SOUTHFACING

Sustainability Statement

Great Ormond Street Hospital for Children – NHS Foundation Trust

May 2019

Southfacing Services Ltd
81 Essex Road
London N1 2SF

Tel: 020 7359 5014
Email: info@southfacing.co.uk

CONTENTS

Executive Summary

This document is the sustainability and energy statement required as part of a formal planning application for the construction of a single building comprising three-storeys within an external courtyard on the main hospital site. It outlines the environmental design principles that have been considered, and provides an overview of the scheme's sustainability credentials. It sets out how the proposed project will meet, in principal, the aspirations of the London Plan and Camden's Local Development Framework in line with Camden's Planning Guidance on Sustainability (CPG3).

The Trust has identified that to offer world-class tertiary paediatric neurosciences and neurosurgery, it needs to provide an Intraoperative Magnetic Resonance Imaging (iMRI) facility on the main hospital site. The new scheme, Southwood Courtyard Building, will provide the Trust with dedicated iMRI clinical facilities as well as enhanced rehabilitation services. The proposed building will accommodate a physiotherapy and rehabilitation department at Level 2, an iMRI suite that includes the machine, a theatre room and associated preparation rooms at Level 3 connecting to existing theatres of the Variety Club Building, and plant and equipment at Level 4. The plant floor would be enclosed and insulated. A green roof is proposed at roof level. The clinical capabilities of GOSH and the experience of children and families attending for physiotherapy will be dramatically improved. The building is also a key enabler in the Hospital's site-wide strategy to upgrade its buildings with staged moves of key clinical services over a number of years.

A BREEAM New Construction 2014 assessment has been undertaken for Pre-Assessment stage and indicates a clear pathway to achieving a rating of 'Excellent' with a score of 72.7%. This is possible despite restrictions on the site and stringent clinical requirements as; the scheme is able to connect to the existing hospital energy network, the works will include clearing of contamination (asbestos), there will be improved water retention and there will be a net gain in biodiversity on site due to the addition of a new green roof.

An Energy Assessment using SBEM has been carried out in conjunction with the energy hierarchy as detailed in the London Plan and predicts a total regulated CO_2e savings over Part L 2013 Building Regulations baseline of 49.52%.

The potential savings from energy demand reduction "Be Lean" is 21.22% through optimised building design and use of high performing construction materials, while still meeting stringent heating, cooling and hot water requirements for clinical facilities. The potential to "Be Clean" is 9.48% through connection to the hospital's existing energy network, a combined heat and power (CHP/TRIGEN) that was installed at GOSH in 2011. The opportunities to "Be Green" (use of low & zero carbon technologies on site) have resulted in an 18.8% reduction.

Given its central location, the overall impact on local amenities and transport is considered minimal. There will be a relatively small increase in jobs (circa 5), as it is largely an upgrading / transfer of existing clinical facilities. It will contribute a modest increase in patient and visitor numbers, but this is considered well within the expected overall year-on-year increase at GOSH. There are no proposed changes to the highways layout nor parking or drop-off facilities as a direct result of this scheme; however, there will be the provision of an additional 8 cycle parking spaces. All deliveries and waste collection will take place via the internal access corridors as a normal part of the broader GOSH servicing; the external access is for emergency exit and access to new bicycle parking facilities.

The building services installed will be of highest efficiency possible within the financial and clinical constraints of the scheme; keeping the energy consumption to a minimum. Key features include dedicated air handling units, connection to existing networks (heating, water and medical gases) and a building energy management system (BEMS).

Optimised design includes use of 20% opaque translucent KalWall system on Level 2 and connecting corridors which ensures privacy while maximising use of natural light. Other design features; the façade at upper levels, u-values of walls, doors and windows, air permeability and hence building leakage and daylight factors; these will be optimised and developed in accordance with the performance standards outlined in Building Regulations Part L 2013.

All building materials and their thermal properties will be assessed against the BRE Green Guide, with the aspiration of achieving A or A+ rated build-ups. All timber used on site and for construction

materials will be from an independently verified sustainable source such as Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC). Where feasible, other materials will seek to be sourced from responsible suppliers ideally with BES6001 certification.

The existing site is paved and contains a single storey contractors' office, gas bottle storage and redundant plant; and contains some asbestos which will be removed as part of the scheme. The scheme will improve the overall biodiversity and water retention capacity of the courtyard through proposed installation of a green roof. The scheme therefore represents a net gain in ecological assets. The green roof, and the low number of windows, will help to provide passive assistance to managing heat gains, and reduce overheating in summer (urban heat island effect).

Water management will be optimised. Low flow sanitary fittings are proposed throughout and in addition to extensive metering, a Building Management System (BMS) will be provided which will include capability to monitor water utilisation, leaks etc. through use of 'out of normal range' alarms. The green roof will rely on precipitation. Rainwater or greywater harvesting is not feasible due to site constraints.

The impermeable surface area will not increase as a result of the new development, and therefore run-off rates are not expected to change. New drainage systems will connect to the existing sewer network. The site lies within Environment Agency Flood Zone 1 and therefore is not considered at risk of fluvial flooding. The biodiverse roof areas will provide some attenuation through the hydraulic capacity of the substrate.

The waste hierarchy will be followed, prioritising the reduction, re-use and recycling of materials. This is as part of an ongoing wider GOSH waste reduction program where zero waste to landfill is targeted. Construction waste will also be minimised, the contractor will be required to produce a Site Waste Management Plan and waste will be sorted on site. The contractor will target a minimum Considerate Constructors Scheme score of 40 points per visit.

To ensure the building operation is as efficient as possible, ongoing contractor engagement beyond handover will be carried out. Seasonal commissioning activities will allow systems to be refined for high and low demand. In addition, a commitment will be made to monitor and record key performance data for three years beyond handover, in accordance with the BREEAM New Construction criteria.

Prepared by: Ben Cartmell, Director For and on behalf of Southfacing Services Ltd	Date: 20/05/19

1. Introduction

This sustainability statement accompanies a full planning application dated June 2017. The planning application is submitted on behalf of Great Ormond Street Hospital for Children – NHS Foundation Trust, known as GOSH, and is referred to as the Trust hereafter. Redevelopment is part of the Trust's ongoing commitment to update the hospital's existing facilitates and deliver an improved model of care into the 21st century.

The development is part of a broader strategy of regeneration of older building stock and provides temporary accommodation as part of a sequence of moves of clinical facilities within the site over time. As a result, the development will not significantly add to the numbers of staff and visitors.

This Sustainability Statement has been prepared by Southfacing, RSP and Ansell and Bailey Architects. The document outlines the sustainability, energy and environmental principles that have been considered in the design of the proposed GOSH iMRI suite, Southwood Courtyard, and the measures by which the planning application meets, in principal, the aspirations of the London Plan, Camden Core Strategy 2010-2025 Local Development Framework, Camden's Planning Guidance on Sustainability (CPG3), and Camden's emerging policy: Camden Local Plan 2016 Proposed Submission.

This statement should be read in conjunction with all other documents submitted in support of the planning application, which include the Design and Access Statement, Planning Statement, Drawing Package, Draft Construction Management Plan, Sunlight and Daylight Assessment, Noise and Vibration Assessment, Ground Conditions Report and Desk Based Archaeological Assessment.

