report issued by Price & Myers on the 28th of June of 2013, submitted with the original planning application. The changes included in this report are:

- Air Source Heat Pump (ASHP) has been included as the main heating source and Ground Source Heat Pump has been omitted, due to the technical constraints imposed on the site from the proximity of London Underground tube lines;
- Improvement of the building fabric U-values;
- Omission of Code for Sustainable Homes Assessment in accordance with Written Ministerial Statement published on the 25th of March 2015;

National, Regional and Local Policy, in particular the London Plan and the London Borough of Camden Strategic Policies, outline the sustainability and energy issues which should be addressed in the planning application for the proposed development. The key issues that have been incorporated into the design are:

- The development must demonstrate a 40% improvement in the DER over the TER for Part L 2010. A combination of passive design features and energy efficient systems, incorporating an Air Source Heat Pump have been demonstrated to achieve a 49.5% improvement over Part L 2010.
- The energy strategy shall achieve a 20% reduction of carbon dioxide emissions over the TER through on-site renewable energy generation where feasible.

To achieve the carbon dioxide emissions reduction targets, it is proposed to:

- Use building fabric with good thermal performance and air permeability, exceeding the requirements of the Building Regulations Part L1A (2010).
- Utilise low energy building services systems, i.e. lighting, mechanical ventilation with heat recovery and air source heat pumps for the heating systems.
- The building fabric thermal performance will meet or exceed Part L 2010 requirements and robust detailing at joints and junctions will further reduce heat loss due to excessive infiltration. Building services systems, Energy efficient light fittings will minimise the electricity demand for lighting.
- A 24.19% reduction in carbon dioxide emissions is achieved through the use of an air source heat pump.

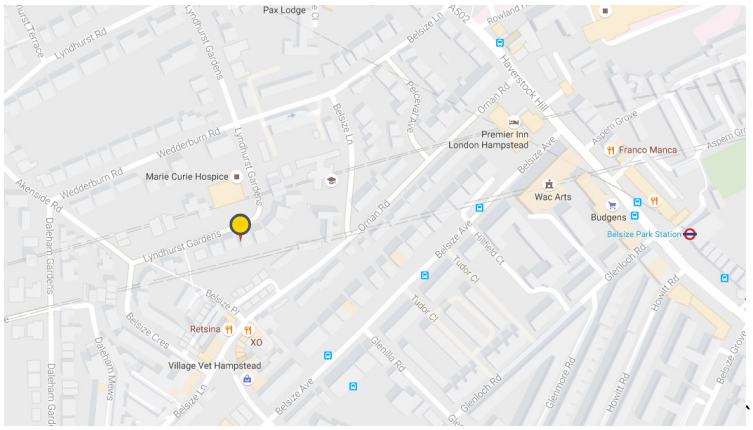
1 INTRODUCTION

This Sustainability & Energy Statement has been prepared by Integration Consultancy Limited in support of the revision of the planning application for the development of the site at 16A Lyndhurst Gardens, in the London Borough of Camden. The report is one of several documents that accompany the planning application and should be read in conjunction with these.

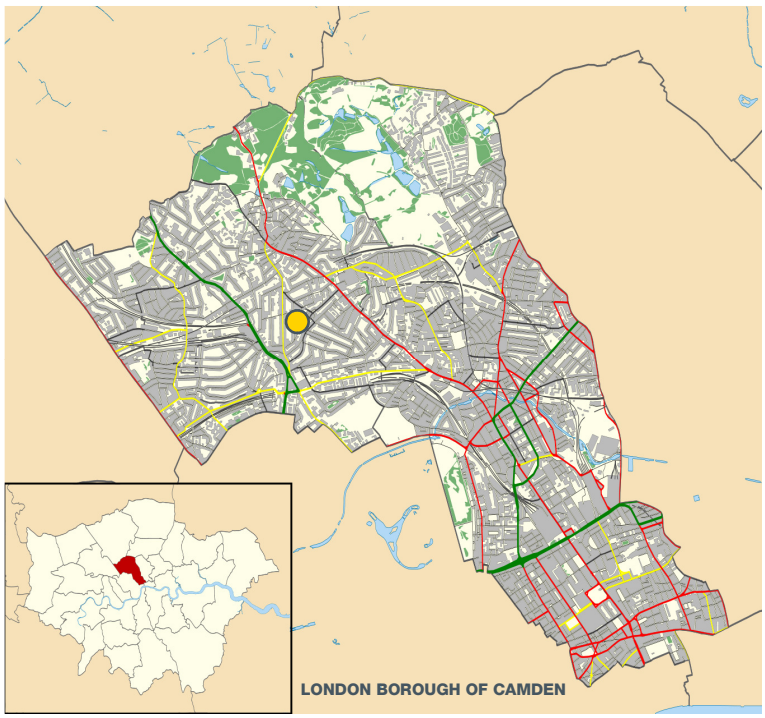
The purpose of this report is to set out how sustainability is integrated into the design and construction of the proposals, to demonstrate that the proposed changes to the original Energy Strategy Report submitted with the original Planning Application meet the sustainability targets set out in the London Borough of Camden Strategic and Development Policies and the London Plan.

