

Lynton Road, Haringey

Sustainability and Energy Report

**Ensphere Group Ltd
on behalf of Seemo Assets Ltd**

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Lynton Road, Haringey

Sustainability & Energy Statement

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Sustainability

Energy

Climate Change

Socio-Economic

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1. Executive Summary

- 1.1 This Sustainability and Energy Statement presents the sustainability credentials for the proposed redevelopment at Lynton Road, Crouch End.
- 1.2 The proposals comprise the demolition of the existing building and the redevelopment of the site to create a part 4 / part 5 storey building. The mixed-use development will comprise commercial ground floor space on the ground and first floors, and residential accommodation on the upper floors.
- 1.3 At a strategic level, this is considered sustainable on the basis that it will help alleviate the supply-side housing shortage and assist with the rebalancing of the socio-economic factors. The creation of new commercial space will also enhance employment for local people, improve the local economy, increase the wealth and lifestyle of employed individuals and contribute to local business rates. The development is therefore considered to be beneficial to the local community and aligned with socio-economic requirements.
- 1.4 A range of sustainable design features are proposed, and construction will be responsibly managed to ensure minimal impact on the environment and local community.
- 1.5 It is proposed to reduce energy demands in line with the Energy Hierarchy; with a priority given to energy reduction and efficiency. This will be achieved through high performance building fabric and energy efficient lighting, services and equipment. An Air Source Heat Pump (ASHP) system is also proposed for hot water and space heating in the residential units, as well as for space heating in the commercial. Water consumption shall be reduced below 105 litres / person / day.
- 1.6 The development will satisfy the Council target for an on-site carbon saving of >35% relative to Part L 2021. Residual emissions will be offset with a Carbon Offset payment. Energy efficient measures will target a >15% reduction. A copy of the GLA Carbon Emission Reporting Spreadsheet is appended to this report outlining the savings at each stage of the Energy Hierarchy.
- 1.7 Overall, the proposals for the scheme are in line with the overarching principles of sustainable development as well as the policy requirements of the National Planning Policy Framework, London Plan and policies of the Council. When implemented, the scheme will provide an efficient and low carbon development.

2. Introduction

- 2.1 Ensphere Group Ltd was commissioned by Seemo Assets Ltd to produce a Sustainability and Energy Statement for the proposed redevelopment at Lynton Road, Crouch End.

Site and Surroundings

- 2.2 The Site measures approximately 800m² and comprises an existing warehouse, which will be demolished as part of the proposals, as well as some hard landscaping.
- 2.3 The Site is located just off Park Road, in Crouch End. On the southwestern border is a 4-storey building which is currently occupied by a parade of shops under residential flats. Lynton Round bounds the northeast and southeast sides of the Site, with carparking located to the northwest.
- 2.4 The development is situated within a predominantly residential area, but with many services and commercial uses such as a pharmacy, hairdresser, cafes and convenience stores along Park Road. Several bus stops are located within 200 meters from the Site serving routes W7 and W5. Highgate Underground station is located less than a mile from the Site with connections to central London. National rail stations Alexandra Palace and Harringay are also in close vicinity of the Site.

Proposed Development

- 2.5 Demolition of the existing building and the redevelopment of the site to create a part 4 / part 5 storey building. The mixed-use development will comprise commercial ground floor space on the ground and first floors, and residential accommodation on the upper floors.

Report Objective

- 2.6 The objective of the Sustainability and Energy Statement is to outline how sustainability and the principles of sustainable development have been incorporated into the development proposals.

3. Assessment Methodology

Sustainability & Sustainable Development

- 3.1 “Sustainability” is a broad concept generally used to describe the ability to perpetuate a particular state of being. It is widely used in the context of development and where there is potential for changing circumstances to cause an impediment to the perpetuation of a phenomenon.
- 3.2 The term is subjective and the understanding of the concept is influenced by perceptions and aspirations. “Sustainability” is therefore variably defined but normally encapsulates a wide range of issues, often characterised by their relationship with the economy, society and the environment (the “three pillars” of sustainability).
- 3.3 These issues are not necessarily mutually exclusive and whilst they are often presented as such, technically, the economy is a function of society; and society concerns the interrelationships and behaviours of one species within the wider environment. Nevertheless, the identification and characterisation of these issues enables a better understanding of the things that matter in decision making, which enable a balance to be struck when priorities compete.
- 3.4 The term “sustainable development” is often used interchangeable with “sustainability” but it is narrower in scope and seeks to promote the perpetuation of human advancement. The “Brundtland Report” (officially titled “Our Common Future” and written by the United Nations World Commission on Environment and Development, Chaired by Gro Harlem Brundtland in 1987), presents perhaps the most widely cited and understood interpretation of this concept:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

- 3.5 The definition introduces the concept of “needs” and the generational timeframe for evaluating whether an action is sustainable or otherwise.

Analysis Methodology

- 3.6 Given the broad definitions associated with the terminology of “sustainability” and “sustainable development”, understanding how these concepts have been interpreted and incorporated into the local planning regime requires a review of the planning policy as well as the documents upon which the policy is based. The report therefore commences with an overview of the sustainable communities’ strategy, planning policy and other considerations.

