May 2018

Hoare Lea

Sustainability Statement

HOARE LEA

Lincoln House, High Holborn.
Camden.
Maizelands Limited & Arringford Limited.

SUSTAINABILITY
ENERGY AND SUSTAINABILITY STATEMENT

REVISION C – 26.04.2018

Audit sheet.

Rev.	Date	Description	Prepared	Verified
A	14/12/17	Draft for comment	WW	SC
B	12.03.2018	Updated draft for comment	WW	OB
C	26.04.2018	Updated for submission	WW	OB

Document reference: REP-2310752-5A-WW-20171129-Energy and Sustainability Statement-Rev C.docx

Contents.

1. Executive summary.

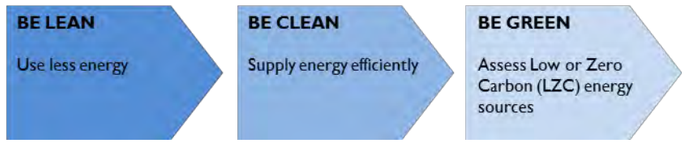
1.1 The Application.

This energy and sustainability statement has been prepared on behalf of Maizelands Limited & Arringford Limited in support of the full planning application for the refurbishment and extension of the office building at Lincoln House, Camden.

1.2 Approach.

The energy and sustainability strategy for the Proposed Development will draw guidance from the London Plan and other local planning policy. Every practical opportunity to improve the sustainability performance has been taken within the constraints of the existing development.

The Energy Strategy follows the Energy Hierarchy: Be Lean – Be Clean – Be Green:



Calculations demonstrating the energy requirements and associated CO_2 emissions have been carried out for the Proposed Development using Building Regulations approved software. This has been used to inform the energy strategy for the works.

The Sustainability Strategy responds to National Planning Policy and Guidance, and also makes reference to pertinent local and regional policies and guidance.

1.3 Energy Strategy Summary.

The energy strategy proposed effectively aims to overcome the constraints of the existing building to bring the performance up to the level of a modern new build office.

'Be Lean'.

A range of passive design and energy efficiency measures are targeted for the Proposed Development, including:

- Fabric insulation levels for the new elements achieving improvements over the minimum requirements of the Building Regulations Part L (2013)
- Fabric upgrades for the retained elements to the extent that these are feasible.
- Glazing specification for the new main façades developed to balance heat gains and losses against provision of daylight.
- Fabric air permeability improvement upon Building Regulations Part L (2013) requirements
- Modern air handling plant with incorporating high levels of heat recovery
- High efficacy LED lighting with daylight and occupancy sensing
- Variable speed pumps to minimise energy consumption for distribution of services.

'Be Clean'.

Camden local policies promote the use of decentralised energy and the potential for this has been investigated for the building. Although the building is located within an area identified as having potential for the development of heat networks, there are no networks immediately adjacent to the building. In addition the refurbished building is anticipated to have only a low demand for heat, making it impractical to support the implementation of technologies such as CHP.

'Be Green'.

A preliminary feasibility assessment of incorporating low and zero carbon energy systems has been undertaken. Of these the implementation of photovoltaic panels is considered to be the most effective in providing on site carbon emissions reductions from a suitable low or zero carbon technology however due to the sensitive nature of the site they are not currently proposed.

Overall CO2 Emissions Strategy.

The proposed works are anticipated to result in a substantial improvement over the energy performance of the existing building. The combination of upgrades to the fabric and services mean that it is expected to exceed compliance with the requirements of the Building Regulations Part L2A (2013), with indicative modelling results suggesting an approx. 21% improvement on Part L2A 2013 regulated carbon emissions. Please refer to Appendix 1 for indicative Part L2A BRUKL and EPC excerpts.

Cooling Hierarchy.

The demand for cooling has been minimised by following the GLA cooling hierarchy through the following measures:

- Internal heat gains have been minimised through the implementation of high efficacy lighting, and low temperature distribution of heating via low temperature hot water (LTHW) systems
- Effective control of solar gains by balancing the façade glazing ratio and glass specification
- The mechanical ventilation can provide free cooling when external temperatures are lower than internal, or can recover coolth from the exhaust airstream during hotter periods

1.4 Further Sustainability Measures.

1.4.1 Water.

The Development will be fitted with water efficient fixtures and fittings, and water meters will be provided to enable the monitoring of both landlord and tenant demises and will include grey water recycling subject to technical design and viability.

1.4.2 Materials.

Consideration will be given to the lifecycle of building elements, with the aim of specifying materials which have environmental product declarations (EPDs) where feasible. Additionally all timber will be legally harvested and sourced and it is an aim that all timber used at the Development will be FSC or PEFC certified (or similar) and where possible, other materials will be responsibly sourced.

Materials will aim to be 'low emissions', through achieving low volatile organic compound (VOC) levels where feasible, to assist in providing a good indoor air quality for the office, and insulation will be specified to minimise Global Warming Potential (GWP) to five or less.

1.4.3 Waste.

A Resource Management Plan (similar to a site waste management plan) will be developed to outline opportunities to steer the direction of waste management and ensure good practice is adopted for the demolition and construction phase of the Proposed Development. Demolition waste will be re-used on site where possible.

The Proposed Development will be constructed in a manner which aims to protect the environment and local community through reusing, recycling and recovering waste which would otherwise be disposed of at landfill.

Tenants will be encouraged to segregate their waste at source, and a central refuse storage area provided to enable storage of different waste streams prior to collection. All waste would be taken off site and managed appropriately, and in accordance with the waste hierarchy.

1.4.4 Sustainable Transport.

The site has the highest Public Transport Accessibility Level (PTAL) of 6b due to its proximity to a range of key public transport options.

Secure cycle storage will be provided at the Development to maximise the potential for sustainable transport to and from the building. This will be supported by the provision of changing and shower facilities.

1.4.5 Biodiversity.

The existing building lacks any kind of biodiversity. The Proposed Development will aim to increase the biodiversity of the site through the provision of green walls and bird boxes.

1.4.6 Pollution .

Consideration will be given to the reduction of pollution from a number of sources, such as, but not limited to:

- Construction site generated pollution (e.g. dust)
- Indoor Air Quality
- Ground pollution
- Water pollution
- External Lighting – minimising spill of light
- Noise and vibrations (achieving Part E of Building Regulations)

New heat generating plant will be specified to be low NOx and meet the local air quality requirements with respect to NOx emissions and particulates.

2. Introduction.

2.1 The Application.

This energy and sustainability statement has been prepared on behalf of Maizelands Limited & Arringford Limited, hereafter referred to as the Applicant, in support of the full planning application for the refurbishment and extension of the office building at Lincoln House, hereafter referred to as the Proposed Development.

2.2 Development Description.

The application seeks the refurbishment, remodelling and extensions at rear, flank and roof level to provide 2,193sqm (GIA) additional floorspace and rooftop plant. Change of use of ground floor Use Classes from A1, A2 and B1a uses to provide 2 x A1 units (204sqm GIA) and remainder in B1a Use. Associated external alterations to the elevations. Provision of appropriate cycle parking, waste/recycling storage, additional services and associated ancillary works.

Internally, the building will be refurbished to provide Grade A office space, with cycle stores and shower facilities being included at lower ground level, for the first time.