1.1 Background

Great Ormond Street Hospital (GOSH) for Children NHS Foundation Trust has identified that to offer a 'world class' centre for tertiary paediatric neurosciences and neurosurgery, it needs to provide an Intraoperative Magnetic Resonance Imaging (iMRI) facility with a 3 Tesla (3T) MRI on the main hospital site. The Southwood Courtyard Building will provide the Trust with dedicated clinical facilities for the iMRI facility at level 3 and Physiotherapy and Rehabilitation Services located at level 2.

The Physiotherapy and Rehabilitation Services provided at GOSH for children and young people with a variety of conditions is currently located in Frontage Building, level 5. Relocating this clinical facility gives the Trust the opportunity to decant the current 'dated' Physiotherapy and Rehabilitation Services into up-to-date modern facilities at Level 2 of the Southwood Courtyard. This central location on the ground level will benefit children and young people attending physiotherapy with direct access from the hospital main entrance without taking the lift to access the facility (as they currently do). The experience of children and families attending for physiotherapy treatment and assessment will be dramatically improved.

This newly constructed Southwood Courtyard building allows the Trust to achieve its strategic objective to enable the GOSH Redevelopment Masterplan and for Phase 4 specifically, since the physiotherapy facilities need to decant out of the Frontage Building to facilitate it's demolition. The courtyard building will become redundant once the iMRI facility moves to Phase 4 in 2023 and the physiotherapy unit move to Level 1 VCB (see Masterplan 2015) following the completion of Phase 4.

The Southwood Courtyard Building also gives the Trust the opportunity to provide the iMRI suite at level 3, co-locating it with existing operating theatres, providing advantages operationally (such as efficient patient flows and use of staffing resources) and in reducing the space requirement for some support accommodation which can be shared where appropriate. For example, recovery, offices and staff amenities will not be required as these are all provided in the adjacent theatre suite.

The Trust currently has 5 MRI scanners, none of which has intraoperative capability. GOSH's aim is to maximise the use of the 3T MRI, using it for outpatient and inpatient activity and possibly research, as well as intraoperative patients/research subjects.

The option of the Southwood courtyard location was decided in late 2016 and provides the Trust with a dedicated clinical facility to accommodate the iMRI facility at level 3 and Physiotherapy and Rehabilitation Services at Level 2 with direct access to the Variety Club Building at both Levels 2 & 3. The location of the Southwood Courtyard Building and the Planning Application submission boundary are shown on drawing reference (00)002, reproduced as Figure 1, below.

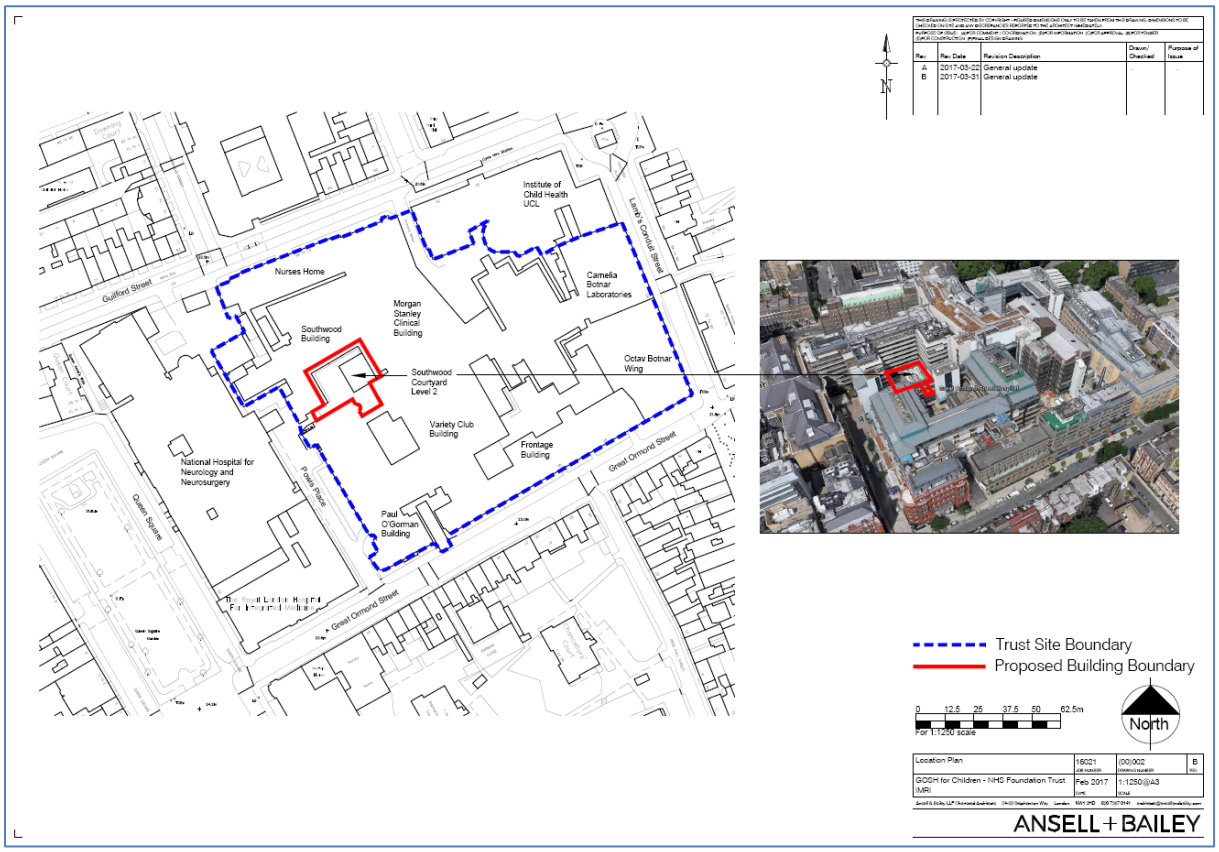


Figure 1. GOSH iMRI Suite Southwood Courtyard site overview

1.2 Site context

Great Ormond Street Hospital for Children is made up by a campus of buildings that occupies the majority of a perimeter block bounded by Guilford Street to the north, Lamb's Conduit Street to the east, Great Ormond Street to the south and Powis Place to the west. The frontage elements of the hospital site fall within the Bloomsbury Conservation Area (CA), whilst the internal elements of the block are outside of the CA. The hospital campus lies within the protected vista from Primrose Hill to St Paul's Cathedral. In addition, the proposal is immediately adjacent to the Grade II* listed Chapel of St Christopher (i.e. Hospital Chapel).

1.3 Proposal

The proposal is located within an external courtyard adjacent to the Southwood Building, to the north, east and west, the Variety Club Building and to a lesser extent the Paul O'Gorman Building to the south. Whilst the courtyard does not fall within the CA, or appear in any sight-lines, the proposed scheme would have an impact on overall sustainability of the hospital campus itself.

Given its central location, the overall impact on local amenities and transport carbon cost is considered minimal, the site is exceedingly well connected site for public transport.

The proposal is for a single building that would accommodate the Physiotherapy and Rehabilitation department at Level 2, an Intraoperative Magnetic Resonance Imaging (IMRI) Suite that includes the machine, a theatre room and associated preparation rooms at Level 3 that would connect to existing theatres at Levels 2 and 3 of the Variety Club Building, and plant and equipment at Level 4. The plant floor would be enclosed and insulated. A green roof is proposed at roof level.