1.1 THE DEVELOPMENT SITE

The proposed new development consists of one new build property, which will replace the existing building with total combined area of 645 m^2. The new development will be occupying a similar built envelope as the previous building above ground and a two storey basement.



Detail of Local Area (© Google)



Location of the Proposed Property within the London Borough of Camden

2 PLANNING POLICY CONTEXT

2.1 THE LONDON PLAN – CHAPTER 5: LONDON'S RESPONSE TO CLIMATE CHANGE

Regional policy in London is controlled by The Greater London Authority, and is set out in The London Plan. The Plan sets out policy and guidance in the London context and identifies a number of main objectives related to improving London as a workplace and living place.

The concept of sustainable development runs through the London Plan and all its policies with reference to topics including Places, People, Economy, Response to climate change, Transport, and Living places and spaces. Chapter 5 of the London Plan sets out a range of policies in relation to climate change, including climate change mitigation and adaptation, waste, aggregates, contaminated land and hazardous substances.

Key policies within the London Plan which are applicable to the proposed development and addressed in this report are:

POLICY 5.2 -MINIMISING CARBON DIOXIDE EMISSIONS

Planning Decisions

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

1 Be lean: use less energy

2 Be clean: supply energy efficiently

3 Be green: use renewable energy

B The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

Residential Buildings:

Year	**Improvement on 2010 Building Regulations**
2010 – 2013	25 per cent
2013 – 2016	40 per cent

Other key policies within the London Plan which are applicable to the proposed development and addressed in this report are:

- 5.6 - Decentralised Energy In Development Proposals
- 5.7 - Renewable Energy

2.2 LONDON BOROUGH OF CAMDEN RELEVANT POLICIES

The sustainability and energy strategy for the development will be developed in accordance with London Borough of Camden's Local Development Framework, specifically the following policies:

- Core Strategy Policy CS13: Tackling climate change through promoting higher environmental standards
- Development Policy DP22: Promoting Sustainable Design and Construction

2.3 CORE STRATEGY POLICY CS13: TACKLING CLIMATE CHANGE THROUGH PROMOTING HIGHER ENVIRONMENTAL STANDARDS

Camden's Core Strategy sets out the key elements of the Council's planning vision and strategy for the borough and is the central part of the Local Development Framework.

Core Strategy Policy CS13 sets out the Council's commitment to reducing Camden's carbon dioxide emissions in line with the national target of 80% by 2050. Applicable policy for the new development at 16A Lyndhurst Gardens is:

Reducing the effects of and adapting to climate change

The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

a) ensuring patterns of land use that minimise the need to travel by car and help support local energy networks:

b) promoting the efficient use of land and buildings;

c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:

1. Ensuring developments use less energy;
2. Making use of energy from efficient sources;
3. Generating renewable energy on-site; and

d) ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The development of the existing land is considered an efficient use of land and buildings. The proposed property will minimise carbon emissions through enhancements to the thermal performance of the building fabric, passive design measures, the use of energy efficient active building services systems and the incorporation of renewable energy technologies.

2.4 DEVELOPMENT POLICY DP22: PROMOTING SUSTAINABLE DESIGN & CONSTRUCTION

The London Borough of Camden Local Development Framework - Development Management Policies 2010-2025, sets out a long term planning vision and strategic objectives for future development in the area.

Development Policy DP22 sets out the Council's approach to improving energy conservation, efficiency and sustainability.

Applicable policy for the proposed development is:

> The Council will require development to incorporate sustainable design and construction measures. Schemes must:
>
> a) demonstrate how sustainable development principles have been incorporated into the design and proposed implementation; and
>
> b) incorporate green or brown roofs and green walls wherever suitable.
>
> The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:
>
> f) summer shading and planting;
>
> g) limiting run-off;
>
> h) reducing water consumption;
>
> i) reducing air pollution; and
>
> j) not locating vulnerable uses in basements in flood-prone areas.

The proposed development will have a floor area greater than 500m^2 therefore a sustainability assessment will be undertaken using SAP (Standard Assessment Procedure) as the assessment tool.

Appropriate climate change adaptation measures will be incorporated into the proposals, including rainwater collection and recycling and clean, renewable energy systems.

2.5 SUMMARY OF KEY POLICY REQUIREMENTS

> 1. 40% improvement in CO_2 emissions over the Target Emission Rate (TER) outlined in the national Building Regulations 2010.
> 2. Major development should be designed to link to and extend existing heat and energy networks in the vicinity. Where it is not possible to link to an existing heat and energy network, major development will be required to provide site-wide decentralised energy generation.
>
>   Smaller developments will be encouraged to be enabled to connect into heat and energy networks.
> 3. 20% reduction of CO_2 emissions through on-site renewable energy generation where feasible.