2.3 Approach.

The Energy Strategy follows the energy hierarchy: 'Be Lean, Be Clean, Be Green'.

The Sustainability Strategy responds to National Planning Policy and Guidance, and also makes reference to pertinent local and regional policies and guidance.

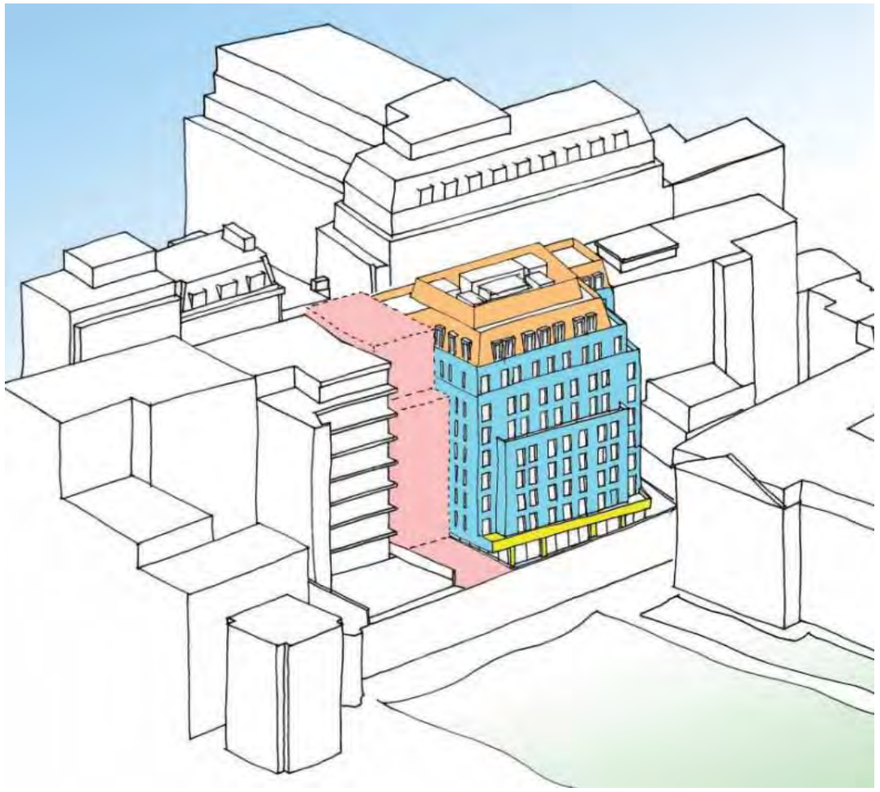


Figure 1 Image of Proposed Development

2.4 Policy Context and Drivers.

2.4.1 Relevant National and Local Policies.

The site is located in the London Borough of Camden. The applicable planning policies are those of the London Borough of Camden as well as the Greater London Area (GLA) London Plan. Planning policy documents applicable to the scheme with regards to energy and sustainability include the following:

- National Planning Policy Framework (2012)
- National Building Regulations (2013)
- London Plan (2016) and Supplementary Planning Documents
- Local Plan (July 2017)
  - Policy CC1-5
  - CPG 3 Sustainability
  - Environmental Design Planning Guidance.

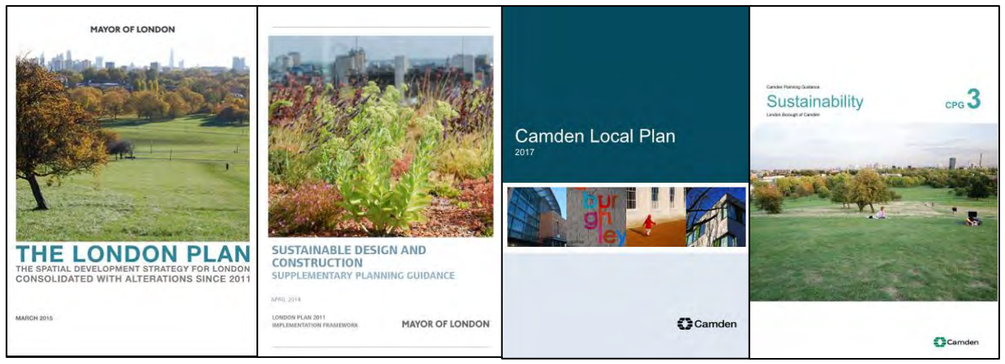


Figure 2 Relevant Policy Documents

The proposed development is currently expected to be referable to the GLA and as such will report against London Plan energy targets in line with Camden policy requirements. Sustainable design principles and the guidance embodied in the local and regional policies have been integral to the development of the proposals.

2.4.2 Building Regulations Part L 2013.

As an existing building the applicable Building Regulations Approved Document would normally be L2B. The extent of the works however is such that many aspects of the building will be brought in line with current best practice new build standards. The approach to the energy strategy is therefore to largely treat the building as for a new build project, and to model the whole building according to the procedures of Approved Document L2A.

For Building Regulations purposes though there may be some areas where the building is unable to comply with the normal requirements for L2A due to the constraints of the existing building. Notably this may apply to some areas of the retained fabric which may not comply with the guidance for minimum U-values under Part L2A. These areas should therefore be considered against the requirements outlined for retained elements under Part L2B. Effectively then a hybrid approach is proposed which utilises L2A to demonstrate compliance, whilst referring to L2B as appropriate where retained elements cannot comply with normal guidance for new builds.

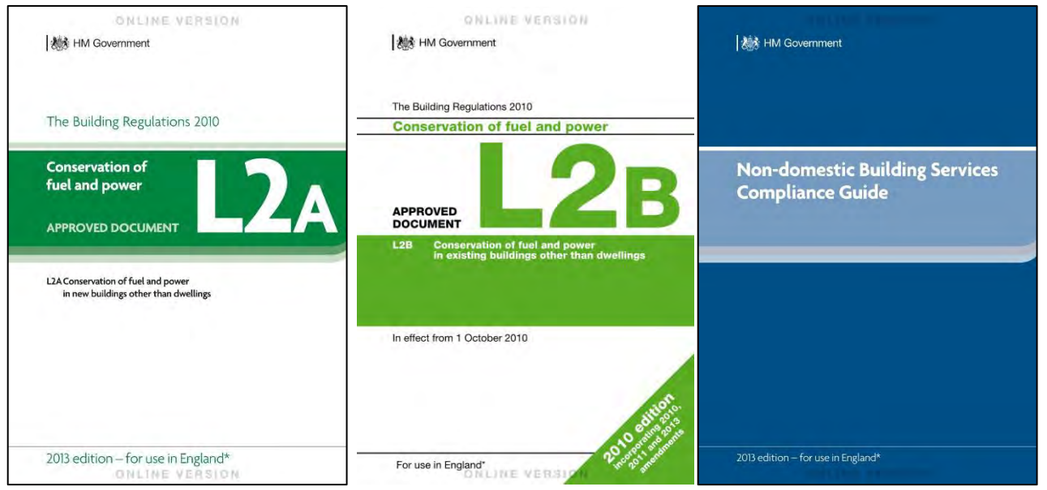


Figure 3 Building Regulations: Approved Documents L2A and L2B and Non-domestic Building Services Compliance Guide

2.4.3 BREEAM.

BREEAM®

In order to demonstrate the sustainability credentials of the building, the Proposed Development is undergoing certification with the Building Research Establishment Environmental Assessment Method, and is targeting a rating of Excellent under the BREEAM Refurbishment and Fit-out 2014 scheme. A pre-assessment for the project has been carried out and a summary is provided in Appendix 2. In order to achieve an Excellent rating a score of 70% is required. The current pre-assessment predicts a baseline score of 70.01%. A pool of potential credits have been identified and these will be explored during detailed design.