The overall floor area is approximately 997 square metres (GEA) of floorspace.

1.4 The Sustainability and Energy Statement

The purpose of this Sustainability and Energy Statement is to provide an overview of the scheme's sustainability credentials in terms of the energy optimisation, progressive design, construction and operation of the buildings and related infrastructure that forms the development. It sets out how the proposed project will meet the principles of national and local sustainable development policy.

The statement is developed in line with Camden's planning Guidance (CPG3) and is required as part of the formal planning application. The document describes the sustainable design principles adopted, and the scheme is planned to achieve a BREEAM 'Excellent' rating with minimum credit requirements under Energy (60%), Materials (40%) and Water (60%). Alongside the Sustainability Statement, an Energy Statement is required, showing how the development would address the Energy Hierarchy contained in the Local Plan and meet the targets.

Throughout the document, each aspect has been related to its relevant policy context and refers to the supporting documents where appropriate.

Appendix A outlines the relevant strategies and planning policies that seek to influence and promote sustainable development at GOSH. These include The London Plan, Camden Council Core Strategy and Policies, and the GOSH Sustainability Strategy itself. Key policies are highlighted, with a brief summary of the requirements in each case.

Appendix B contains the related Energy Assessment (Design Stage BRUKL Report (Part L2B 2013) for IMRI Wing).

Appendix C contains the BREEAM Pre-Assessment Summary Report (GOSH iMRI - BREEAM Pre-assessment Report).

2. Sustainable Building Standards

The proposal has been developed in line with the environmental assessment methodology, BREEAM. In accordance with Camden Development Policy DP22 and Camden Planning Guidance CPG3, the environmental credentials of the developments have been reviewed against the relevant assessment criteria.

The project has been registered under and will be assessed against the BREEAM New Construction 2014 scheme. A copy of the detailed pre-assessments can be found in Appendix C.

BREEAM is a two-stage process assessing both the initial design commitment and as-built, post construction information. Ratings are determined by performance in several credits across 9 environmental sections. Ratings range from 'Pass' (>40%) to 'Outstanding' (>85%). An increasing number of mandatory credits are prescribed within each rating as a higher level of performance is pursued.

A pre-assessment has been carried out, providing a framework with which the design should be developed. These target scores are tabulated below: These pre-assessment scores are based on the current design proposals, discussion with the design team and previous project experience. It is noted that the pre-assessment achieves a current score of 56.6 (Very Good) and is targeting a score of 74.4 (Excellent).

BREEAM 'Excellent' is required under DP22.

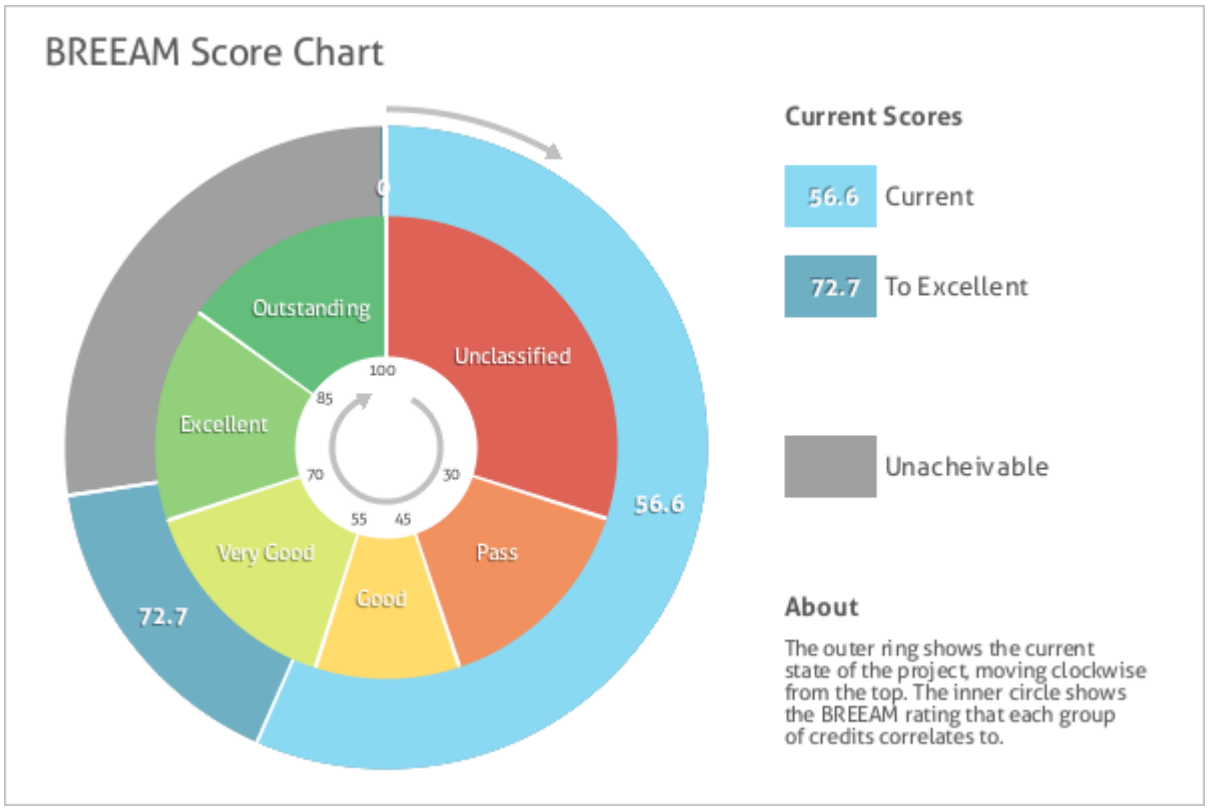


Figure 2. BREEAM New Construction 2014 score breakdown for GOSH iMRI Suite, Southwood Courtyard.

A clear pathway to achieving a rating of 'Excellent' with a score of 72.7% is possible despite restrictions on the site and stringent clinical requirements, as credits are achieved in a number of areas:

- The works will include clearing of contamination (asbestos) in existing structures.

- There will be improved water retention and a net gain in biodiversity on site due to the addition of a new green roof.

- There is an existing local energy network within the Hospital for the development to connect to. GOSH implemented CHP plant in 2011 and has plans to further extend this capability as part of a site-wide strategy (GOSH Annual Sustainability Report 2015-2016). It is considered that the greatest efficiencies are to be had connecting to this wider energy network rather than support the installation of new micro-CHP as part of the scheme.

- Air source heat pumps have been included which contribute an 18.82% reduction in CO_2 emissions as part of the 'Be Green' section of the Energy Hierarchy (see Section 3).

There is limited potential for other renewable energy technologies:

- The courtyard is overshadowed by taller buildings, preventing the utilisation of effective solar thermal and solar PV.

- Geothermal technology such as a ground source heat pump installation is not viable due to the constrained nature of the site. The infill nature of the development means that excavation may impact the structural integrity of the surrounding existing building stock. There are restrictions due to nearby listed buildings (The Chapel) and an historic trench.