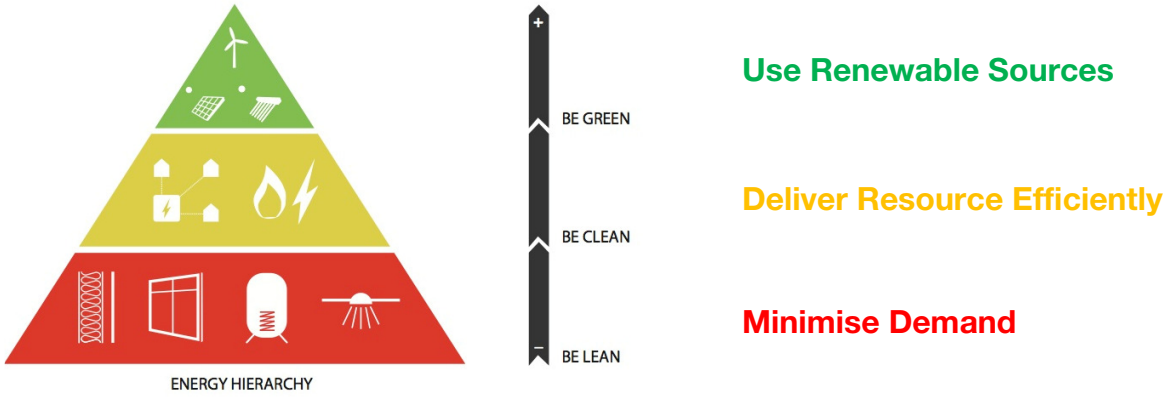
3 DESIGN APPROACH TO SUSTAINABILITY

The Energy Strategy for 16A Lyndhurst Gardens will have the potential to generate significant carbon savings over the lifetime of the development. The objective is to develop an energy infrastructure that supplies low carbon energy, utilises renewable sources, reduces energy bills for the occupants, provides a high quality internal environment, is adaptable and able to accommodate future upgrades.

Sustainability will be integral to the design, construction, operation and performance of the proposed development, the design principles will encompass a wide range of criteria, i.e. energy, water use, selection of construction materials, waste generation and management, pollution, Health & Well-Being of the occupants, and the ecological impact of the building both during construction and operational use.

3.1 THE ENERGY HIERARCHY

The energy hierarchy referred to in the London Plan suggests a three-step approach to decision making and prioritizing strategies for the reduction of resource consumption and carbon emissions from energy. This approach is applicable to other resources such as water, waste and construction materials.



ENERGY HIERARCHY

The purpose of this approach is to reduce the resource consumption and consequent carbon emissions of development without compromising the occupant comfort and quality of the development. This will be achieved by developing design strategies that respond to the opportunities and challenges of the climate, site and the local external environment as well as implementing efficient energy infrastructure that also integrates on-site renewable sources.

3.2 MINIMISING DEMAND

The incorporation of appropriate passive measures in the building design is essential if the building services systems are to be efficient and economic. Passive design measures are integral to the building form and fabric and therefore have the greatest influence on carbon emissions throughout the life cycle of a building.

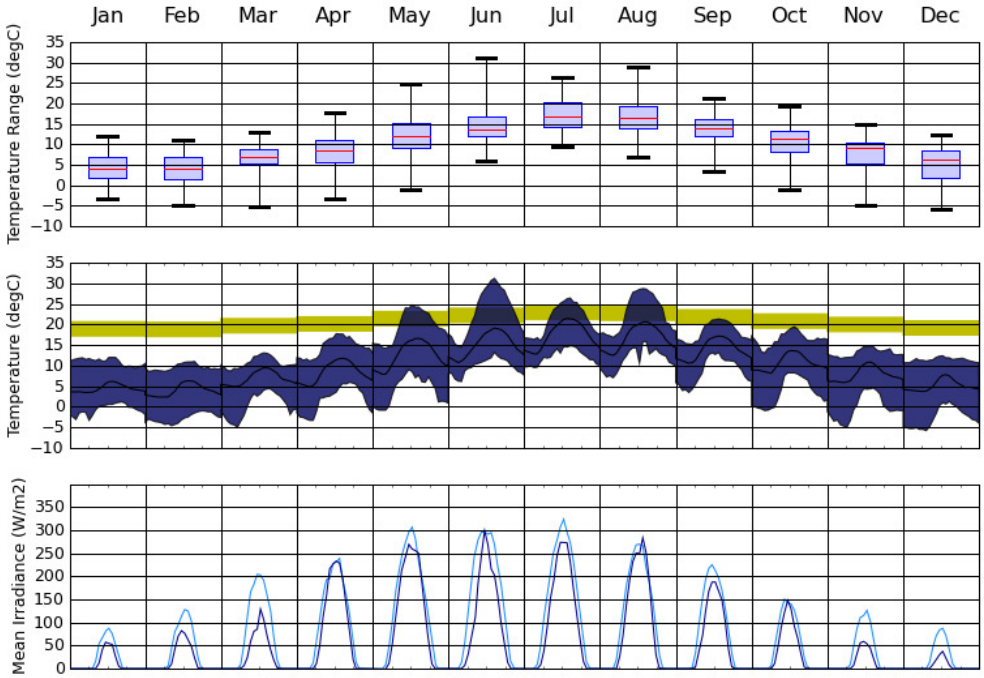
The development of passive design strategies starts by identifying site-specific challenges and opportunities, considering the microclimate, location and surroundings and applying them to the building form, façade and orientation.