- 3.7 An appraisal of the sustainability credentials of the scheme then follows. Structure is important when assessing sustainability due to the breadth of issues being considered; an approach has been created based upon the phases of the development cycle relevant to the planning decision making processes, with consideration given to the “three pillars” (discussed above) and requirements of policy.

Assessment Matrix

	Economic	Social	Environmental
Strategic	✓	✓	✓
Design	✓	✓	✓
Construction	✓	✓	✓

- 3.8 It is recognised that the scale and nature of the scheme will affect the relative importance of the matrix dimensions and entries. For example, a single residential unit is unlikely to be viewed as having a major societal impact on the basis of its scale relative to its context. However, the societal implications of an urban extension may be much more significant.
- 3.9 The emphasis is therefore case specific, and the assessment sections of this report seek to highlight the relevant factors in a suitably balanced manner.

4. Planning Context

National Context

National Planning Policy Framework (2021)

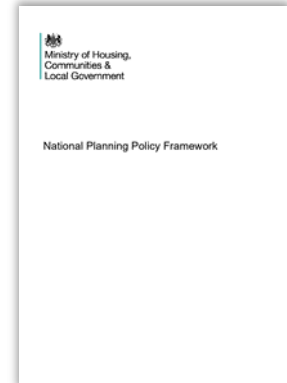
- 4.1 The National Planning Policy Framework (NPPF) was updated in July 2021. Paragraphs 7, 8 and 10 of the revised NPPF include reference to the following:

7. *“The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. At a similarly high level, members of the United Nations – including the United Kingdom – have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection”.*

8. *“Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):*

- *An economic objective - to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*
- *A social objective - to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*
- *An environmental objective - an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”*

10. *“So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development”*



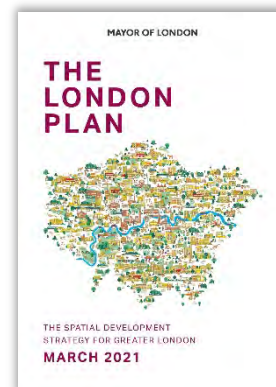
Planning Practice Guidance (2016; updated 2022)

- Climate Change - Advises how planning can identify suitable mitigation and adaption measures in plan-making and the application process to address the potential for climate change.
- Design - Design affects how people interact with places and can affect a range of economic, social and environmental objectives. The guidance states that planning policies and decisions should seek to ensure that the physical environment supports these objectives.
- Natural Environment - Explains key issues in implementing policy to protect biodiversity, including local requirements.
- Environmental Impact Assessment – Explains requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. This allows local planning authorities to better consider the environmental effects of a project when granting planning permission.
- Renewable and Low Carbon Energy - Guidance to help local councils in developing policies for renewable and low carbon energy and identifies the planning considerations.
- Flood Risk and Coastal Change - Advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

London Context

London Plan (2021)

- 4.2 The London Plan is the overall strategic plan for London, it sets out an integrated economic, environmental, transport and social framework for development of London over the next 20-25 years. The London Plan is part of the Development Plan and covers a range of planning issues. The presented policies provide a vision for how London should sustainably grow and develop in the future. Policies considered pertinent to this report are presented below:



- Policy D2 (*Infrastructure requirements for sustainable densities*) – development proposals should be considerate of future planned levels of infrastructure and proportionate to the site's connectivity.
- Policy D3 (*Optimising site capacity through the design-led approach*) - lists a series of requirements including a requirement for development to aim for high sustainability standards.

- Policy G1 (*Green Infrastructure*) - Development proposals should incorporate appropriate elements of green infrastructure that are integrated into London's wider green infrastructure network.
- Policy G4 (*Open Space*) - Development proposals should not result in the loss of protected open space; and where possible create areas of publicly accessible open space.
- Policy G5 (*Urban Greening*) - Major development proposals should contribute to the greening of London by including urban greening as a fundamental element of site and building design.
- Policy G6 (*Biodiversity and access to nature*) - Development proposals should manage impacts on biodiversity and aim to secure net biodiversity gain.
- Policy SI 1 (*Improving air quality*) – Development proposals should not lead to further deterioration of existing poor air quality.
- Policy SI 2 (*Minimising greenhouse gas emissions*) - Major development should be net zero-carbon and minimise emissions in accordance with the following energy hierarchy: be lean, be clean, be green, be seen. A minimum on site reduction of 35% beyond Building Regulations will be required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Any short fall with the zero-carbon target should be addressed through a carbon offset payment. Development referable to the GLA should also calculate whole life-cycle carbon emissions.
- Policy SI 3 (*Energy infrastructure*) - Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system.
- Policy SI 4 (*Managing heat risk*) - Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems.
- Policy SI 5 (*Water infrastructure*) – Development proposals should be achieving mains water consumption of 105 litres or less per head per day; and achieve at least the BREEAM excellent standard for the 'Wat 01' water category. Smart metering, water saving, and recycling measures should also be incorporated.
- Policy SI 7 (*Reducing waste and supporting the circular economy*) - Referable applications should promote circular economy outcomes and aim to be net zero-waste.
- Policy SI 12 (*Flood risk management*) - Development proposals should ensure that flood risk is minimised and mitigated.