The following scores are considered achievable under each scenario;

Scenario	**Score**	**BREEAM Rating**
Current	56.6	Very Good
To Excellent	72.73	Excellent

Table 1. BREEAM New Construction 2014 score and rating

In addition, the following credits are achieved with both scenarios, which are minimum standards required for the specified target rating of "Excellent":

- Man 03 - Responsible construction practices
- Man 04 - Commissioning and handover
- Man 05 - Aftercare
- Ene 01 - Reduction of energy use and carbon emissions
- Ene 02 - Energy Monitoring
- Wat 01 - Water Consumption
- Wat 02 - Water Monitoring
- Mat 03 - Responsible Sourcing of Materials
- Wst 01 - Construction Waste Management
- Wst 03 - Operational Waste
- LE 03 - Minimising impact on existing site ecology

3. Energy Performance and CO_2

3.1 The Energy Hierarchy

This section is the energy statement for the scheme, setting out how the building will address the energy hierarchy:

- Be lean … i.e. design to use less energy,
- Be clean … i.e. supply energy efficiently,
- Be green … i.e. use renewable energy.

This is in accordance with the London Plan Policy 5.2, Camden Planning Guidance CPG3 and Camden's emerging policies, where an emissions reduction target of greater than 40% (against the Part LB 2013 Building Regulations baseline) should be met (and expected to be leading to zero carbon by 2019).

The project team are committed to delivering a building that minimises its impact on the environment and resource consumption. An energy assessment has been carried out on the initial design and can be found in Appendix B. This is a design stage Part L Compliance report and EPC using the SBEM calculation method. This adapted feasibility report provides the key energy figures required for this energy statement.

An overall emissions reduction of 49.52% (against the Part L 2013 Building Regulations baseline) is identified in the energy assessment. Steady state energy calculations are used to size the plant. The scheme is not proposing to carry out dynamic thermal modelling, or future climate change projections as the constrained and "in-fill" nature of the site are considered to make negligible difference to the energy calculations.

Be Lean

This section relates to Stage 1 of the energy hierarchy. Stage 1 aims to ensure that developments have done all they can to minimise energy requirements through design, form, orientation, features, materials etc. and maximise energy efficiency in the building and the engineering services.

Due to the constrained nature of the site and the limitations posed by the existing estate, minimal opportunity exists to consider form and orientation as part of the proposals. These constraints have meant that greater attention has been placed on façade and cladding that respond to these constraints, whilst controlling both solar overheating and glare. The functional and clinical needs demand rooms with high level of privacy. The courtyard is overlooked by taller buildings in close proximity. The design meets this challenge by including use of 20% opaque translucent KalWall system on Level 2 and connecting corridors which ensures privacy while maximizing use of natural light. Also, the upper floors will contain the operating theatres and as such will have very few windows, but will be dressed in a cladding that is visually nourishing. All new building elements and services will be developed in accordance with the performance standards outlined in Building Regulations Part L 2013.

The targeted U-values (W/m^2K) are detailed below. The design is aiming for $0.15W/m^2K$ all around.

Element	Benchmark Figure	Scheme
Wall	0.35	0.15
Floor	0.25	0.15
Roof	0.25	0.15
Windows	2.2	2.2
Doors	2.2	2.2

Table 2. Envelope thermal performance values

All aspects of the new build façade, including building materials and their thermal properties, air permeability and hence building leakage and daylight factors have been considered. Further options

will be considered during the next design stage and will ensure that these components work effectively to optimise internal conditions whilst minimising energy consumption.

The Operating Theatre suite and MRI treatment rooms require the installation of dedicated supply and extraction air handling units (AHUs) with individual room controls. Specialist gas handling systems, chilled water systems, and environmental control systems including pressure controlled zones are also required. Connection to existing networks (e.g. hot and cold water) will be made wherever possible.

Automatic control systems, sub-metering and a Building Energy Management System (BEMS) will provide the ability to control and interrogate the engineering services systems and minimise energy utilisation. Lighting and emergency lighting is to be provided in accordance with CIBSE LG2 lighting guide for hospitals and in line with GOSH sustainability strategy. The design will be carried out in line with "Operation TLC" (GOSH 2014-15 Sustainable Development Management Plan); an initiative which engages staff to increase use of natural light, ensure comfortable heating levels are maintained and switch equipment off (e.g. LED luminaires capable of being dimmed from the MRI control room). The use of more LED fittings and other forms of lighting control will be explored, and as a minimum, lighting to toilets, stores and other transient areas will be controlled via passive infra-red (PIR) control.

To further minimise the energy consumption of the ventilation system, ductwork distribution will be designed such that velocities are low and that the route does not add unnecessary resistance on the fan. To achieve this, plantrooms, risers and ceiling voids will be sized adequately to accommodate the ductwork and other engineering services.

Overall the energy savings through "Be Lean" are 21.22% against the Part L 2013 Building Regulations baseline.

Regulated CO_2e savings (per annum figures)	kg CO_2e/m2	Tonnes CO_2/year	Tonnes CO_2 Reduction	% Reduction
Baseline (Part L 2013)	145.6	128.23	-	-
Be Lean	114.7	101.02	27.21	21.22%

Table 3. Energy hierarchy summary (Be Lean)

Be Clean

This section relates to Stage 2 of the energy hierarchy. Stage 2 aims to ensure that developments have done all they can to obtain an efficient supply of energy. In addition to energy efficient buildings and engineering services, the London Plan Policies 5.2 and 5.5 and Camden Policy DP22 seek to encourage the supply of energy efficiently via heating and cooling infrastructure networks. Energy networks and Combined Heat and Power plants are often well suited to hospital or healthcare environments due to the large energy demands across large single-owner estates. The systems generate energy onsite, with greater efficiencies in energy production and distribution.

GOSH is within the catchment area of existing and emerging networks namely UCL and Euston Road Network, as well as potential networks, namely, British Museum, Regents Place and Kings Cross (Camden Core Strategy 2010-2025 Local Development Framework). However, GOSH already has a significant centralised energy network and given the scheme is in the middle of the site, connection to this existing network is considered sensible.

It is proposed that the development will utilise the current CHP boiler plant and therefore be part of a shared heating network with neighbouring buildings. No new heat generation plant is being proposed within the scope of this planning application. All of the existing heat generating plant is located within the existing hospital; including a CHP/TRIGEN that was installed at GOSH in 2011. Further roll-out of CHP and PV at the hospital is also planned (GOSH Annual Sustainability Report 2015-2016).

The domestic hot water load for the development is not large enough to yield carbon or financial benefit from the installation of micro-CHP, and would require significant heat exhaust. It is considered that the greatest efficiencies are to be had connecting to this wider water network rather than support the installation of micro-CHP as part of the scheme, and as such connection to domestic hot water and other services will be made at each level where appropriate.

Overall the energy savings through "Be Clean" are 15.1% against the Part L 2013 Building Regulations baseline.

Regulated CO_2e savings (per annum figures)	kg CO_2e/m2	Tonnes CO_2/year	Tonnes CO_2 Reduction	% Reduction
Baseline (Part L 2013)	145.6	128.23	-	-
Be Lean	114.7	101.02	27.21	21.22%
Be Clean	100.9	88.86	12.16	9.48%

Table 4. Energy hierarchy summary (Be Clean)

Be Green

This section relates to Stage 3 of the energy hierarchy. Stage 3 aims to maximise the use of sustainable energy generation technologies; i.e. renewables. The London Plan policies 5.3 and 5.7, Camden Policy DP22 encourage the integration of renewable/low carbon technologies.