The existing property will be demolished and replaced with a new building resulting in a significant reduction in the energy demand of the site (per m^2 of habitable floor area) by constructing the new development to current Building Regulations standards.

Climate Analysis

The London climate is heating dominated, hence the key passive measure to be implemented are high levels of insulation and air-tightness. Temperatures in the summer can occasionally rise above comfortable levels; this will intensify as a consequence of the climate change and further urbanisation.

Diurnal temperature variations are high, with average daily swing of 8-10°C even during peak summer, this creates potential for passive cooling using night-time purging of heat via openable windows. Other passive measures to reduce the risk of overheating include solar shading, daytime natural ventilation and providing local vegetation to mitigate the heat island effect.



Average climate data for Central London

Building Fabric Performance & Insulation

Thermal insulation must be able to deliver significant carbon emissions reductions throughout the life of the development. High levels of insulation will significantly reduce energy consumption and ensure optimum occupant comfort all year-round by retaining heat in the winter and reducing heat gain in the summer.

This is particularly relevant for glazed surfaces that may suffer from overheating in summer or overcooling and condensation formation in winter. A minimum U-value of 1.2 W/m^{2}K for all glazed elements is recommended to avoid radiant temperature asymmetry in winter.

The thermal performance of all new exposed elements will exceed the minimum requirements for Building Regulations compliance.

Air Tightness & Infiltration

The target air-permeability rate is 5 m^3/m^2/h, however it is possible to achieve as low as 4 m^3/m^2/h though appropriate selection of materials and seals and design of airtight details.

The key to achieving high levels of airtightness is the quality of construction. Selection of Accredited or Improved Robust Details improves air-tightness of the building envelope in practice.

Natural Ventilation & Thermal Mass

Daytime natural ventilation is essential to purge excess heat during the summer months and enables rapid dilution of pollutants. When used in combination with exposed thermal mass, natural ventilation will reduce high internal daily temperature variations, which will minimise the overheating risk in the summer.

Solar Exposure and Daylight

Maximising exposure to solar energy and daylight is essential to reduce reliance on artificial lighting reducing winter daytime heating requirements and to contribute to the general wellbeing of occupants.

Daylight levels are good and are supplemented with low energy light fittings. The orientation of the building reduces peak solar gain while ensuring good levels of daylight both morning and evening.

The U-Values of all glazed elements will exceed Building Regulations standards and incorporate low emissivity coating, resulting in an efficient balance between passive solar gain and the thermal losses from each room.

Active Building Services Systems

All building services systems will be in accordance with, and where possible exceed the energy efficiency requirements of the Domestic Building Service Compliance Guide.

The heating and hot water systems will be controlled via the Air Source Heat Pump and manifold controls, providing weather compensation, optimised start and time clock and temperature control to each individual room.

Individual Mechanical Ventilation with Heat Recovery (MVHR) system will be installed. Balanced whole-house MVHR systems will supply air to all habitable rooms and exhaust from all wet rooms (kitchens, toilets, WC's, Utility Rooms). This will negate any requirement for trickle vents in the façade and contribute to achieving low air permeability rates. Systems will be designed and low energy fans selected to ensure a low specific fan power (SFP) and electrical consumption.

Low energy fixed lighting, generally comprising LED fittings, will be installed throughout the development.

3.3 DECENTRALISED ENERGY IN DEVELOPMENT PROPOSALS

Policy 5.6 of the London Plan requires developments to connect to a decentralised energy network and use the heat unless it can demonstrate it is not technically feasible or financially viable.

The property is located in the Hampstead area of the London Borough of Camden, therefore connection to an existing district heating network is unlikely to be viable at the time of construction.

3.4 RENEWABLE & LOW ENERGY TECHNOLOGY SYSTEMS

In accordance with Policy 5.7 of the London Plan, a viability assessment for the most applicable renewable energy and low carbon technologies that could be installed to meet the target 20% CO_2 emissions reduction has been developed in the following section. Capital and operational costs, local availability of renewable energy resource, local pollution, environmental impact, commercial availability, maintenance, control and operational issues, and carbon emissions are considered.

4 ENERGY STRATEGY

The energy strategy for the residential areas of the proposed development has been established using the following process:

- Qualitative assessment of the viable options for conventional, renewable & low energy technologies, considering CO_2 reduction potential, suitability and practicalities of incorporating into the scheme and financial viability to determine the most applicable system.
- Determine the baseline Target Emissions Rate for evaluation of the proposed option in terms of achieving the CO_2 emission reduction targets.
- Calculate the Dwelling Emissions Rate (TER) for the residential units for the preferred options to enable quantitative assessment of CO_2 reductions.
- Quantitative assessment of CO_2 emissions reductions from the proposed renewable energy systems.