3. Energy Strategy.

The following sections detail the passive design and energy efficiency measures that have neem considered, and those that will be implemented at the Proposed Development.

3.1 Energy Hierarchy.

This strategy outlines how the Proposed Development will have a reduced impact on climate change by reducing CO_2 emissions associated with energy use in buildings.

The Energy and CO_2 appraisal is based on the following approach:

Figure 4 Energy Hierarchy

The strategic approach to the design of the Proposed Development has been to reduce demand for energy prior to the consideration of integrating Low or Zero Carbon (LZC) technologies, since controlling demand is the most effective way of reducing energy requirements and CO_2 emissions.

Further reductions are ensured through the specification of high-efficiency building services to limit losses in energy supply, storage and distribution.

After the inclusion of passive design and energy efficiency measures, various options have been investigated to reduce CO_2 emissions associated with energy supply, such as investigating the feasibility of implementing LZC technologies.

3.2 Be Lean.

3.2.1 Passive Design Measures.

Passive design measures are those which reduce the energy demand within buildings, without triggering an energy requirement (i.e. no need for fuel) in the process.

These are the most effective and robust measures for reducing CO_2 emissions as the performance of the solutions (e.g. wall insulation), is unlikely to deteriorate significantly with time or be subject to change by future property owners. In this sense, we can be confident that the benefits of these measures will continue at a similar level for the duration of their installation.

3.2.2 Glazing Ratio, Solar Energy and Light Transmittance.

The proposals for the replacement façades have been carefully considered and supported through the use of performance modelling in order to provide a good balance of daylight against solar gain. The expressed structure of the main front façade provides shading to the glass, and the orientation of this elevation means that peak solar gains will not coincide with periods of high temperature, thereby limiting the impact on local cooling loads. The façades at the front of the building benefit from being substantially shaded by adjacent properties or the local building form, and the window design is generally of reasonable proportions to control the risk of summer overheating. Consideration has also been given to the overheating hierarchy (where feasible for a refurbishment), see section 3.6 for details.

3.2.3 Thermal Insulation.

The works to the building provide an opportunity to upgrade the thermal envelope to provide a substantial reduction in heat losses. The main front and rear facades will be upgraded to modern best practice standards, as will the roof by way of a new top floor. Where fabric is retained this will be reviewed for opportunities to provide additional insulation (such as insulated dry-lining) as part of the refurbishment, although there are likely to be some areas where substantial improvements may be impractical.

Table 1 outlines the U-values being initially targeted for the Proposed Development. The new build elements meet or exceed the requirements of Building Regulations Part L2A (2013) Criterion 2 by up to 69% depending on the element in question. Refurbished elements are strictly provisional and subject to additional survey works and design development.

Table 1 U-Value Targets.

Element	U-Value (W/m^2.K)		Improvement over Part L 2013
	Part L2A/B (2013) Limiting factor	Proposed Development target	
Roof (new)	0.25	0.18	28%
External Wall (new)	0.35	0.26	26%
Existing Wall (refurbished)	0.7	0.26	63%
Floor (refurbished)	0.7	0.22	69%
Glazing/curtain walling	2.2	NA	-

3.2.4 Fabric Air Permeability.

Fabric air permeability is a measure of the volume of air that can penetrate through the fabric of a building, leading to ventilation heat loss and gain.

High air permeability can lead to uncomfortable drafts and increase the demand for space heating in winter (and space cooling in summer) when the air-flow works in reverse i.e. cool air escaping from the building.

The refurbishment of the building offers an opportunity to improve the sealing of the fabric, supported through the use of air pressure testing to identify and correct leakage paths. The building will therefore target good air permeability levels of 3m^3/(m^2.h) at 50Pa.

3.2.5 Energy Efficiency Measures.

Energy efficiency measures are those which seek to service the demand for energy (i.e. the remaining demand after implementation of passive design measures) in the most efficient way.

3.2.5.1 Heating, Cooling and Hot Water.

The Proposed Development will be served by efficient chillers and gas fired boilers providing cooling and heating throughout. Options for hot water provision are under review subject to the most energy and / or carbon efficient solution and will likely consist of gas fired DHW with central distribution.

3.2.5.2 Lighting.

The Proposed Development will be provided with high efficacy lighting (LED or similar) throughout equipped with daylight and occupancy detection to minimise lighting use when not required.

3.2.5.3 Ventilation.

Ventilation will be provided through central air handling plant incorporating high levels of heat recovery. Controls for the ventilation will incorporate CO2 sensors enabling the flow to be modulated according to the building occupancy and the AHU fans to ramp down to save energy when demand is low.

3.2.5.4 Pipework Insulation.

Heating and hot water pipework will be insulated in accordance with the requirements of the Building Regulations in order to minimise heat gains and losses to / from pipework and improve system efficiency. Careful attention will be paid to insulating joints and knuckles to minimise standing heat losses.

3.2.5.5 Metering and Controls.
The control of the heating, ventilation and lighting systems will be fundamental to the energy efficiency of the Proposed Development, and the building will be equipped with a comprehensive controls and energy monitoring package which will enable energy usage to be tracked and managed effectively, including any energy generation from low and zero carbon technologies.

3.3 Be Clean.

The following sections discuss the infrastructure and clean energy supply measures that have been considered for the Proposed Development in order to further reduce regulated CO2 emissions and outline the technologies that will be implemented.

3.3.1 Decentralised Energy Networks.

The Proposed Development is located close by but not within an area which is identified as being potentially suitable for the development of a district heat network.

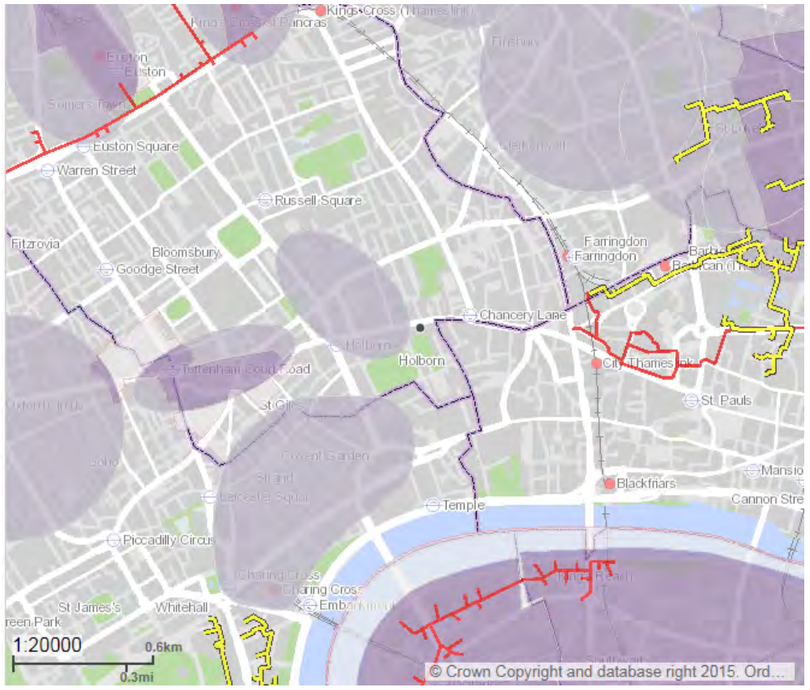


Figure 5 London Heat Map (site location black dot, existing networks yellow, potential networks red)