The incorporation of any roof-mounted solar technology is restricted as the work consists of infill developments between taller existing buildings that will overshadow and limit efficiency. It is therefore considered that solar thermal or PV are not feasible due to limited capacity of the available roof area.

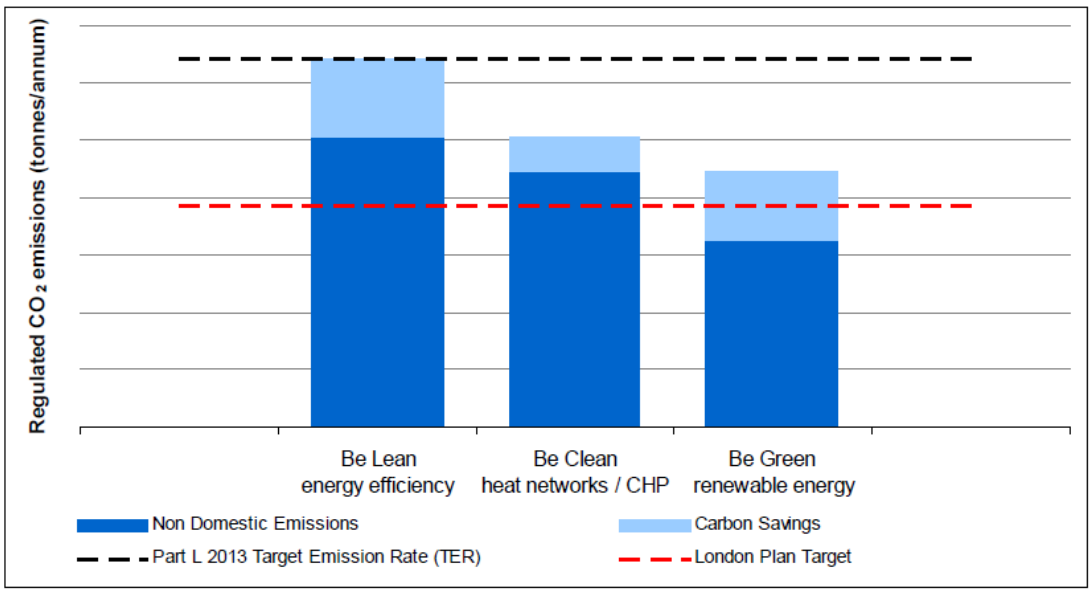
There are also restrictions on ground-works due to the infill nature of the development and constrained site. Excavation may impact the structural integrity of the surrounding existing building stock and there are restrictions due to nearby listed buildings (The Chapel) and a historic trench. As such, there will be very little available space for installation of effective geothermal technology such as ground source heat pumps (GSHP).

Air source heat pumps (ASHPs / VRV/VRF) have been included in this section as permitted by London Plan Energy Assessment guidance, October 2018.

The energy savings through "green" are therefore 18.82%, and overall the TOTAL savings are 49.52% against the Part L 2013 Building Regulations baseline. This exceeds the emissions reduction target of 40% as outlined in the London Plan Policy 5.2 and Camden Planning Guidance CPG3; and is optimal within the constraints of the site and clinical requirements.

Regulated CO_2e savings (per annum figures)	kg CO_2e/m2	Tonnes CO_2/year	Tonnes CO_2 Reduction	% Reduction
Baseline (Part L 2013)	145.6	128.23	-	-
Be Lean	114.7	101.02	27.21	21.22%
Be Clean	100.9	88.86	12.16	9.48%
Be Green	73.5	64.73	24.13	18.82%
TOTAL	**73.5**	**64.73**	**63.5**	**49.52%**

Table 5. Energy hierarchy summary (Be Green and TOTAL)



3.2 Water Efficiency

Minimisation of water use has been considered in accordance with London Plan Policy 5.15, and Camden Core Strategy CS13 and Development Policies DP23, within the constraints of the water requirements of the clinical facilities.

Low flow sanitary fittings and shut-off flow control devices are proposed throughout to reduce water consumption in cold and hot water systems, but also to reduce the energy used to heat the hot water service. Fitting will be specified in accordance with the BREEAM benchmarks for reducing water consumption. Currently, a reduction of 25% over the BREEAM 2014 water consumption baseline is being targeted through the use of efficient fittings and water saving devices. Specification to this level will achieve 2 from 5 credits under the 2014 assessment criteria.

In addition to extensive metering to allow accurate monitoring of water use, a Building Management System (BMS) will be provided which will include capability to monitor water utilisation, leaks etc. through use of ‘out of normal range’ alarms.

The green roof will rely on precipitation. Rainwater or greywater harvesting is not feasible due to the site constraints as either system would require the location of a large water storage tank. Furthermore, stringent and costly infection control systems would be required to ensure that the healthcare environment is not impacted. Any external planting, including the biodiverse roof planting, will rely on precipitation.

4. Climate Change Adaptation

4.1 Cooling

Reducing energy demand is the first fundamental step in reducing CO_2 emissions. A new development must demonstrate that it has maximised the opportunity presented to mitigate any potential detrimental effect from climate change. This is in accordance with London Plan Policies 5.2, 5.3, 5.11 and 5.13; Camden Core Strategy CS13; and Camden Development Policy DP22.

The project team are committed to taking a positive approach to this through encouraging good building design and energy saving techniques. The cooling hierarchy has informed the building design and maximised where constraints allow. The following features are designed in at this early stage to minimise the need for active cooling and help tackle the urban heat island effect:

- the orientation of the building is such that it will be predominantly in shadow and the functional requirements means the use of windows will be minimal,
- the external cladding on the upper levels will be a printed design that is light in colour to minimise heat absorption,
- building materials will be selected to optimise u-values and minimise heat flow (overall <0.15W/m2K is targeted),
- thermal mass (through concrete elements and solid blockwork) will help to provide passive assistance to managing heat gains,
- a new biodiverse roof will also assist in regulating conditions within the building through the provision of humidity control.

The green roof will also help manage the expected increase in rainfall levels due to climate change by increasing the sites capacity for water retention.

Other features will be considered during the next stage of design to minimise over-heating and help ensure that increasing temperatures and rainfall levels do not impact upon the building's function, including: high-performance triple glazing, and internal and external solar shading where windows exist.

Active cooling (air conditioning) will be required due to the environmental requirements of the clinical facilities. Steady state energy calculations will be carried out to size the plant. The design team is not proposing to carry out dynamic thermal modelling, or future climate change projections as the constrained and "in-fill" nature of the site are considered to make negligible difference to the energy calculations.

Chilled water will be required for cooling coils in the AHUs. It may be possible to provide a winter chilled water supply from the central GOSH system, with standby packaged air cooled chillers to enable the peak summer loads to be met. This will be confirmed in the final equipment selection. Chilled water to the MRI liquid cooling cabinet (LCC) is also required at a higher spec and will be provided by packaged plate heat exchangers via dedicated flow and return branches on a low loss header.

4.2 Water run-off and SUDS

The impermeable surface area will decrease as a result of the new development, and therefore run-off rates are expected to improve. In addition, the scope of works encompasses relatively little ground works, and any new drainage systems will connect to the existing sewer network.