4.1 RENEWABLE & LOW ENERGY TECHNOLOGY SYSTEMS ASSESSMENT

Technology		Assessment / Viability
Wind Power	Wind turbine installed on the roof of the development.	Due to the urban location, and the impacts in terms of visual appearance, noise and shadow flicker, wind turbines are not considered a viable technology for the development. CONCLUSION: **VISUALLY AND TECHNICALLY INAPPROPRIATE**
Ground Source Heat Pumps	Open or closed loop GSHP system requiring extraction of ground water and / or deep boreholes.	Significant investment required, limits to how many boreholes can be installed in an area and the capacity achievable within a confined site. No external visual or noise impact, could be used to supply cooling in summer. **Proximity of the site to LUL train lines significantly constrains capacity achievable.** CONCLUSION: **NOT CONSIDERED FINANCIALLY OR TECHNICALLY VIABLE**
Air Source Heat Pumps	Electric powered external plant serving each residential unit providing heating and cooling	Simple and economic system utilises grid electricity - resultant CO_2 reductions lesser other options available. The proposed location of external units at the rear garden will minimise the visual / planning impact of the system. CONCLUSION: **CONSIDERED A FEASIBLE OPTION**
Solar Thermal Collectors	Roof mounted solar thermal panels providing heating energy to a centralised domestic hot water system	Roofs have good potential for solar thermal energy collection. Solar hot water collectors have a high efficiency and would provide a significant proportion of domestic hot water demand of the development. However, PV systems have a greater carbon reduction potential and are more cost effective over the lifetime of the building for the same roof area coverage. CONCLUSION: **NOT CONSIDERED TECHNICALLY VIABLE**
Solar Photovoltaic Panels	Roof mounted Photovoltaic panels (PV) provide electricity directly to the development, exporting any surplus production to the grid.	The building roof has areas of pitched roofs although it is potentially to be covered by a green roof, and it is one storey high and is shaded by surrounding large trees shade making it unfeasible to locate solar technologies. In addition, it is not thought this would fit into building aesthetics. CONCLUSION: **POTENTIALLY VIABLE BUT CONSIDERATION SHOULD BE TAKEN TO PROTECT THE CHARACTER AND APPEARANCE OF THE CONSERVATION AREA**
Solar PV-Thermal Panes	Emerging hybrid system, combination of the Solar Thermal Panels for heat supply and PV panels for electrical power supply.	Hybrid solar thermal + PV systems enhance efficiency by cooling exposed PV cells. Water is circulated on the rear of the panel and the heat is supplied to the building. There are few UK suppliers of PVT systems and installation will require significant investment. CONCLUSION: **NOT CONSIDERED FINANCIALLY VIABLE**

Technology		Assessment / Viability
Biomass Heating	Biomass fired community heating system.	Biomass heating is proven technology and is likely to provide a significant CO_2 reduction. The size of fuel storage, delivery management and local increase in pollution, notably particulates (PM10), SO_2 and NO_x emissions should be considered. The entire borough of Camden discourage biomass heating due to frequent deliveries of biomass fuel and air quality implications for the use of biomass as high level of NOx. CONCLUSION: **NOT CONSIDERED TECHNICALLY VIABLE**
Combined Heat & Power	Mains gas fired electricity generation plant to supply electrical power and waste heat recovered and used to community heating and domestic hot water.	Communal CHP is not viable for a single dwelling. Micro CHP would be technically feasible but is unlikely to save enough carbon to meet the targets. CONCLUSION: **NOT CONSIDERED TECHNICALLY OR FINANCIALLY VIABLE FOR A MINOR DEVELOPMENT**

The table above summarises the viability assessment for the most applicable renewable energy and low carbon technologies. Capital and operational costs, local availability of renewable energy resource, local pollution, environmental impact, commercial availability, maintenance, control and operational issues, and carbon emissions are considered.

When determining the most suitable system, the priority is to maximise the utilisation of on-site renewable energy, minimise the use of carbon intensive and high polluting fossil fuels and avoid energy conversion and transmission losses.

Solar PV panels are considered a viable option to integrate renewable energy as part of the development. However, due to the location within the Conservation Area it is not considered feasible to install PV panels on the pitched roof of the property without causing harm to the character and appearance of the development and the surrounding area.

A ground source heat pump has previously been considered and recommended as the most appropriate option, however due to capacity required, the limited site area and the presence of London Underground tube lines below the property, this solution is not considered technically feasible.

Air source heat pumps are therefore considered to be the most viable option to integrate renewable energy as part of the proposals. Installing an air source heat pump on the rear garden of the properties would be a recommended solution.

4.2 ENERGY ASSESSMENT METHODOLOGY

The proposed energy strategy and compliance with the required CO_2 emissions reductions targets are demonstrated using SAP 2009 software. A Target Emissions Rate (TER) is calculated and an average TER across the whole development is used for comparison/evaluation.

The SAP calculations have been repeated to evaluate the CO_2 reduction potential of improvements to the building fabric and the following systems:

- 40% Improvement on Building Regulations 2010 achieved by enhanced building fabric performance and heating via air source heat pumps (ASHP).