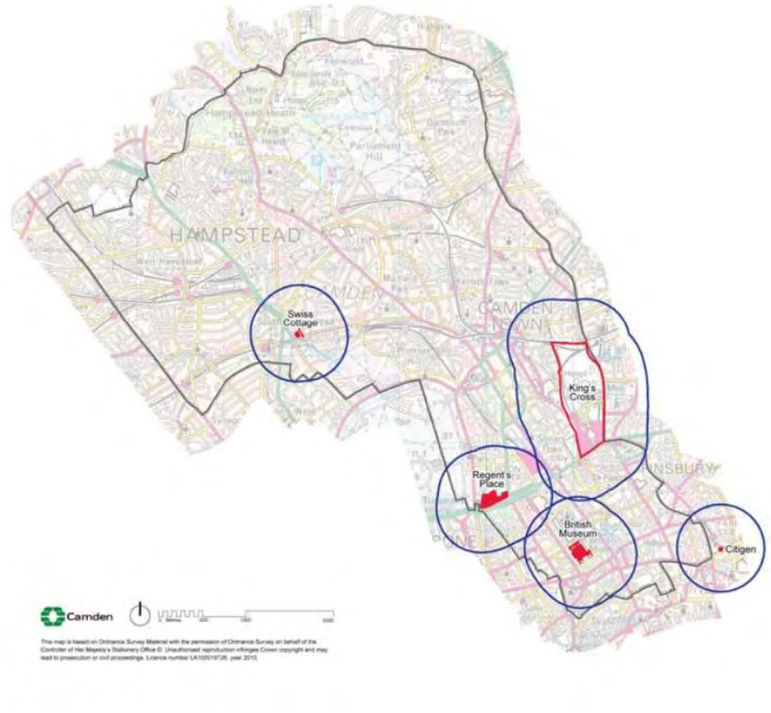


Figure 6 Camden developments within 500m radius of a potential network (site location black dot)

Noting that the development is not within close proximity of a suitable district heat network (as shown in both the London Heat Map and Camden Potential Networks map), the development is unable to implement an immediate connection and is therefore expected to provide capped services only to enable a future connection if and when a suitable district energy network is available.

3.3.2 On-site Combined Heat and Power (CHP).

The building has been reviewed for the potential to implement on-site CHP. Where thermal demand is adequate, CHP can achieve substantial reductions in primary energy demand relative to traditional sources such as gas fired boilers.

For efficient operation, a CHP engine requires a high base-load. A CHP engine is not like a traditional gas boiler, and is not well suited to highly variable loads as the output tends to be in discrete segments. The London Plan acknowledges that a CHP engine is not likely to be suitable where a non-residential development has a simultaneous demand for heat and power of less than 5000hrs per year, and that this is often the case for offices.

Due to the extent of the refurbishment the heat loads for the Proposed Development are expected to be low, with demand well below the level at which a CHP system would become viable. CHP is therefore not proposed for the building.

3.4 Be Green.

The following sections discuss the renewable energy generation measures that have been considered, and those which will be implemented at the Proposed Development.

Renewable technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available. However, not all these are commercially viable, suitable for city-centre locations or appropriate for the Proposed Development.

Technologies which have been considered for the Proposed Development include:

- Heat Pumps (ground-source / air-source)
- Biomass boilers
- Photovoltaics
- Solar Thermal Panels
- Wind turbines

3.4.1 Heat Pumps.
Air Source Heat Pumps (ASHP) and Ground Source Heat Pumps (GSHP) work to extract heat from the air or the ground. Generally, GSHPs are more efficient as the ground temperature is more stable over the course of the year relative to air temperature. However these require either boreholes or trenches and hence these are not overly practical to install within the existing development site.

ASHPs often do not operate as efficiently as GSHPs. Moreover, during times of peak heating demand (i.e. during winter months) the ambient air temperatures are at their minimum, meaning the ASHP needs to work harder to extract the desired amount of heat. Nevertheless, the extent of renewable heat that can be captured at other times of the year is such that they are able to deliver high seasonal efficiencies when implemented correctly. It is noted that modern chillers can achieve higher coefficient of performance figures compared to air source heat pumps and are the preferred servicing strategy due to longevity and preference of water based distribution systems. As such ground and air source heat pumps have are not considered.

3.4.2 Biomass Boilers.
Biomass boilers burn wood fuel or other bio-fuel sources to generate heat. These boilers can operate at high efficiencies, comparable to condensing gas boilers. However, they require a large fuel store to maintain continuous operation during the winter months. As such, area take for such plant is high. Furthermore, fuel deliveries in city-centre locations can prove difficult and security of fuel supply is an important consideration.

Biomass boilers also result in higher emission of Nitrous Oxide (NOx) in comparison with gas boilers. This can have a negative impact on the local air quality. They are also less responsive than other technologies to variable loads, and better suited to stable (typically higher) base loads than will be provided by an office development such as this one.

For these reasons the use of a biomass boiler has been discounted for the site.

3.4.3 Photovoltaic Panels.
The building has limited roof space available due to the plant areas required to support the cooling systems, AHUs, and other plant. This means that whilst PV would in principle be a suitable technology for inclusion in the building, the limited panel area available means it would make only a minimal contribution to the energy consumption and carbon emissions of the building. The team are also considering the practicalities of including vertically mounted PV on the southern orientations however the feedback to date from Camden has suggested that PV would not be appropriate due to the sensitive nature of the site.

3.4.4 Solar Thermal Panels.
Solar thermal panels operate by capturing solar energy and transferring this via glycol to a thermal store to generate hot water. These systems can operate at efficiencies up to ~75% thus a high yield of energy can be derived from small collector areas.

A solar thermal installation would be challenging to incorporate in the building due to the relatively low hot water load and the losses which would be incurred due to the distance which would result between the panels and the primary load (the ground floor showers). As a consequence solar thermal systems will not be incorporated into the building.

3.4.5 Wind Turbines.
Wind turbines use the force of the wind to drive a rotor and generator to produce electricity. In order to yield high electrical output, wind turbines require 'smooth' laminar wind flow, and consistent wind speeds. Where wind flow is turbulent, a wind turbine will not operate effectively.

Monitoring of wind turbines in urban and suburban locations has shown in practice that the outputs can be greatly reduced by local wind turbulence effects, leading to low electricity generation and low CO2 savings. Factors to consider in addition to the above are visual impact on the surroundings, noise, and flicker.

Based on the above information, wind turbines are not considered suitable for inclusion within the development.