- Policy SI 13 (*Sustainable drainage*) - Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.

Sustainable Design and Construction Supplementary Planning Guidance (2014)

4.3 This SPG aims to support developers, local planning authorities and neighbourhoods to achieve sustainable development. It provides guidance on how to achieve the London Plan objectives effectively, supporting the Mayor's aims for growth, including the delivery of housing and infrastructure.

4.4 The guidance in this SPG is intended to:

- provide detail on how to implement the sustainable design and construction and wider environmental sustainability policies in the London Plan.
- provide guidance on how to develop more detailed local policies on sustainable design and construction.
- provide best practice guidance on how to meet the sustainability targets set out in the London Plan; and
- provide examples of how to implement sustainability measures within developments.

Energy Assessment Guidance (2022)

4.5 This guidance document explains how to prepare an energy assessment to accompany strategic planning applications referred to the Mayor as set out in London Plan Policy SI 2. It states that the purpose of an energy assessment is to demonstrate that the proposed climate change mitigation measures comply with London Plan energy policies, including the energy hierarchy.

4.6 Although primarily aimed at strategic planning applications, London boroughs are encouraged to apply the same structure for energy assessments related to non-referable applications and adapt it for relevant scales of development.

Local Context

Haringey's Local Plan, Strategic Policies (2013, updated 2017)

4.7 The Local Plan sets out the key planning policies for the future development of the borough up to 2026 and acts as the central document in the Borough's Development Plan.

4.8 The following policies are considered pertinent to this report:



- Policy SP0 (*Presumption in Favour of Sustainable Development*) – Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework (NPPF);
- Policy SP2 (*Housing*) – promotes an excellence in design quality and sustainability for all new homes;
- Policy SP4 (*Working towards a low carbon Haringey*) – In line with the London Plan, all new residential and non-residential development shall be zero carbon. All new non-residential development shall be built to at least BREEAM “Very Good” and aim for “Excellent”. The policy encourages connection to district energy and, where viable, a reduction in predicted carbon dioxide emissions of 20% from on site renewable energy generation.
- Policy SP5 (*Water Management and Flooding*) – The Council will require all development in Haringey to be water efficient during construction and operation and to reduce all forms of flood risk; and
- Policy SP6 (*Waste and Recycling*) – Requires integrated, well-designed recycling facilities to be incorporated into all new developments.

Haringey’s Development Management DPD – (July 2017)

4.9 This Development Plan Document (DPD) provides support to help contribute to the delivery of sustainable development in accordance with the Haringey strategy. It sets out criteria based policies against which planning applications will be assessed.

4.10 The following policies are highlighted:

- Policy DM1 (*Delivering High Quality Design*) – encourages all new developments to achieve a high standard of design as well as contribute to the overall distinctive character of the surrounding area;
- Policy DM4 (*Provision and Design of Waste Management Facilities*) - All proposals should consider how to sustainably manage waste arising from the development during the design, construction and occupation phases;
- Policy DM21 (*Sustainable Design, Layout and Construction*) – Promotes new developments to consider and implement sustainable design, layout and construction techniques;
- Policy DM22 (*Decentralised Energy*) – encourages proposals that contribute to the provisions to contribute to decentralised energy networks;



- Policy DM23 (*Environmental Protection*) – requires new development proposals to consider air quality, noise and vibration, light pollution, contaminated land and hazardous substances;
- Policy DM24 (*Managing and Reducing Flood Risk*) - requires new development proposals to consider the risk of flooding to future occupants; and
- Policy DM25 (*Sustainable Drainage Systems*) – promotes Sustainable Drainage Systems to be incorporated within the new development's design to manage surface water as close to its source as possible.

Sustainable Design and Construction SPD (2013)

- 4.11 The purpose of the sustainable design and construction SPD is to provide advice on how development should be designed to ensure it is as sustainable as possible.
- 4.12 The topics that are discussed within this supporting document are to be incorporated within the sustainability Statement including energy and carbon, changing climate, flood risk, water, pollution, waste, conservation, biodiversity and transport.
- 4.13 The guidance states that on-site renewable energy generation should be considered within all major developments to reduce carbon dioxide emissions by at least 20 per cent.