As a product of the infill/refurbishment nature of the development, the LPA has not requested a flood risk assessment. Camden Development Management Policies (LDF) identifies the area as low flood risk. The site lies within Environment Agency Flood Zone 1 and therefore is not considered at risk of fluvial flooding.

The planned biodiverse roof areas will provide some attenuation through the hydraulic capacity of the substrate. These will also slow run-off and provide some filtration of pollutants.

4.3 Biodiversity

In accordance with LPP5.10, LPP5.11, DP22 and CPG 3:10 and CPG3:13 an ecology survey will be carried out to inform the enhancement and protection of the ecology and biodiversity of the site as per BREEAM 2014 guidelines.

The survey will inform the preliminary ecological appraisal, which will highlight any ecological constraints associated with the proposed development and provide recommendations for protecting, managing and enhancing the ecological value of the site.

Following the ecology survey, it may be decided to install bat and bird boxes to provide habitats in appropriate locations. These would need to be located on flight paths and positioned out of range of artificial lighting. The bird boxes would require some maintenance to ensure ongoing use.

As already noted, an area of green roof is proposed. The planting mix will be developed to provide habitat for fauna through low-nutrient planting. Planting will utilise both native and non-native species to provide pollen, nectar and fruits. Planting will pursue structural diversity through mixing of species and scale. Additional features will be incorporated where feasible to encourage microhabitat creation. The substrate depth will exceed 80mm to ensure suitable depth for planting.

5. Construction

5.1 Materials and Design

The design of the project gives consideration to environmental impact and will source materials sustainably. All materials will be assessed against the BRE Green Guide, with the aspiration of achieving A or A+ rated build-ups. Where this is not possible, recycled content will be maximised.

All timber used on site and for construction materials will be from an independently verified sustainable source such as Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC). Ensuring materials are sustainably procured is a key aspect of the materials specification, and where feasible other materials will seek to be sourced from responsible suppliers. If possible, suppliers with BES6001 certification will be sought. Locally sourced materials will be used wherever possible.

Contractors will be required to demonstrate compliance with the above aims.

5.2 Waste

The waste hierarchy will be followed as set out in LPP5.3, CS18 & DP22, prioritising the reduction, re-use and recycling of materials.

The initial demolition activity is minimal and will therefore result in relatively low levels of construction waste.

During the construction phase, the contractor will be required to produce a Site Waste Management Plan. Waste will be sorted on site and diverted from land-fill where possible. The scheme is targeting 50% of the BREEAM credits under Wst 01 – Construction Waste Management.

The following measures will be taken forward by the construction contractor appointed:

- Work within the legal requirements of the Environmental Protection (Duty of Care) Regulations 1991 and Hazardous Waste Regulations 2005 as appropriate at all times and only use appropriately licensed waste carriers for the disposal of waste.
- Conduct testing of representative sampling of waste materials, including soils, made-ground and geological deposits against the Waste Acceptance Criteria to determine the required disposal route for materials. From the identification of any contaminated hotspots across the site, it will be established, with a watching brief, if testing is required before removal off site.

During construction, all deliveries and waste collection will take place via the service road accessed from Great Ormond Street via Powis Place.

5.3 Air Quality, Noise and other impacts

A Construction and Environmental Management Plan will be produced to help manage on site impact arising from demolition and construction processes. This will ensure that the impact from the construction process has been given due attention and disruption minimised, including construction traffic access. The contractor will target a Considerate Constructors Scheme score of a minimum of 40 points per visit.

6. Operational Sustainability

6.1 Transport

Following the works, the Southwood Courtyard Building and its associated facilities will be able to accommodate an increased number of scans (approximately 2 per day). Additionally, the new clinical facilities will result in an estimated additional 5 staff on site during a typical day; employed within the new building (est. x3 radiographers, x1 consultant radiologist, x1 admin team member).

However, the development is part of a broader strategy of regeneration of older building stock and provides accommodation as part of a sequence of moves of clinical facilities within the site to enable this. As a result, the development will not significantly add to the volume of patients or visitors to the site beyond the wider year-on-year increases expected at GOSH.

Therefore, there are no proposed changes to the highways layout nor parking or drop off facilities. As such, it is a reasonable assumption that the mode in which patients and visitors arrive and depart the site will remain the same, which, given the sites location is a high level of use of public transport. The hospital provides accessible parking for disabled patients/visitors and designated staff parking. There is no standard parking provision for visitors as the site is exceedingly well connected site for public transport.

To accommodate the modest increase of staff and to supplement the existing provision available across the site; an additional 8 cycle spaces will be provided. The additional cycle facilities will be provided in the form of Sheffield Stands allowing two cycles to be securely locked to each stand (one either side) under the cover of the connecting corridor. Additional changing and shower facilities will form part of the fit-out works.

6.2 Servicing

All deliveries and waste collection will continue to take place via the internal corridors. Servicing the new building will be managed centrally by the Hospital Facilities Management, which will continue to be pre-booked. There is an opportunity to consolidate hospital deliveries so it is assumed that the development will not generate any additional delivery or servicing trips to the GOSH site.

6.3 Air Quality and Noise

The scheme will require the installation of new building services plant; which will comprise new air handling units, and chillers. Mechanical ventilation is required for these spaces to maintain strict environmental conditions in accordance with HTM 03-01. To achieve the noise limits will require noise mitigation measures to be included within the design. Such measures include:

- low noise equipment selected as a starting point,
- acoustically rated unit casing (likely to be double skinned) to limit case breakout noise,
- air handling and extract fans to incorporate ducted splitter attenuators to fresh air intakes and exhaust ducts,
- anti-vibration mounts fitted to all air handling units to protect building occupants.

6.4 Post-Occupancy

Research has also shown that new buildings, once operated typically consume between 50% and 150% more energy than original expectations. This highlights that there is a real opportunity to maximise efficiency if the operation of buildings is considered beyond handover.

Generally, energy models are used at the design stage to compare design options and to check compliance with Building Regulations. These energy models only consider regulated energy, that is, generally large building services plant and systems that can be easily predicted; boilers, chillers, AHUs, lighting, etc. These building regulation compliance models do not account for unregulated loads, such as lifts, servers, office equipment and catering loads, which are often significant. This often leads to confusion and disappointment by clients when a justifiably low energy building generates higher than anticipated fuel bills.

Therefore, there are three components to ensuring this risk is mitigated;

a) Ensure that operational energy performance is evaluated during the design process to provide a realistic indication of total energy consumption
b) Ensure that commissioning processes are robust and thorough, and undertaken over an extended period to accounts for nuances in building use/operation.
c) Ensure that the building is delivered progressively and in collaboration with the owner/occupier so that design features are understood and operated correctly.

The outputs of these points give light to the following key questions:

- Does the buildings actual energy performance meet the design expectations?
- Has the building in use met the original Client brief?
- Are we performing more or less efficiently than planned?
- How does the building compare to similar buildings?
- Did we make the right choices?
- Are our people happy in the building, because of the building?
- Is there more we could have done to improve?

As the energy performance calculations are developed further for GOSH iMRI, the design detail will be refined to further enhance energy performance. Though this early modelling provides useful and more accurate insight into energy performance, fundamental to the process is ongoing contractor engagement beyond handover to provide seasonal commissioning activities so systems can be refined for high and low demand.