3.4.6 Summary of Be Green Measures.
Given the above appraisal no technologies are currently proposed for the development.

3.5 Summary Energy Strategy.

The Proposed Development entails a substantial upgrade to the thermal performance of the existing building fabric through the replacement of existing facades and the extension areas which wrap parts of the building in new fabric, and proposed upgrades to the remaining areas of retained fabric. High efficiency building services will then be provided in order to further minimise the energy demands. The combination of upgrades to the fabric and systems mean that it is expected to exceed compliance with the requirements of the Building Regulations Part L2A (2013). Current modelling results indicatively suggest an approx. 21% improvement on Part L2A 2013 regulated carbon emissions. Please refer to Appendix 1 for Part L2A BRUKL excerpts.

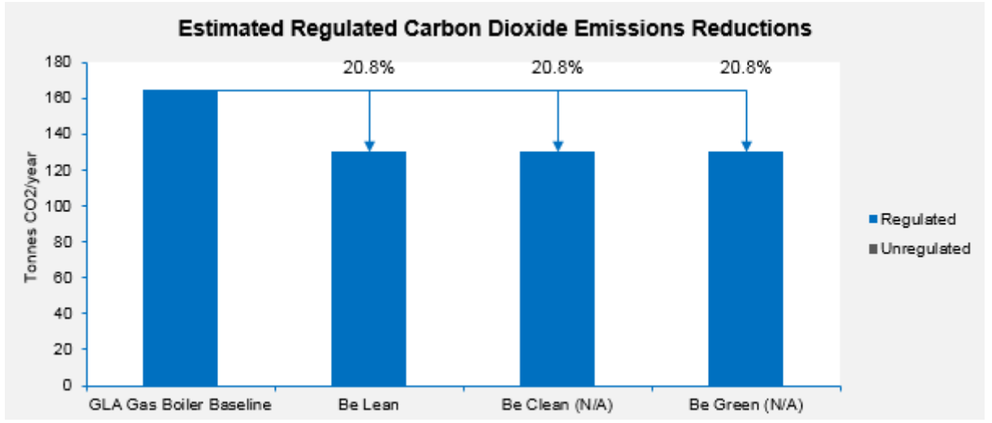


Figure 7 Regulated carbon dioxide emissions reductions (compared to Part L2A 2013)

Table 2 summaries key parameters being targeted for the Proposed Development as part of the energy strategy.

Table 2 Summary of Key Specifications.

Parameter	Targeted for Lincoln House (subject to feasibility)
Roof (new) U-value (W/.m^2.K)	0.18
Floor (refurbished) U-value (W/.m^2.K)	0.22
External Wall (new) U-value (W/.m^2.K)	0.26
External Wall (refurbished) U-value (W/.m^2.K)	0.26
Window/curtain walling U-value (W/.m^2.K)	1.6
Glazing g-value	0.4
Shading	
Fabric Air Permeability (m^3/(m^2.h) at 50Pa)	3
Space Heating and DHW boiler efficiency	92%
Cooling SEER	5.5
Lighting efficacy	Office = 1.5, cupboard and Plant 3.0, Toilets 4, Circulation 3, retail 5.2 W/m^2.100lux
Lighting controls	Daylight dimming to office perimeter zones Presence detection throughout building Controls parasitic power: 0.1W/m^2
Ventilation SFP (W/l/s)	Central AHU: 1.8, terminals 0.25
Heat recovery efficiency (%)	AHU: 75%
Metering & Controls	To enable at least 90% of end use energy to be accounted for, and incorporating alarms for out-of-range values
Power Factor Correction	>0.95

3.5.1 Summary of carbon offset requirements

Development	Carbon Dioxide Emissions (tonnes CO2 per annum)	
	(Regulated)	(Unregulated)
GLA Gas Boiler Baseline	164	164
Reduction from Be Lean	130	164
Reduction from Be Clean	130	164
Reduction from Be Green	130	164

Development	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	34.2	21%
Reduction from Be Clean	0.0	0
Reduction from Be Green	0.0	0
Total Reduction	34.2	21%
Total Target Reduction	57.6	35%
Annual Shortfall	23.4	14%

3.6 Limiting the Effect of Heat Gains in Summer Months

In tandem with the energy and CO_2 emissions appraisal, an assessment has been undertaken to determine the risk of summertime overheating and consider measures for the minimisation of cooling demand.

3.6.1 Basis of the Assessment

The London Plan Policy 5.9 (Overheating and Cooling) requests that Development's should reduce potential overheating risk and reliance on air conditioning systems. A 'cooling hierarchy' is provided and the Development has sought to follow this hierarchy.

3.6.2 Cooling Hierarchy

The following cooling hierarchy has been followed to limit the effects of heat gains in summer:

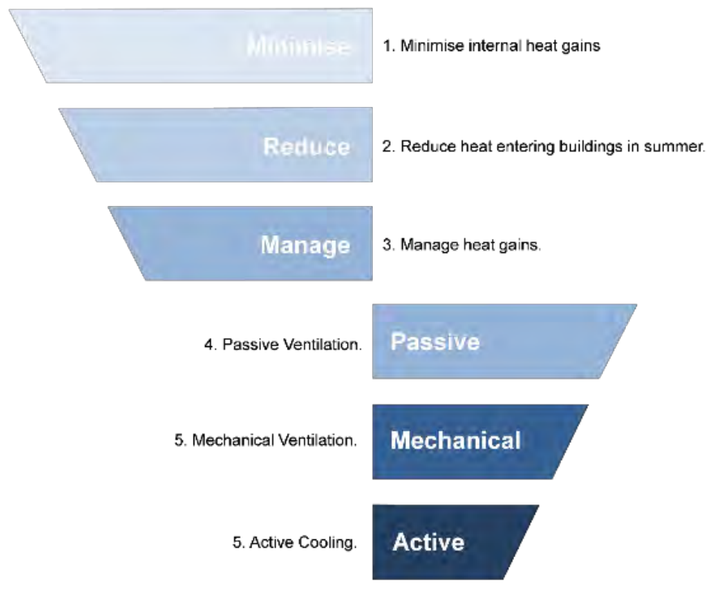


Figure 8: Mayor of London Cooling Hierarchy.

3.6.3 Summary of Mitigation Measures – Internal Heat Gains

The following mitigation methods will be implemented at the Development to minimise internal heat gains.

3.6.3.1 Energy Efficient Lighting and Equipment

Energy efficient lighting would be provided with low heat output, such as LED or compact fluorescent. Equipment should be selected in accordance with their Energy Rating as per the EU product Energy Labelling scheme. Where possible, preference should be given to 'A' rated goods and above.

3.6.3.2 Pipework Insulation

All necessary space heating and hot water pipework will be insulated in accordance with the requirements of the Building Regulations.

This is necessary in order to minimise heat gains and losses to / from distribution pipework and assist in maximising system efficiency. Careful attention would also be paid to insulating joints and knuckles to minimise standing heat losses. Ductwork would be insulated to minimise heat gains and losses, and would be of suitable construction to minimise air leakage.

3.6.4 Summary of Mitigation Measures – External Heat Gains

The following mitigation methods will be implemented at the Development to minimise external heat gains.

Glazing Ratio, G-value and Light Transmittance
The solar gains received by each space has been controlled through an appropriate g-value, whilst having regard for adequate daylight transmittance.