5. Site Context

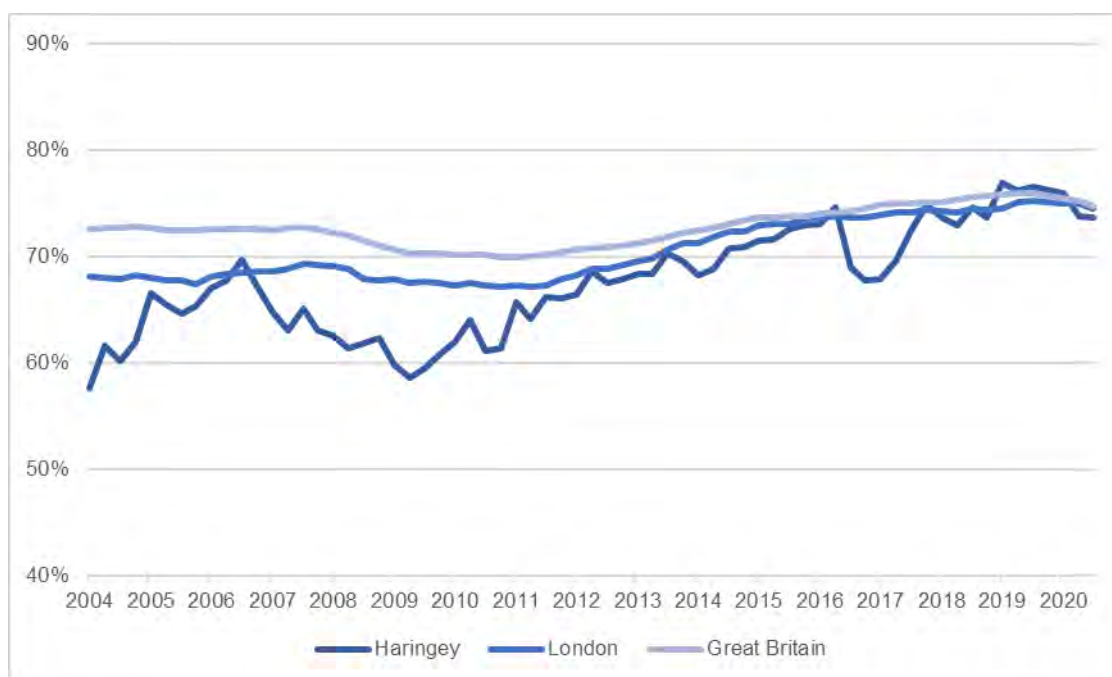
- 5.1 In line with the “three pillars” of sustainability discussed within the methodology section, the site context has been considered with regard to its economic, social and environmental context; acknowledging that interrelationships exist between many of these issues.

Socio Economic Context

Labour Market

- 5.2 Nomis is a service provided by the Office for National Statistics, providing local labour market profiles. It provides data on the percentage of economically active residents in an area in groups from January 2004 – December 2004 to July 2020 – June 2021.
- 5.3 The percentage of economically active residents in employment in Haringey has historically been lower than for London and Great Britain; however, more recently it has aligned (and at times exceeded) the regional and national trends. There is also an upward trend in economically active residents who are in employment in Haringey.

Figure 5.1 Economically Active – In Employment



Note: Percentage figures are for those of aged 16-64.

ONS Household Projections

- 5.4 The Office for National Statistics presents data relevant to household projections for England, by region and local authority, mid-2001 to mid-2043 (formerly referred to as live tables on household projections).

5.5 The assumptions underlying national household and population projections are based on demographic trends. They are not forecasts as, for example, they do not attempt to predict the impact of future Government policies, changing economic circumstances or other factors that might influence household growth. The projections show the household numbers that would result if the assumptions based in previous demographic trends in the population and rates of household formation were to be realised in practice.

5.6 Nevertheless, data suggests that household numbers in Haringey will increase from circa 109,412 in 2022 to around 123,449 by 2043; a ~13% increase over the period.

Output Area Classifications

5.7 Area classifications for Great Britain have been produced after every census since 1971, and as of the 2001 Census, they have been extended to cover the UK as a whole.

5.8 Using socioeconomic and demographic data from each census, the classifications seek to identify areas of the country with similar characteristics. Therefore, the presented information should not be interpreted as an assessment specific to the Application Site and the surrounding area; but rather it is a reflection of the characteristics of areas with a similar socioeconomic and demographic pattern.

5.9 Data from the 2011 Census has been released identifying the site as covering an OAC area with OAC Code E00010172 which is classified as “Ethnicity Central” (Supergroup Code 3), “Aspirational Techies” (Group Code 3d) and “Established Tech Workers” (Subgroup Code 3d2).

5.10 Radial Plots are provided by the Office for National Statistics. Each data point on a radial plot displays the value for each one of the 60 standardised and transformed 2011 Census variables used.

5.11 The data indicates higher than average occupancy of flatted accommodation, with less houses compared to the national average. Renting (both private and social) is notably above the national average, along with overcrowding. The proportion of people who commute by public transport, walking and bicycle is also higher than average.

Indices of Multiple Deprivation

5.12 The English Indices of Deprivation use 38 separate indicators, organised across seven distinct domains of deprivation. The Indices of Multiple Deprivation data are then constructed by combining the seven transformed domain scores, using the following weights; income (22.5%); employment (22.5%); health and disability (13.5%); education, skills and training (13.5%); barriers to housing and services (9.3%); crime (9.3%); and living environment (9.3%).

5.13 The IMD can be used to rank every Lower Layer Super Output Area in England according to their relative level of deprivation. The data is not a measure of affluence; therefore the area ranked as the least deprived is not necessarily the most affluent.