4.3 BUILDING FABRIC PERFORMANCE

The following building fabric properties have been used in the SAP calculations

Element	Building Regulations 2010 Compliant (base case)		Enhanced Building Fabric – Target 40% Improvement	
	U Value (W/m²K)	G Value	U Value (W/m²K)	G Value
External Walls	0.35	-	0.14	-
Floor	0.25	-	0.12	-
Roof	0.16	-	0.19 / 0.12	-
Windows	2.0	0.72	1.20	0.63
External Doors	2.0	-	1.20	-
Air Tightness	10.0 $m^3/m^2/h$		5.0 $m^3/m^2/h$	

4.4 BUILDING SERVICES SYSTEM DATA

The following building services systems have been used in the SAP calculations

Element	Building Regulations 2010 Compliant (base case)	Target 40% Improvement
Space Heating	SEDBUK (2009) 78% Underfloor heating in insulated floor	Air Source Heat Pumps Underfloor heating in insulated floor
Heating Controls	Programmer, room Thermostat and TRVs boiler interlock	Time and temperature zone control by suitable arrangement of plumbing and electrical services
Hot Water Storage	via boiler, separate time control for space and water heating	Via Air Source Heat Pump
Ventilation	Natural ventilation with intermittent extract fans	local MVHR – 89% efficient
Lighting	30% low energy	100% low energy

4.5 ENERGY DEMAND & CO_2 EMISSIONS

The energy demand and carbon emissions calculations for Regulated Energy have been prepared using SAP 2009 software. The calculations are based on the proposed building fabric performance and building services systems detailed in this report.

Energy Demand

Energy Use	Primary Energy Demand (kWh/year)		Primary Energy Demand Rate (kWh/m²/year)	
	Part L 2010 Compliant Building	Proposed Building	Part L 2010 Compliant Building	Proposed Building
Space Heating	59,446	9,410	92.16	15.29
Domestic Hot Water	4,121	2,635	6.39	4.28
Cooling	0	109	0	0.17
Regulated Electricity	1,823	1,083	2.82	1.76
Non-regulated Electricity	175	1,563	0.27	2.54
Total	**65,566**	**14,802**	**101.65**	**24.59**

The predicted total annual regulated energy demand of the proposed development following the introduction of energy efficiency measures, passive design and renewable and low energy technologies is 14,800 kWh compared to a Building Regulations Part L1A (2010) compliant building demand of 65,566 kWh. This represents a significant improvement in energy efficiency, equating to a reduction of 77.06 kWh per m^2 or 24.19%.

The following table details the potential subsequent reduction in CO_2 emissions as a result of the improvements to the energy demand.

CO_2 Emissions

Energy Use	Emissions (Kg CO_2/year) [1]		Emissions Rate (Kg CO_2/m^2/year) [1]	
	Part L 2010 Compliant Building	Proposed Building	Part L 2010 Compliant Building	Proposed Building
Space Heating	12,625	4,865	19.57	7.90
Domestic Hot Water	799	1,362	1.23	2.21
Cooling	0	56	0	0.09
Regulated Electricity	73	560	0.11	0.91
Non-regulated Electricity	769	808	1.19	1.31
Total	**14,268**	**7,652**	**24.63**	**12.43**

(1) Carbon Emissions conversion factors have been taken from SAP 2009:

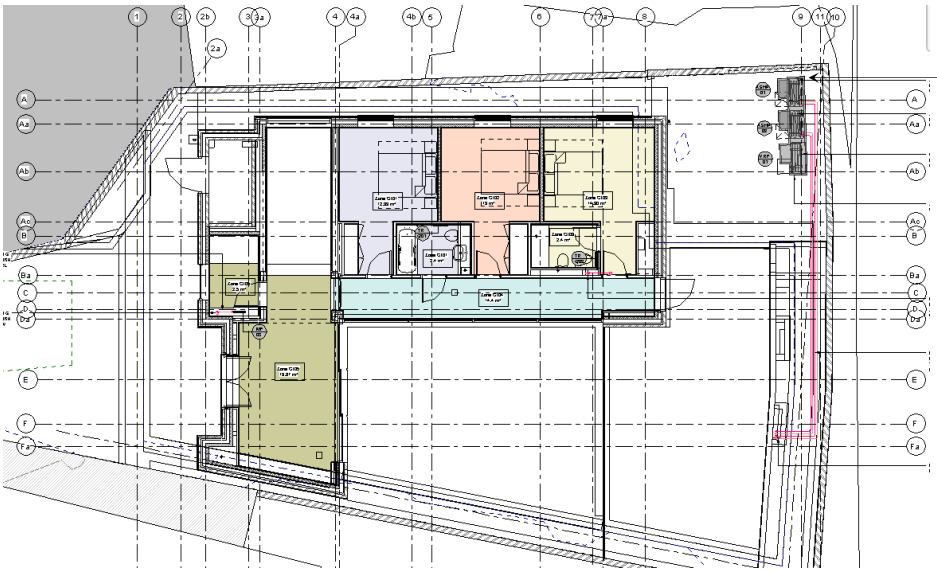
- Grid Electricity – 0.517 kgCO_2 / kWh

The predicted total regulated energy annual CO_2 emissions of the proposed development following the introduction of energy efficiency measures, passive design and renewable and low energy technologies is 7,652 Kg CO_2 compared to the Building Regulations Part L1A (2010) compliant building of 14,268 Kg. This represents a significant improvement in carbon emissions, equating to a reduction of 12.20 Kg per m^2 or 49.5%.