Insulation and Fabric Air Permeability
High levels of insulation and low fabric air permeability has been targeted, demonstrating significant improvements over the Building Regulations Part L limiting values and the notional building.

3.6.5 Ventilation

The development will be provided with mechanical ventilation which will automatically aid in the extraction of warm air.

3.6.6 Summary of Calculation Results

Thermal modelling for Part L compliance has been carried out and has demonstrated that compliance with Criterion 3 will be achieved in all occupied areas of the building (although this is not strictly a requirement for refurbishment projects). Additionally the actual cooling energy demand is lower than the notional – see Appendix 1

3.6.7 Cooling and Overheating Risk

Active cooling is also being provided. The system will deliver cooling to the required building zones at an agreed temperature set point. The British Council of Offices Guide to Specification states that the summer air temperature of 24°C should be achieved and the system will be designed to be capable of delivering this temperature set point.

Therefore the measures for minimisation, reduction and management of heat gains described in the above section, along with the provision of active cooling for summer suggests than the building would not be at risk from excessive overheating.

4. Sustainability Strategy.

4.1 Land and Building.

The Proposed Development will be designed and built to a high standard that is compatible in scale and character of surrounding development and its setting.

The Proposed Development has been designed to include the following:

- Efficient use of land by providing additional accommodation within an existing development.
- Reuse and local sourcing of materials, and responsible sourcing of materials where possible.
- Provision of sufficient waste and recycling facilities to facilitate the segregation of waste streams.

4.2 Passive Design and Energy Efficiency.

Passive design measures that will be implemented at the Proposed Development:

- Suitable glazing specification to balance heat losses, heat gains and daylight ingress.
- Fabric insulation and airtightness levels targeting improvements over the Building Regulations Part L2A standards for new elements, and to upgrade existing fabric wherever practical.

Energy Efficiency measures which will be implemented at the Proposed Development:

- Modern building services including high efficiency ventilation plant with variable speed fans and high levels of heat recovery.
- Efficient low-energy lighting throughout all spaces with low heat output to minimise risk of high internal heat gains.

4.3 Climate Change Adaption.

The design will contribute to adaptation and mitigation of the effects of climate change by the specification of high performing elements to minimise heat gains and losses.

The Proposed Development will improve upon the requisite standards of Part L 2013 of the Building Regulations.

The Proposed Development will be designed in accordance with the cooling hierarchy to minimise cooling demand. Mitigation measures such as an appropriate glazing ratios and g-values, high levels of insulation and minimisation of internal heat gains are targeted. Through these measures, the relevant areas of Proposed Development will achieve compliance with Criterion Three of the Building Regulations Part L (2013).

Other climate change adaptation measures which will be implemented for the development include the provision of green walls to contribute to the biodiversity of the site, to minimise the buildings contribution to the urban heat island effect, and to provide a sustainable urban drainage system measure.

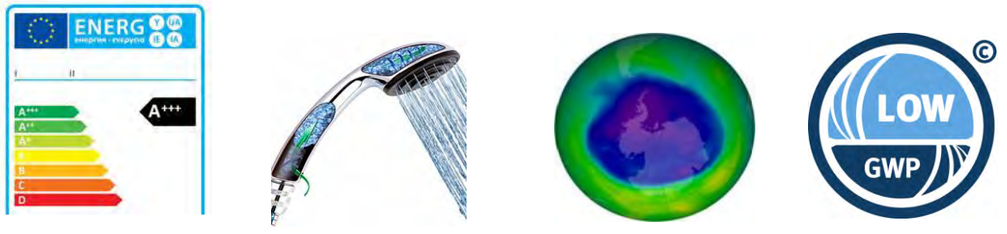


Figure 9 General sustainability measures.

4.4 Flood Risk, Sustainable Urban Drainage, Flood Resilience and Surface Water Run-off.

The proposed development site lies in an area designated by the EA as Flood Zone 1 (when including flood defence systems as applicable), and is outlined to have a chance of flooding of less than 1 in 1,000 (<0.1%) in any year (very low risk of flooding from fluvial sources).

Flood risk from groundwater and artificial sources is considered low, however to contribute to addressing policy 5.12 Flood Risk Management of the London Plan the following mitigation measures will be incorporated, such as:

- Best practice to be followed for all new pipes/sewers to prevent the ingress of groundwater into the drainage systems
- Non-return valves could be fitted to prevent flooding within the property
- Any retained sewers and drains which may be leaking to be replaced and renewed.

Rainwater harvesting is being considered and will be incorporated subject to detailed design and viability.

No net increase in surface water run-off is expected to occur.

4.5 Conservation of Energy, Water, Materials and Other Resources.

The Proposed Development is targeting to achieve compliance with Part L 2013. It is anticipated that this target for CO_2 emissions reductions will be achieved from a combination of passive design, energy efficiency, and renewable heating technology.

Water efficient fixtures and fittings will be supplied to all aspects of the Proposed Development. These will be selected to ensure that water consumption is minimised.

The Proposed Development has minimised its material use through retaining and reusing the core structure of the building. For newly constructed elements the building elements will be selected to minimise environmental impact. A full review of the materials specified for the development will be undertaken during the detailed design development stages aiming for materials to meet the following requirements where possible:

- Responsible sourcing certificates
- Environmental Product Declarations
- Low emitting materials

Wherever possible, demolition materials will be reused to limit use of virgin materials. Insulation will be specified to have a Green Guide Rating of A as a minimum and minimise Global Warming Potential (GWP) to five or less and all timber used at the Proposed Development will be FSC or PFC certified or similar.

Figure 10 General responsible sourcing measures.

4.6 Construction.

The Proposed Development will be constructed by a developer certified under the Considerate Constructors Scheme who will be expected to target good practice score in all areas. The contractor will furthermore monitor and set targets for energy usage, water usage and construction waste related to the site for the duration of the works.

During the construction phase, all areas of concern will be managed, including waste reduction strategies, noise and dust pollution, construction traffic and protection of any and all ecology features identified on the Site. A construction management plan will be created to assess the impact of construction activities and to identify methods of mitigation against any identified potential impact.

Work is to be scheduled within normal working hours.

Wheel washing, road cleansing and dust and noise suppression will take place to ensure no adverse impact to the surrounding environment.

Please refer to the CMP report for further information.

Figure 11 General construction measures.

4.7 Transport Strategy.

4.7.1 Public transport.

The site has the highest Public Transport Accessibility Level (PTAL) of 6b due to its close proximity to a range of key public transport options, including major London rail stations, the London Underground system, and numerous bus routes.

4.7.2 Pedestrians and Cyclists.

Secure cycle storage will be provided at the Development to maximise the potential for sustainable transport to and from the building. This will be located in a dedicated facility at basement level, accessed via a service route at the front of the building to side of the main entrance. Changing and shower facilities will also be provided at this level to encourage cycling as a preferred transport mode.

Figure 12 Generic forms of cycle storage.