- 5.14 The IMD data comprise a numeric value in a scale of 1 to 32,844 (1=most deprived) and are represented in a coloured scale of deciles (1=most deprived – dark red; 10=least deprived – dark blue) in the respective maps. Government data (illustrated below) indicates that the area ranks 16,274 out of 32,844; where 1 is the most deprived. The area is therefore considered to have a slightly higher than average level of deprivation overall.
- 5.15 The table below provides the data for the individual domains:

Table 5.1 IMD Domain Scores

Domain	Score
Income Rank	15,153
Employment Rank	16,306
Education, Skills and Training Rank	31,735
Health Deprivation and Disability Rank	17,098
Crime Rank	6,699
Barriers to Housing and Services Rank	10,788
Living Environment Rank	9,217
Rank of IMD Score	16,274

Note: Scores out of 32,844, where 1 is the most deprived.

Environmental Context

- 5.16 The environmental context is assessed in greater detail in the accompanying environmental reports. The following provides an overview of the pertinent matters:

Land Use

- 5.17 The site constitutes previously developed land, meaning that its re-development will reduce the pressure to develop elsewhere and on greenfield land.

Flooding

- 5.18 From review of the Environment Agency (EA) Flood Map for Planning, the site is identified as being in a Flood Zone 1 and at low risk of flooding.

Ecology

- 5.19 The site is almost entirely covered by hardstanding and existing structures. The current ecological value is considered negligible.

Local Amenities & Public Transport

- 5.20 Many of the social and economic issues concern accessibility, which in its broadest sense is regarded as a combination of access to local shops, services, amenities, employment opportunities; as well as access to public and other transport facilities. Therefore, the

accessibility of the proposed scheme to local amenities is a relevant consideration in determining whether the site represents a sustainable location.

- 5.21 The Site is located just off Park Road where many shops, restaurants and services are present. The Site has a PTAL rating of 3, indicating a moderate access to public transport. Several bus stops are located within 200 meters from the site serving routes W7 and W5. Highgate Underground station is located less than a mile from the site with connections to central London, as well as national rail stations Alexandra Palace and Harringay within 1.5 miles. Cycling is also facilitated, and a number of cycle paths are also evident in the locality.
- 5.22 Further detail of the transport infrastructure can be found in the Transport Statement produced in support of the planning application.

6. Sustainable Design Proposals

6.1 This section presents an overview of the proposed sustainable design features for the scheme.

Energy

6.2 The assessment methodology follows the Energy Hierarchy, on the basis that it is preferable to firstly minimise carbon dioxide emissions through reduced energy demand; prior to considering low carbon and renewable energy supply options.

6.3 The tiers of the Energy Hierarchy are:

- Be Lean Demand Reduction
- Be Clean Use Energy More Efficiently
- Be Green Use Renewable Energy
- Be Seen Monitor, Verify & Report

6.4 Where opportunities to improve the efficiency of the design have been maximised, consideration is then given to the second principle whereby priority is given to the efficient use of energy. This is on the basis that low carbon technologies can be cost-effective and provide significant carbon savings when compared to conventional technologies.

6.5 The third principle of the hierarchy promotes the use of renewable technologies. Whilst these technologies can be relatively expensive to install, they do offer the potential to significantly reduce carbon emissions.

6.6 Following the application of renewable technologies, the final tier of the Hierarchy requires monitoring, verification and reporting on energy performance.

Demand Reduction

6.7 In line with the first principle of the Hierarchy, the design has explored measures to reduce demand as follows:

- It is intended to optimise the extent of glazing to improve access to natural daylight whilst preserving heating within the properties.
- It is anticipated that the building will have the potential to be ventilated naturally via openable windows and / or trickle vents. This has the advantage of lower energy consumption; decreased costs associated with capital expenditure, operation and maintenance. Mechanical ventilation heat recovery will also be included where necessary (likely in the office areas) to ensure that energy is used efficiently in cooler months, and when it is less desirable to open windows.

- It is intended that the performance of the building fabric will incorporate relatively low U-Values to reduce the rate at which the building loses heat, preserving the heat within the space and reducing the requirement for mechanical heating. The U-values for the basic building elements shall be enhanced compared to minimum Building Regulations standards (updated 2021); indicative upper limits are given below:

Table 6.1 Baseline Building Fabric U-Values (Part L 2021 – Domestic)

Fabric Element	Part L 1 (W/m ² K)	Proposed (W/m ² K)
External Wall	0.26	0.18
Roof	0.16	0.12
Ground Floor	0.18	0.12
Windows	1.6	1.4

- An improved level of air tightness is proposed with 3m³/h/m² targeted, meaning that air infiltration between the internal and the external environment will be largely controlled and space heating demand further reduced.
- Lighting design is intended to be highly efficient and in excess of Building Standards requirements and considerate of appropriate CIBSE guidance. Light fittings should be predominately LED.
- Thermal bridging is the penetration of the insulation layer by a highly conductive non-insulating material allowing rapid heat transfer from an interior to exterior environment (and vice versa). In well insulated buildings, as much as 30% of heat loss can occur through thermal bridges. The building fabric shall be constructed so that there are no reasonably avoidable thermal bridges in the insulation layers caused by gaps within the various elements. A “Y” value of 0.04 has been assumed for the purposes of the indicative SAPs and it is expected that Accredited Construction Details (ACDs) will be applied.
- Time and temperature controls by suitable arrangement will be installed within each dwelling, in order to maximise the efficiency of the heating system.
- The external lighting strategy shall be designed to minimise light spillage and night time light pollution in line with the ILP’s Guidance notes for the reduction of obtrusive light; low illuminance levels, fittings and controls shall be employed accordingly.
- Good internal air quality will be achieved through the creation of a building envelope with a low air permeability; meaning that the building fabric will reduce the infiltration of pollution from the external environment.