In addition, a commitment will be made to monitor and record key performance data for three years beyond handover, in accordance with the BREEAM New Construction criteria.

7. Conclusion

The preceding document outlines the measures by which the planning application for GOSH iMRI Suite meets, in principal, the aspirations of the London Plan, Camden's Core Strategy, and Development Management Policies.

Throughout the document, the planning policies and guidance documents have been referenced where appropriate.

This Sustainable Design and Construction Statement provides justification that the development complies with the requirements of:

- LP Policy 5.2 Minimising carbon dioxide emissions
- LP Policy 5.3 Sustainable Design and Construction
- LP Policy 5.5 Decentralised Energy Networks
- LP Policy 5.6 Decentralised energy in development proposals
- LP Policy 5.7 Renewable energy
- LP Policy 5.9 Overheating and cooling
- LP Policy 5.10 Urban greening
- LP Policy 5.11 Green roofs and development site environs
- LP Policy 5.13 Sustainable drainage
- LP Policy 5.15 Water use and supplies
- Camden Core Strategy LDF
    - CS13 Tackling climate change through promoting higher environmental standards
    - CS18 Dealing with our waste and encouraging recycling
- Camden Development Policies LDF
    - DP22 Promoting sustainable design and construction
    - DP23 Water
- Camden's Planning Guidance Sustainability (CPG3).

The development will seek to attain as a minimum a BREEAM New Construction 2014 'Excellent' rating, and will achieve the minimum number of BREEAM credits on energy, materials and water as stated in Camden Development Policy DP22 and Camden planning Guidance CPG3.

The scheme will also achieve 49.52% improvement against the Part L 2013 Building Regulations baseline. This exceeds the emissions reduction target of greater than 40% as outlined in the London Plan Policy 5.2 and Camden Planning Guidance CPG3; and is optimal within the constraints of the site and clinical requirements.

This Sustainability and Energy Statement provides comprehensive detail in support of the sustainability credentials of the design and construction of the planned GOSH iMRI Suite Southwood Courtyard.

References

The London Plan (Mayor of London) March 2016

- Published by Greater London Authority, City Hall, London SE1 2AA. Crown Copyright. All rights reserved.
- Chapter 5: London's Response to Climate Change

Sustainable Design and Construction, Supplementary Planning Guidance (SPG) April 2014

- London Plan 2011 Implementation Framework (Mayor of London)
- Published by Greater London Authority, City Hall, London SE1 2AA. Crown Copyright. All rights reserved.

Camden Core Strategy; 2010-2025 Local Development Framework

- Core Strategy (adopted)
- Section 3: A sustainable and attractive Camden – Tackling climate change and improving and protecting Camden's environment and quality of life

Camden Development Policies; 2010-2025 Local Development Framework

- Development Management Policies (adopted)
- Section 2 Meeting Camden's needs – Providing homes, jobs and facilities
- Section 3 A sustainable and attractive Camden – Tackling climate change and improving and protecting Camden's environment and quality of life

Camden's Planning Guidance, Sustainability (CPG3), London Borough of Camden.

- CPG3.2 The energy hierarchy
- CPG3.3 Energy efficiency: new buildings
- CPG3:5 Decentralised energy networks and combined heat and power
- CPG3:6 Renewable energy
- CPG3:7 Water efficiency
- CPG3:8 Sustainable use of materials.
- CPG3:9 Sustainability assessment tools
- CPG3:10 Brown roofs, green roofs and green walls
- CPG3:11 Flooding
- CPG3:12 Adapting to climate change
- CPG3:13 Biodiversity
- CPG3:14 Local food growing

Camden Local Plan 2016 Proposed Submission

- *Please note, this is the Council's emerging Local Plan, it has been examined by an independent inspector, and its emerging policies will be a material consideration. Please refer to relevant policies in this plan as well as the above.*
- Chapter 8: Sustainability and climate change
- Chapter 10. Transport

GOSH Annual Sustainability Report 2015 – 16, Sustainable Health, Low Carbon (Carbon Architecture)

GOSH Masterplan 2015

Appendix A: Sustainability Strategy & Planning Policy Review

This appendix outlines the relevant strategies and planning policies that seek to influence and promote sustainable development at GOSH. These include The London Plan, Camden Council Core Strategy, Policies, Planning Guidance and Local Plan, and the GOSH Sustainability Strategy itself. Key policies are listed here with brief summary notes of the relevant requirements.

The London Plan (Mayor of London) March 2016

The most recent version of the London Plan (March 2016) is used to inform the planning application and Camden Sustainability strategy and key policies are listed in this section. A London Plan review process is underway for the new mayor. Public consultation is scheduled for Summer 2018 and publication of the final London Plan due in Autumn 2019.

- **Chapter 5: London's Response to Climate Change**
  - Policy 5.2 Minimising carbon dioxide emissions
  - Policy 5.3 Sustainable Design and Construction
  - Policy 5.5 Decentralised Energy Networks
  - Policy 5.6 Decentralised energy in development proposals
  - Policy 5.7 Renewable energy
  - Policy 5.9 Overheating and cooling
  - Policy 5.10 Urban greening
  - Policy 5.11 Green roofs and development site environs
  - Policy 5.13 Sustainable drainage
  - Policy 5.15 Water use and supplies

- **Policy 5.2 Minimising carbon dioxide emissions …** 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

  … an emissions reduction target of greater than 40% (against the Part L 2013 Building Regulations baseline) should be met. … expected to be leading to zero carbon by 2019.

- **Policy 5.3 Sustainable Design and Construction ..**. This policy and the associated SPG document aims to support developers, local planning authorities and neighbourhoods to achieve sustainable development by providing guidance on to how to achieve the London Plan objectives effectively. … demonstrate that sustainable design standards have been considered at the beginning of the design process in all areas (CO_2, heating, cooling, water, pollution, waste, flooding, sustainable procurement and biodiversity).

- **Policy 5.5 Decentralised Energy Networks** … prioritise connection to existing or planned decentralised energy networks where feasible.

- **Policy 5.6 Decentralised energy in development proposals** … Connection to existing heating or cooling networks as first priority in the hierarchy.

- **Policy 5.7 Renewable energy** … net increase in renewable energy capacity

- **Policy 5.9 Overheating and cooling** … reduce urban heat island effect avoid overheating, design, ventilation, materials

- **Policy 5.10 Urban greening …** integrate green infrastructure including the public realm.

- **Policy 5.11 Green roofs and development site environs** … include roof, wall and side planting where possible

- **Policy 5.13 Sustainable drainage** … SUDS & store, use, attenuate, discharge hierarchy

- **Policy 5.15 Water use and supplies …** protect and conserve water supplies and resources, minimise use etc.

Legally, all local plans have to be in 'general conformity' with the London Plan.

Camden Core Strategy & Policies

Camden Core Strategy 2010-2025 Local development Framework (LDF) … identifies Holborn High Growth Area that lies adjacent to GOSH. The proposed development at GOSH will contribute marginally in terms of new jobs, but will make significant contribution community facilities, regeneration initiatives and employment and training schemes; as well as enhancing biodiversity (net gain) while preserving the areas historic environment.