4.8 Refuse and Recycling.

4.8.1 Construction Site Waste Management.

The Principal Contractor, once appointed, will develop a Resource Management Plan (RMP) for the Proposed Development, to outline opportunities to steer the direction of waste management and ensure good practice is adopted for the demolition and construction phase of the Proposed Development. Where feasible diversion from landfill will be pursued. The Principal Contractor will be expected to adopt the recommendation measures made in line with the waste hierarchy with the aim of maximising diversion from landfill. The Proposed Development will be constructed in a manner which aims to protect the environment and local community through reusing, recycling and recovering waste which would otherwise be disposed of at landfill. Demolition waste will be re-used on site where possible.

4.8.2 Operational Waste.

The strategy for operational waste management within the development provides for the separation of refuse and recycling. Internal waste facilities should be considered to provide opportunities which encourage recycling. All waste will be taken off site and managed appropriately, and in accordance with the waste hierarchy. Bin storage is located at the ground floor level for collection via the service entrance to the front of the building. The bin stores will be designed to comply with the relevant British Standards and Building Regulations with regard to capacity, provision and accessibility.

Figure 13 Waste Hierarchy.

4.9 Heath & Wellbeing.

4.9.1 Indoor Air Quality.

The quality of the air within buildings can have a considerable effect on health due to the amount of time people spend indoors. The Proposed Development will consider developing and implementing an indoor air quality plan which aims to highlight potential sources of pollution and minimise spread or contamination. Additionally all finishes installed in the building will aim to have low volatile organic compound (VOC) content.

Figure 14 Example LOW VOC paint.

4.9.2 Daylight & Thermal Comfort.

The Proposed Development has optimised the glazing ratios and g-values in order to maximise exposure to daylight, whilst considering the level of incoming solar gains in order to minimise the energy consumption necessary for cooling. Internal blinds will be provided to control glare when the sun is low in the sky relative to a given façade.

4.9.3 Noise.

Any negative effect to the acoustic environment nearby as a result of the Proposed Development will be mitigated as far as practically possible. Plant emission limits for externally located building services have been set in line with Local Authority requirements.

An environmental noise survey has been undertaken for the development to understand the existing noise environment surrounding the development. Part of the survey work has been to determine plant noise emission limits for new plant equipment. Measures to be considered include solid plant screens and sound attenuators. The appropriate measures will be developed during detailed design.

4.10 Landscaping & Biodiversity.

The existing building has minimal surrounding as part of the project scope, and is predominantly hard landscaped.

The Proposed Development will aim to increase the biodiversity of the site through the provision of green walls. This will contribute to the Sustainable urban Drainage Strategy (SuDs) as well.

Figure 15 Indicative green wall proposals (subject to detailed design).

Where suitable bird boxes will be considered to encourage new ecologically valuable habitats.

Figure 16 Example landscaping and biodiversity improvements.

4.11 Pollution Prevention.

4.11.1 During Construction.

During the construction phase, all areas of concern will be managed including waste reduction strategies, noise and dust pollution, and construction traffic.

Contractors will be required to identify potential sources of dust and other air pollution and appropriate dust control measures would be implemented.

It is also intended that the main contractor shall register under the Considerate Constructors Scheme and achieve a best practice score. The contractor will furthermore monitor and set targets for energy usage, water usage and construction waste related to the site for the duration of the works.

4.11.2 Air Quality.

Through the replacement of the facades the fabric of the building will be improved to be very air tight, targeting a permeability of 5m3/(m2.h) at 50Pa. As such, air pollution would not be permitted to enter the building through the fabric, whilst the mechanical ventilation system will also filter out unwanted pollutants to provide a high standard of indoor air quality.

The replacement of the existing boiler plant with electrically powered equipment for heating and hot water generation means that current onsite sources of NOx and particle pollution are eliminated, and the Proposed Development thereby makes a positive contribution to the improvement of local air quality.

4.11.3 External Lighting.

The development will follow Secured by Design Principles where feasible to ensure that a safe and secure environment is provided.

All external lighting will be energy efficient, and it is anticipated that suitable controls such as daylight detection and time-switches will be installed to minimise inappropriate use. Luminaires will be provided with suitable outputs and polar curves in order to direct lighting appropriately to further reduce light pollution and loss of light to the sky in order to minimise adverse effects to neighbouring buildings or biodiversity.

Secured by Design

SBD

Police Preferred Specification

Appendix 1: Part L BRUKL and EPC Output.

Lean BRUKL:

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Lincoln House — As designed

Date: Tue Dec 12 10:09:36 2017

Administrative information

Building Details

Address: High Holborn, London, WC1V

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.8

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.8

BRUKL compliance check version: v5.3.a.0

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Hoare Lea

Telephone number: 020 3668 7100

Address: 12-13 Soho Street, London, W1D4AB

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

CO_2 emission rate from the notional building, kgCO$_2$/m^2.annum	22.4
Target CO_2 emission rate (TER), kgCO$_2$/m^2.annum	22.4
Building CO_2 emission rate (BER), kgCO$_2$/m^2.annum	17.6
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{i,Limit}$	$U_{e,Calc}$	$U_{i,Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.26	0.26	01000006:Surf[2]
Floor	0.25	0.22	0.22	01000005:Surf[0]
Roof	0.25	0.18	0.18	01000006:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	01000006:Surf[2]
Personnel doors	2.2	2.2	2.2	00000026:Surf[2]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{e,Limit}$ = Limiting area weighted average U-values (W/m^{2}K)
$U_{e,Calc}$ = Calculated area weighted average U-values (W/m^{2}K) — $U_{i,Calc}$ = Calculated maximum individual element U-values (W/m^{2}K)

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

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	7356.7	7356.7
External area [m^2]	5957	5957
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	2814.78	3384.24
Average U-value [W/m^{2}K]	0.47	0.57
Alpha value* [%]	10.08	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
3	**A1/A2 Retail/Financial and Professional services**
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
97	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	5.37	5.67
Cooling	6.23	7.81
Auxiliary	9.58	10.64
Lighting	15.61	22.23
Hot water	2.63	2.53
Equipment*	43.04	43.04
TOTAL**	39.42	48.88

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	113.92	124.15
Primary energy* [kWh/m^2]	103.81	131.78
Total emissions [kg/m^2]	17.6	22.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	17.6	120.2	5.7	7.7	11.6	0.86	4.34	0.92	5.5
	Notional	19.1	131.7	6.2	9.7	12.9	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	9.5	0	3.1	0	3.3	0.86	0	0.92	0
	Notional	1.9	0	0.6	0	3.5	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	19.7	0	6.3	0	1	0.86	0	0.92	0
	Notional	18.5	0	6	0	1	0.86	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Indicative EPC:

Energy Performance Certificate
Non-Domestic Building

HM Government

Lincoln House
High Holborn
London
WC1V

Certificate Reference Number:
0000-0040-0030-9000-0803

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+ ..... Net zero CO_2 emissions

A 0-25
B 26-50
C 51-75
D 76-100
E 101-125
F 126-150
G Over 150

34 This is how energy efficient the building is.

Less energy efficient

Technical information

Main heating fuel:	Natural Gas
Building environment:	Air Conditioning
Total useful floor area (m^2):	7356.737
Building complexity (NOS level):	5
Building emission rate ($kgCO_2/m^2$ per year):	17.63
Primary energy use (kWh/m^2 per year):	103.81

Benchmarks

Buildings similar to this one could have ratings as follows:

43 If newly built
113 If typical of the existing stock

Appendix 2: BREEAM Pre-assessment.