Energy Supply & Low Carbon / Renewable Technology Options Appraisal

- 6.8 The Amendment Regulations and accompanying Approved Documents L: Volumes 1 and 2 have recently been published by the Ministry of Housing, Communities & Local Government. These contain revised carbon conversion factors to address the carbon intensity projections from the National Grid, with consideration given to the rapidly reducing emission rates associated with electricity in the context of the energy strategy. The newly adopted factors (SAP10.2) are presented below in relation to the previous SAP2012 and SAP10 factors, demonstrating the continued trend of electricity decarbonisation.

Table 6.2 Carbon Factors SAP2012, SAP10 and SAP10.2

	SAP2012	SAP10	SAP10.2
Gas	0.216kgCO ₂ /kWh	0.210kgCO ₂ /kWh	0.210kgCO ₂ /kWh
Electricity	0.519kgCO ₂ /kWh	0.233kgCO ₂ /kWh	0.136kgCO ₂ /kWh

- 6.9 The choice of heating systems is therefore mindful of the need for flexibility in consideration of the decarbonisation of the national grid.
- 6.10 Renewable and low carbon technology options have therefore been considered in the context of the decarbonisation of the Grid as follows:
- Combined Heat & Power (CHP) – Whilst the development would have heat demand, which could be satisfied using CHP, this technology has historically been considered “low carbon” on the basis of the offsetting of Grid electricity and associated carbon. With a significantly reduced quantum of offset carbon anticipated going forward, the technology will likely prove more carbon intensive than a conventional gas-fired boiler on the basis that (a) carbon savings will be negligible or non-existent; and (b) the overall efficiency of CHP is generally lower than conventional boilers. The technology is therefore not proposed.
 - Air Source Heat Pump (ASHP) – This technology is technically feasible for both space and hot water heating. ASHPs are therefore proposed to limit carbon emissions associated with the residential development in operation, as well as for space heating in the commercial areas.
 - Biomass – This technology is rejected on the basis that the use of biomass would require regular deliveries and combustion of the material would likely impact local air quality; furthermore, carbon associated with the processing and transport of material is ignored within the carbon calculation, meaning that actual emissions are much higher.

- Ground Source Heat Pump (GSHP) – The technology is presently rejected on the basis that there are uncertainties concerning the thermal properties of the ground and testing and installation costs are likely to be excessive for a project of this scale.
- Photovoltaics (PV) – An extent of roof area is available, which could be used for solar collectors. Thus, there is a potential for an extent of PV to be installed in the roof area which should be maximised in the context of the available roof space and other demands on the roof area (e.g., green roof).
- Solar Thermal – whilst technically feasible in a limited capacity, the technology is not preferred on the basis that distributing the gained heat on a development of this scale and nature is costly and inefficient.
- Wind Turbines – this technology is rejected on the basis of the urban location and relatively low wind speeds.

Carbon Savings

- 6.11 Energy modelling has been undertaken using SBEM software and the carbon savings delivered by each of the three steps of the Energy Hierarchy have been estimated (indicative output is included in the appendices).

Table 6.3 CO₂ Emissions after Each Stage of the Energy Hierarchy (SAP10.2) (Non-domestic)

Step	Carbon Dioxide Emissions (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline	5.4	6.2
After energy demand reduction	4.9	6.2
After CHP	4.9	6.2
After renewable energy	1.3	6.2

Table 6.4 Regulated CO₂ Savings from Each Stage of the Energy Hierarchy (Non-domestic)

	Regulated Carbon Dioxide Savings	
	(Tonnes CO ₂ per annum)	%
Savings from energy demand reduction	0.5	10%
Savings from CHP	0.0	0%

Savings from renewable energy	3.6	66%
Total Cumulative Savings	4.1	76%

- 6.12 The updated Part L 2021 SAP 10.2 software remains under development at the time of writing, and thus the modelling uses SAP10 carbon factors. Sample SAP outputs have also been included in the appendices. As the new SAP 10.2 carbon factors account for further decarbonisation of the National Grid, and since the new systems are all electric, it is anticipated that the building will perform better under Part L 2021 and effectively become net-zero overtime.