Related core strategies:
- CS11 Promoting sustainable and efficient travel
- CS13 Tackling climate change through promoting higher environmental standards
- CS15 Protecting and improving our parks and open spaces & encouraging biodiversity
- CS18 Dealing with our waste and encouraging recycling

Camden Development Policies 2010-2025, Local Development Framework (LDF).
The Development Management Policies form part of the council's Local Plan, alongside the London Plan and other Development Plan Documents.

Relevant policies include:

- **DP16 – The transport implications of development** … ensure development is properly integrated and capacity is fully considered … Minimum transport information (DP16) is required but a Full Transport Assessment is not required as the development will be less than the Guideline floor space threshold 1,000 sq m GFA or more.

- **DP17 – Walking, cycling and public transport** … make suitable provision for pedestrians, cyclists and public transport and interchanging where appropriate,

- **DP22 – Promoting sustainable design and construction** … incorporate sustainable design and construction measures. Schemes must:
    - demonstrate how sustainable development principles, have been incorporated into the design and proposed implementation;
    - incorporate green or brown roofs and green walls wherever suitable.
    - achieve BREEAM "excellent" from 2016 with the following minimum standard for categories (% of un-weighted credits): Energy 60%, Water 60%, and Materials 40%.
    - and include appropriate climate change adaptation measures, such as: summer shading and planting; limiting run-off; reducing water consumption; reducing air pollution;

- **DP23 – Water … reduce water consumption**, … incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site; limiting the amount and rate of run-off and waste water

Camden Planning Guidance: Sustainability (CPG3)
This guidance provides information on ways to achieve carbon reductions and more sustainable developments. It also highlights the Council's requirements and guidelines which support the relevant Local Development Framework (LDF) policies: CS13, DP22 and DP23.

- **CPG3:2 The energy hierarchy** … All developments are to be design to reduce carbon dioxide emissions and designed following the steps set out by the energy hierarchy

- **CPG3:3 Energy efficiency: new buildings** … minimise carbon dioxide emissions and energy demand through good design and high levels of insulation and air tightness. Guidance is provided on energy efficient design techniques (3.4), Natural systems (3.6), Thermal performance (3.9), Mechanical Systems (3.18), Ventilation & Cooling,
    - BREEAM Developments will be expected to achieve 60% of the un-weighted credits in the Energy category of their BREEAM assessment
    - Proportion of energy efficient lighting 100%

- **CPG3:5 Decentralised energy networks and combined heat and power** … Where feasible and viable required to connect to a decentralised energy network or include CHP.

- **CPG3:6 Renewable energy** … target a 20% reduction in CO_2 emissions from on-site renewables to ensure that the most cost-effective carbon reduction technologies are implemented in line with the energy hierarchy. Consideration given to following technologies:
    - Solar/Thermal Hot Water Panels … where space allows, 100% of the site's summer hot water needs, which equates to 50-60% of the annual demand.
    - Photovoltaic (PVs) … preference for PVs to be flush to the roof or wall, but considerations will include the efficiency of the panel/s and whether they are visible
    - Ground Source Heat Pumps (GSHP) or geothermal … demonstrate that the local geology can accommodate the necessary excavation and must have coefficient of performance (COP) >4.
    - Air source heat pumps (ASHP) … expected co-efficient of performance (COP) > 4 … take into account research and evidence of past performance of heat pumps and the seasonable performance.
    - Biomass heating and power … must be accredited as 'exempt appliance' and fuel must be carbon neutral
    - Wind turbines … assessment of the impact on neighbouring properties, particularly flicker, noise and vibrations and a wind study and feasibility report.

- **CPG3:7 Water efficiency** … minimising water use and maximising the re-use of water, include a grey water harvesting system, unless the applicant demonstrates that this is not feasible.

- **CPG3:8 Sustainable use of materials** … waste hierarchy: reduction, re-use and recycling of materials… source materials responsibly … aim for at least 10% of the total value of materials used to be derived from recycled and reused sources … achieve A+ to B for the major building elements (roof, external walls, floor finishes, internal partitions and windows) in accordance with the BRE Green Guide to Specification. Site Waste Management Plan (SWMP) 8.22 Where a 'site waste management plan' (SWMP) is required (

- **CPG3:9 Sustainability assessment tools** … submission of a pre-assessment report at the planning application stage. You are strongly encouraged to meet the following standards in accordance with Development Policy DP22 - Promoting sustainable design and construction: BREEAM "excellent" with the following minimum standard for categories (% of un-weighted credits): Energy 60%, Water 60%, and Materials 40%.

- **CPG3:10 Brown roofs, green roofs and green walls** … All developments should incorporate appropriate green and brown roofs. Specific information needs to be submitted (a statement of the design objectives for the green or brown roof or green wall • details of its construction and the materials used, including a section at a scale of 1:20 • planting details, including details of the planting technique, plant varieties and planting sizes and densities. • a management plan detailed how the structure and planting will be maintained)

- **CPG3:11 Flooding** … required to prevent or mitigate against flooding, manage drainage and surface water and follow a sustainable drainage system design hierarchy.
- **CPG3:12 Adapting to climate change** … consider how it can be designed to cope with / adapt to the anticipated conditions / impact of climate change (warmer temperatures, heavier rainfall, drier summers, and changing ground conditions).

- **CPG3:13 Biodiversity** … how considerations, mitigations and enhancements have been incorporated into the development. A full species survey and assessment may not be required if it is clear that no protected species are present, … evidence with the planning application to demonstrate that such species are absent (e.g. this might be in the form of a letter or brief report from a suitably qualified and experienced person, or a relevant local nature conservation organisation).

- **CPG3:14 Local food growing** … encourages food to be grown wherever possible and suitable.

GOSH Sustainability Strategy

GOSH's 2015-16 Sustainable Development Management Plan - Sustainable Health, Low Carbon describes a multi-stranded approach.

- Strand 1 – Focusing on efficiency; activities which use fewer resources, reduce waste and have a financial benefit.
- Strand 2 focusing on sustainability activities which improve patient health and experience.
- Strand 3 - suggests using GOSH's Exemplary reputation to take a public advocacy position on children's health and sustainability with a view to benefitting children nationally and globally.

A number of campaigns include: 'greener gosh' campaign for GOSH teenage community and "operation TLC" (initiatives which engages staff to increase use of natural light, ensure comfortable heating levels are maintained and switch equipment off).

The report goes on to describe the sustainable indicators and sets out Sustainability Targets that allows progress to be measured against.

Commentary … It should be noted that the 6% reduction in CO_2 footprint in 2013/14 is the outcome of the CHP installation on the MSCB. Furthermore, the site's 'carbon intensity' (carbon emissions per meter square) has also reduced due to the built gross area and energy efficiency. As the larger modern energy efficient buildings come on line and replace inefficient old building stock, similar benefits should be gained, though increased intensity of use should be considered.

Appendix B: Energy Assessment (RSP)

See document: “Summary - London Plan Compliance - GOSH - IMRI (005)”

And supporting documents:

- 01 Baseline BRUKL - IMRI Wing (005)
- 02 Be Lean BRUKL - IMRI Wing (005)
- 03 Be Clean BRUKL - IMRI Wing (005)
- 04 Be Green BRUKL - IMRI Wing (005)

Appendix C: BREEAM Pre-assessment Report (Southfacing)

See document: “GOSH iMRI - BREEAM Pre-assessment Report”.