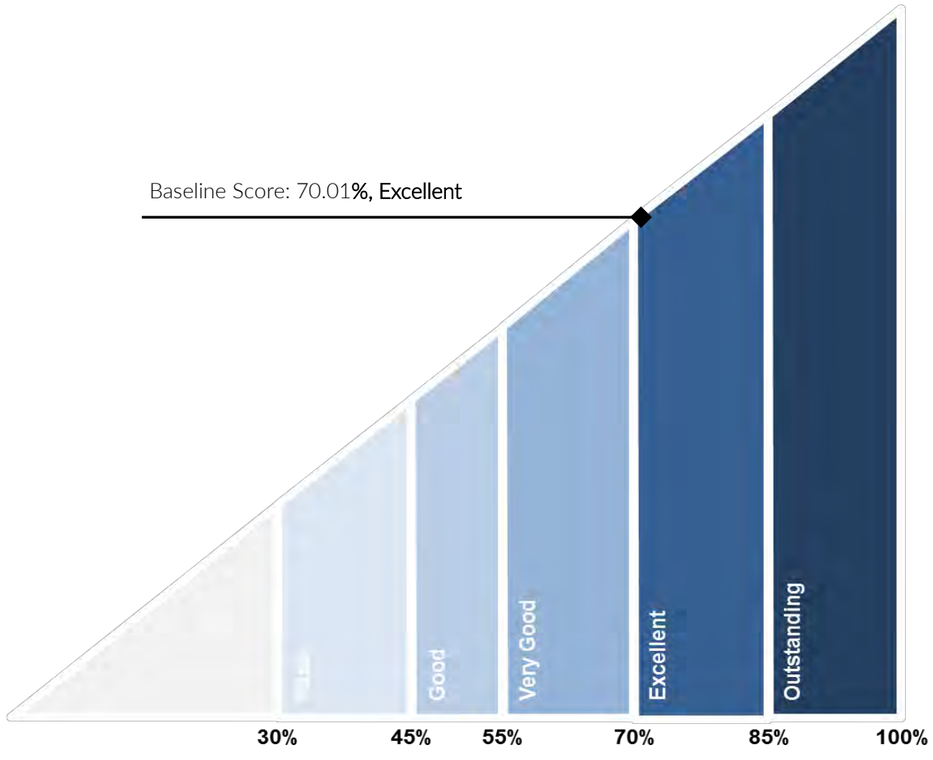
This report provides an initial BREEAM 2014 Refurbishment and Fit out pre-assessment for the proposed Lincoln House development.

The development falls under the 'Office' category and a Parts 1, 2, 3 & 4 (i.e. shell + core + local services + fit out) assessment has been conducted. The proposed development is targeting a BREEAM Excellent rating.

The current anticipated baseline score is 70.01% which is equivalent to an Excellent rating with minimal margin. Potential additional credits have been identified for review with the team to further increase the score.

A margin of at least 3% – 5% is recommended above the minimum required score at this stage to secure the target rating against design changes and potential constraints identified during the construction stage. as such the team will strive to target additional credits to provide further margin, subject to detailed design.

Figure 1 summarises the current anticipated 'baseline' score relative to the minimum required score for each BREEAM rating threshold.



4.11.4 Summary Score Sheet

The summary table below highlights the list of targeted credits for the current BREEAM 2014 pre-assessment. Mandatory credits to achieve a 'Very Good' rating and above are highlighted by **(M).** Additional mandatory credits for an 'Excellent' or 'Outstanding' rating are highlighted by **(M_e) and (M_o)** respectively. Exemplary (innovation) credits are written in brackets; e.g. (+1).

Table 3 BREEAM Target Summary

Category (weighting per credit)	Issue	Credits	
		Available	Targeted
Management (0.71%)	Man 01: Project Brief and design	4	4
	Man 02: Lifecycle Cost and Service Life Planning	4	1
	Man 03: Responsible Construction Practices **(M_e), (M_o)**	6	6
	Man 04: Commissioning and Handover **(M_e), (M_o)**	4	4
	Man 05: Aftercare	3	2
Health & Wellbeing (0.84%)	Hea 01: Visual Comfort	5	1
	Hea 02: Indoor Air Quality	5	4
	Hea 03: Safe containment in laboratories	1	-
	Hea 04: Thermal Comfort	3	2
	Hea 05: Acoustic Performance	3	3
	Hea 06: Safety and Security	1	1
Energy (0.71%)	Ene 01: Reduction of CO_2 Emissions **(M_e)**	12	8
	Ene 02: Energy Monitoring **(M)**	2	2
	Ene 03: External Lighting	1	1
	Ene 04: Low Carbon Design	3	1
	Ene 05: Energy Efficient Cold Storage	2	-
	Ene 06: Energy Efficient Transportation Systems	3	3
	Ene 08: Energy Efficient Equipment	-	-
Transport (0.82%)	Tra 01: Public Transport Accessibility	3	3
	Tra 02: Proximity to Amenities	1	1
	Tra 03: Cyclist Facilities	2	2
	Tra 04: Maximum Car Parking Capacity	2	-
	Tra 05: Travel Plan	1	1
Water (0.82%)	Wat 01: Water Consumption **(M)**	5	4
	Wat 02: Water Monitoring **(M)**	1	1
	Wat 03: Water Leak Detection and Prevention	2	2
	Wat 04: Water Efficient Equipment	-	-

Category (weighting per credit)	Issue	Credits	
Materials (1.19%)	Mat 01: Life Cycle Impacts	5	2
	Mat 02: Hard Landscaping and Boundary Protection	-	-
	Mat 03: Responsible Sourcing of Materials **(M)**	4	2
	Mat 04: Insulation	1	1
	Mat 05: Designing for Durability and Resilience	1	0
	Mat 06: Material Efficiency	1	0
Waste (0.77%)	Wst 01: Construction Waste Management **(M_o)**	7	2
	Wst 02: Recycled Aggregates	1	1
	Wst 03: Operational Waste **(M_e), (M_o)**	1	1
	Wst 05: Adaptation to Climate Change	1	1
	Wst 06: Functional Adaptability	1	0
Land Use and Ecology (2.47%)	LE 01: Site Selection	2	-
	LE 02: Ecological Value of Site and Protection of Ecological Features	1	1
	LE 03: Minimising Impact on Existing Site Ecology **(M)**	2	-
	LE 04: Enhancing Site Ecology	1	1
	LE 05: Long Term Impact on Biodiversity	2	-
Pollution (0.95%)	Pol 01: Impact of Refrigerants	3	2
	Pol 02: NO_x Emissions	3	3
	Pol 03: Surface Water Run-off	5	3
	Pol 04: Reduction of Night-time Light Pollution	1	1
	Pol 05: Reduction of Noise Pollution	1	1
Innovation (1.00%)	Inn 01: Approved Innovation and Exemplary Level Credits	10	2
Targeted weighted score rating:		70.01% Excellent	

HOARE LEA

OWEN BOSWELL
SUSTAINABILITY CONSULTANT

+44 20 3668 7179
owenboswell@hoarelea.com

HOARELEA.COM

Western Transit Shed
12-13 Stable Street
London
N1C 4AB
England