Table 6.5 CO₂ Emissions after Each Stage of the Energy Hierarchy (SAP10) (Domestic)

Step	Carbon Dioxide Emissions (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline	13.7	6.8
After energy demand reduction	12.1	6.8
After CHP	12.1	6.8
After renewable energy	7.2	6.8

Table 6.6 Regulated CO₂ Savings from Each Stage of the Energy Hierarchy (Domestic)

	Regulated Carbon Dioxide Savings	
	(Tonnes CO ₂ per annum)	%
Savings from energy demand reduction	1.6	12%
Savings from CHP	0.0	0%
Savings from renewable energy	4.9	36%
Total Cumulative Savings	6.5	48%

- 6.13 The energy strategy is therefore reliant on highly efficient building fabric and ASHPs for hot water and space heating in the residential, and on space heating only in the commercial. Example SAP assessments and indicative SBEM appended illustrating savings in excess of 45% relative to the baseline model. Copies of the GLA Carbon Emission Reporting Spreadsheet (SAP10 for domestic and SAP10.2 for non-domestic) are also appended to this report outlining the savings at each stage of the Energy Hierarchy.

- 6.14 Overall, the proposed energy strategy is considered consistent with the National Planning Policy Framework and London Plan. The policies of the Council encourage a reduction in predicted carbon dioxide emissions of 20% from on site renewable energy generation. The provision of renewable technologies has been maximised in the proposals, with technologies such as PV and ASHPs proposed. Based on the current energy strategy, carbon savings from renewable technologies are expected to exceed this 20%, relative to the baseline.

Overheating Mitigation

- 6.15 The issue of overheating will need detailed and considered assessment at a later stage of design on the basis that, as buildings become progressively better sealed and insulated, the potential for overheating increases. The following is, nevertheless, relevant and should be considered in conjunction and interrelationship with the ventilation strategy, to ensure thermal comfort for occupants and energy savings:

- Solar control glazing shall be installed to the elevations most affected; the precise specification of glazing types for windows is to be based upon further analysis at later stages so that the appropriate balance is found between limiting summer heat gains without compromising daylight harvesting and winter solar gains.
- Thermal mass and internal occupant-controlled shading elements will be considered at the more detailed design stage along with heat reflective finishes of the external building surfaces.

- 6.16 Heat losses from the Hot Water and Low Temperature Hot Water (LTHW) distribution network are considered to be a significant source of potential overheating in well insulated buildings. This issue can be a significant factor affecting comfort and will therefore need full consideration during the detailed design of the mechanical systems. Attention will be given to:

- The positioning of the distribution network and its potential impact on surrounding spaces;
- The (mechanical) ventilation of spaces where heating pipework is distributed (e.g. corridors);
- The implementation of combined passive/active ventilation systems for air exhaust of spaces into corridors and to the outside;
- Maximising the natural ventilation potential of spaces;
- The performance of the insulation, with calculations undertaken assessing heat losses from the pipework relative to the heat losses from the spaces.

Sustainability Standards

BREEAM

- 6.17 The commercial shall be assessed and certified under the BREEAM methodology with a targeted rating of “Very Good”, and aspiration for BREEAM “Excellent”. A Pre-Assessment has been appended to this report, highlighting the targeted credits.

Materials & Waste

- 6.18 The materials strategy for the development shall consider lifecycle environmental impacts, durability, responsible sourcing and pre-fabrication potential, with a view to optimising materials utilisation and safeguarding natural resources.
- Consideration shall be given to embodied carbon as part of the materials selection process, in addition to other factors such as structural properties, aesthetics and cost. As a minimum reference shall be made to the BRE’s Green Guide to Specification for the major elements (walls, floors, roof) where applicable, with a view to targeting products with a predominantly ‘A’ or ‘A+’ rating.
 - All timber and timber-based products should be sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of forestry Certification (PEFC) source.
 - A preference will also be given to products and suppliers which can demonstrate operation within the structure of a formal Environmental Management System (e.g., BS EN ISO 14001, EMAS, BES 6001) on the basis that environmental risks and impacts should be better controlled.
 - Consideration has been given to the embodied carbon emissions of the buildings as part of the BREEAM assessment. This assessment has been undertaken using OneClick LCA (a WLC software tool) exploring a number of potential fabric options to facilitate a more informed review of options at a later date.
 - Durability will form part of the design with features incorporated to ensure robustness and reduced risk of damage. This is to ensure longevity and reduced need for maintenance.
 - Circular economy principles will be applied with consideration given to how the proposal’s design and construction will reduce material demands and enable building materials, components and products to be disassembled and re-used at the end of their useful life.
 - The developer will also endeavour to avoid the use of materials with a high VOC (volatile organic compound) content; therefore ensuring an improved air quality for the completed development.

- The operational waste strategy comprises provision of dedicated space of adequate size and in convenient locations for storage of general refuse, recyclables and food waste. Internal and external storage will be considerate of the Building Regulations and Council requirements.

Water

Water Conservation

- 6.19 Water saving fittings and appliances shall be installed and the following outlines the proposed maximum flow / consumption rates for each of the proposed installation types:
- Dual flush toilets of 6/3 litres;
 - Bath capacity to overflow to be ~100 litres;
 - Shower flow rates to be ~7.75 litres / minute;
 - Taps to have a flow rate <5litres / minute;
 - Washing machine to be <9.5litres / kg;
 - Dishwasher to be <1.25 litres / place setting
- 6.20 Overall water consumption levels to be <105 litres / person / day.