4.6 ON-SITE RENEWABLE ENERGY GENERATION

It is proposed that air source heat pumps are located on the rear garden.

The diagram below indicates the proposed location of the ASHP.



Ground Floor Plan

	Generated Energy (kWh /year)	Equivalent CO_2 Emissions (Kg CO_2/year)	Proportion (CO_2) of Total Demand
Total Demanded Energy	14,802	7,652	100%
Generated from Renewables	7,037	3,638	47.5%
Total from Renewables	**7,037**	**3,638**	**47.5%**

5 SUSTAINABILITY APPRAISAL

The following appraisal addresses the sustainable features of the proposed redevelopment of 16A Lyndhurst Gardens, following policy guidelines.

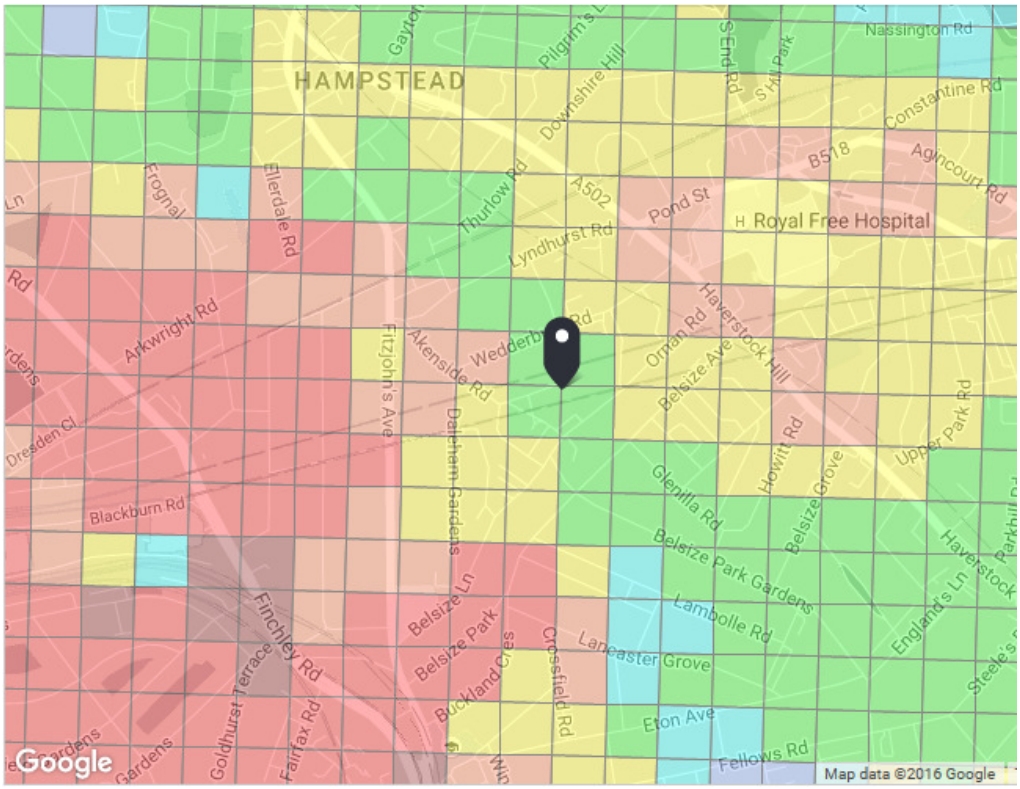
5.1 LAND & BUILDING USE

The site at 16A Lyndhurst Gardens, is located in Hampstead, within the London Borough of Camden. The site is within the Hampstead Conservation area and does not contain any Listed Buildings.

The site is currently occupied by an existing residential building and hard landscaping, and is considered of low architectural merit. The proposed building largely occupies the footprint of the previously proposed building.

5.2 SITE LOCATION & PUBLIC TRANSPORT ACCESSIBILITY

The site is located in the urbanised area of Hampstead, within the London Borough of Camden, which has a range of frequent transport links. The nearest tube station is Belsize Park which is within 850m. There are numerous local bus routes with bus stops within 500 m from the site.



PTAL output for 2011 (Base year)
3

NW3 5NR
Lyndhurst Gardens, London NW3 5NR, UK

Easting: 526895, Northing: 185082

Grid Cell: 104176

Report generated: 26/09/2016

Map key - PTAL

0 (Worst) 1a
1b 2
3 4
5 6a
6b (Best)

Map layers

PTAL (cell size: 100m)

The Transport for London Web PTAL report for the site states that the Accessibility Index is 10.24, which translates as a PTAL Rating of 3.

5.3 ENERGY CONSERVATION & EFFICIENCY

The energy efficient design of the development is discussed in detail in section 4

5.4 WATER CONSERVATION & RECYCLING

The water management strategy will adopt the same *Lean-Clean-Renewable* hierarchy that is applied in development of the energy strategy. To reduce potable water demand and use the resource efficiently, a combination of the following strategies will be adopted:

- Specification of water efficient appliances, including washing machines and dishwashers, all white goods provided will have maximum water efficiency ratings.
- Dual and low flush toilets; flow restrictors on piped water supplies to sinks and basins.
- A pulsed water meter will be installed to each dwelling.

These will reduce potable water demand, when compared to a typical UK dwelling, from 155 litres / person per day to 110 litres / person per day.

5.5 MATERIALS

It is proposed that high quality materials be used throughout the proposed development. The materials selected for the development will therefore:

- Be selected to suit the hierarchy within the BRE Green Guide to Specification, maximising the use of A & A+ materials where ever possible;
- Be sourced from the demolition materials where possible. Where possible, the recovered demolition materials will be reused on-site.
- Be sourced responsibly from certified and accredited suppliers and manufacturers, e.g. Chain of Custody certification, FSC, EWMAS, BES6001 etc.;
- Be manufactured off site where possible;
- Comprise low VOC content products;
- Be locally sourced where possible, with a sourcing hierarchy starting within London, then South East England, England, and then the UK.

5.6 WASTE

The construction of a building involves the production of a variety of waste streams. These can arise at each stage of the development life cycle including demolition of the existing buildings, excavations, construction and the building operation. By careful planning, appropriate design and management of these waste streams the waste volumes can be substantially reduced or in some cases even removed completely.

The waste strategy will be developed with the intention of reducing waste disposal to landfill sites. This includes a waste hierarchy which is consistent with the basic sustainability principles of reduce, reuse and recycle. This hierarchy follows the steps below.

- Waste prevention
- Re-use
- Recycle
- Disposal

The property design will be developed with full consideration given to selection of materials and promotion of construction techniques that can reduce waste. The use of standard material

sizes, and proprietary products can reduce waste generation, as can the specification of materials such as plasterboard which have an inherent recyclable option for off cuts.

The contractor will be required to implement a Site Waste Management Plan for the management of construction materials, to demonstrate how they will be recycled or re-used and confirm how waste discharge to landfill will be kept to a minimum.

The London Borough of Camden is well serviced with regard to refuse collection, with both municipal waste and recycling regularly collected. Waste management and storage provision will be designed to make full benefit of these waste collection facilities.

5.7 HEALTH & WELLBEING

All living rooms, dining areas studies and areas designated as a home office will be designed to achieve a minimum average daylight factor of at least 1.5 %. All kitchens will be designed to achieve a minimum average daylight factor of at least 2.0 %.

The building will be designed to ensure all airborne sound insulation values are at least 5dB higher and impact sound insulation values are at least 5dB lower than the Building Regulation Part E 2003.

5.8 MANAGEMENT OF CONSTRUCTION

The Contractor should be required to meet best practice under a nationally or locally recognised certification scheme such as the Considerate Constructors Scheme. This will include the management, control and monitoring of the following arising from site activities:

- water consumption
- water (ground and surface) pollution
- air (dust) pollution
- the use of reclaimed, re-used and responsibly sourced site timber
- waste generation, mitigation measures and maximising waste diversion from landfill

5.9 ECOLOGY

The site is largely made up of residential buildings and associated hard standing with back garden areas. The gardens have been planned as outdoor areas, making the most use of the available space. The site construction area is considered to be of low ecological value with no specially protected habitats present.

The net internal floor area to net internal ground floor area is in excess of 2,5:1, therefore it can be considered that proposed development provides efficient use of the building footprint by ensuring that land and material use is optimised across the development.

6 SUMMARY

Minimise Demand

Passive design measures will be incorporated into the design of the proposed development to reduce energy consumption whilst enhancing occupant comfort and wellbeing. Key sustainable design features include maximising exposure to solar energy and daylight through considered façade design, minimising overheating and glare via passive shading, providing facilities for effective, controlled natural ventilation.

The thermal performance of the building fabric will be enhanced through the use of appropriate construction materials and details providing low U-values, minimising cold bridging, enhanced air tightness and reduced air infiltration.

Deliver Resource Efficiently

The building will include efficient building services systems including mechanical ventilation systems incorporating heat recovery, low energy lighting and time, temperature and weather compensated heating controls.

Use Renewable Sources

Air source heat pump (ASHP) is considered to be the most viable option to integrate renewable energy as part of the proposals. The air source heat pumps will be located on the rear garden of the property.

Decentralised Energy in Development Proposals

Due to the size and location of the proposed development and availability of local district heating networks it is not deemed feasible to connect to any heat network at this stage.

Achieving CO_2 Emissions Reduction Targets

Improvements to the building fabric and the proposed active building services systems can achieve an average reduction of CO_2 emissions over the TER of 40%.

This strategy represents the maximum energy and CO_2 emissions reductions that could be achieved for this development and therefore it confirms that the development complies with the minimum requirements set by London Plan and the London Borough of Camden's sustainability targets.

The figures within this report are based on preliminary analysis only and further detailed studies will be required as part of the next design stage before any further development of the proposed systems.