Drainage

- 6.21 The existing site is almost entirely impermeable ground and therefore the volume of water run-off over the building's lifecycle will be no greater than it would have been prior to the redevelopment.
- 6.22 Drainage systems and wastewater discharge shall be designed in line with best practice guidance, to eliminate any pollution risks for watercourses and underground water. Further information can be found in the accompanying Drainage Strategy.

Transport

- 6.23 Secure cycle storage will be provided to encourage building users to cycle so promoting exercise and helping reduce congestion and emissions.
- 6.24 The design team will work closely with the Council, local operators and community facilities to promote or enhance access to local public transport. This will be maximised via the framework travel plan.

7. Sustainable Construction Proposals

- 7.1 It is recognised that the construction industry has the potential to cause significant environmental impacts through resource use, waste generation and pollution. It is therefore proposed to manage the construction phase in a sustainable manner to ensure that these impacts are reduced.

Responsible Construction Practices

Impacts on Neighbours, Pedestrians, Road Users and Workforce

- 7.2 The scheme will be registered with the Considerate Constructors Scheme to ensure that the contractor carries out the construction operations in a safe and considerate manner, with due regard to local residents, road users, the workforce and the environment. A target of achieving a score of at least 35 and with a minimum score of 11 points in each of the three sections shall be set. This represents a high level of performance and a commitment to responsibly manage construction activities.

Environmental Management

- 7.3 It is expected that the principal contractor for the project shall also operate a third party certified Environmental Management System (EMS), demonstrating sound management and systematic control of environmental impacts.

Materials Optimisation and Waste

- 7.4 Suitable waste and recycling facilities will be provided within the Development to collect and segregate wastes generated through the operation of the Site. These will be in convenient locations and for storage of general refuse, recyclables and food waste. Internal and external storage will be considerate of the relevant Building Regulations, British Standards and Council requirements.
- 7.5 A Site Waste Management Plan (SWMP) will be undertaken, and the scheme will endeavour to divert more than 95% by tonnage of demolition and construction waste from landfill as per minimum. The SWMP will detail the design measures towards optimum use of materials, set the specific targets for construction and demolition waste generation and appropriate mechanisms/protocols for segregating waste on-site and monitoring overall waste management.

Pollution Prevention

Pollution Prevention Guidelines

- 7.6 The Environment Agency's (EA) Pollution Prevention Guidelines (PPG) shall be followed as appropriate to minimise pollution risks from construction activities; works will also be in line with

the Environment Agency's Building a better environment, A guide for developers (2006) guidance.

Air Pollution

7.7 Best practice methods for minimising the formation of dust and emissions from construction activities shall be implemented, as appropriate to the specific site and proposed activities. Control measures may include:

- Appropriate site layout;
- Solid screens/barriers or other physical boundaries around dust/emission generating activities;
- Good site maintenance and regular inspections for liquid spillages; and
- Sealed storage for cement, sand and fine aggregates.

7.8 In addition to the above, the contractor shall comply with the BRE Code of Practice to control dust from construction and demolition activities.

Water Pollution

7.9 Appropriate measures shall be implemented to minimise risks of watercourse and underground water pollution, in line with EA's PPG 5 Works in, near or liable to affect watercourses and the Guide for developers Building a better environment, as stated above. Specific measures shall be outlined in the contractor's CEMP.

8. Summary

8.1 This Sustainability & Energy Statement provides an overview as to how the proposed scheme contributes to sustainable development in the context of the strategic, design and construction considerations.

8.2 Sustainability is a broad concept and covers a range of environmental, social and economic considerations. A review of the Haringey's Council's planning policies has identified a number of requirements relating to sustainable development, including Local Plan Policy SP4 (*Working Towards a Low Carbon Haringey*).

8.3 The proposed development will provide new self-contained residential dwellings above commercial space.

Strategic Sustainability

8.4 Both nationally and regionally there is a shortfall in housing, which is leading to property prices rising significantly faster than earnings, with implications for affordability and ownership. Local data suggests that these demand pressures are set to continue with ONS data for populations in Haringey predicting continued growth over the forthcoming decades.

8.5 The lack of access to housing is often most acutely felt by for those people who are not yet on the housing ladder and who have not benefited in the increase in property asset values. Typically, these people will be the younger and those with lower incomes; the consequence being that the supply and demand imbalance is contributing towards intergenerational inequality by compromising the ability of current and future generations in meeting their own housing needs. This is inconsistent with the principles of "sustainable development" as defined by Brundtland; and if not addressed, will have longer term societal and economic implications.

8.6 At a local level, the Indices of Multiple Deprivation highlights a higher-than-average level of deprivation in relation to barriers to housing and services. Output Area Classification data indicates a higher-than-average level of overcrowding.

8.7 A need is therefore considered to exist on the basis that the nature of the proposed development will help relieve anticipated future demand pressures on housing and assist with the rebalancing of the socio-economic factors.

8.8 At a strategic level, the development of commercial uses will help maintain employment for local people, improve the local economy, increase the wealth and lifestyle of employed individuals and contribute to local business rates. The development is considered to be beneficial to the local community and aligned with socio-economic requirements.

Sustainable Design and Construction

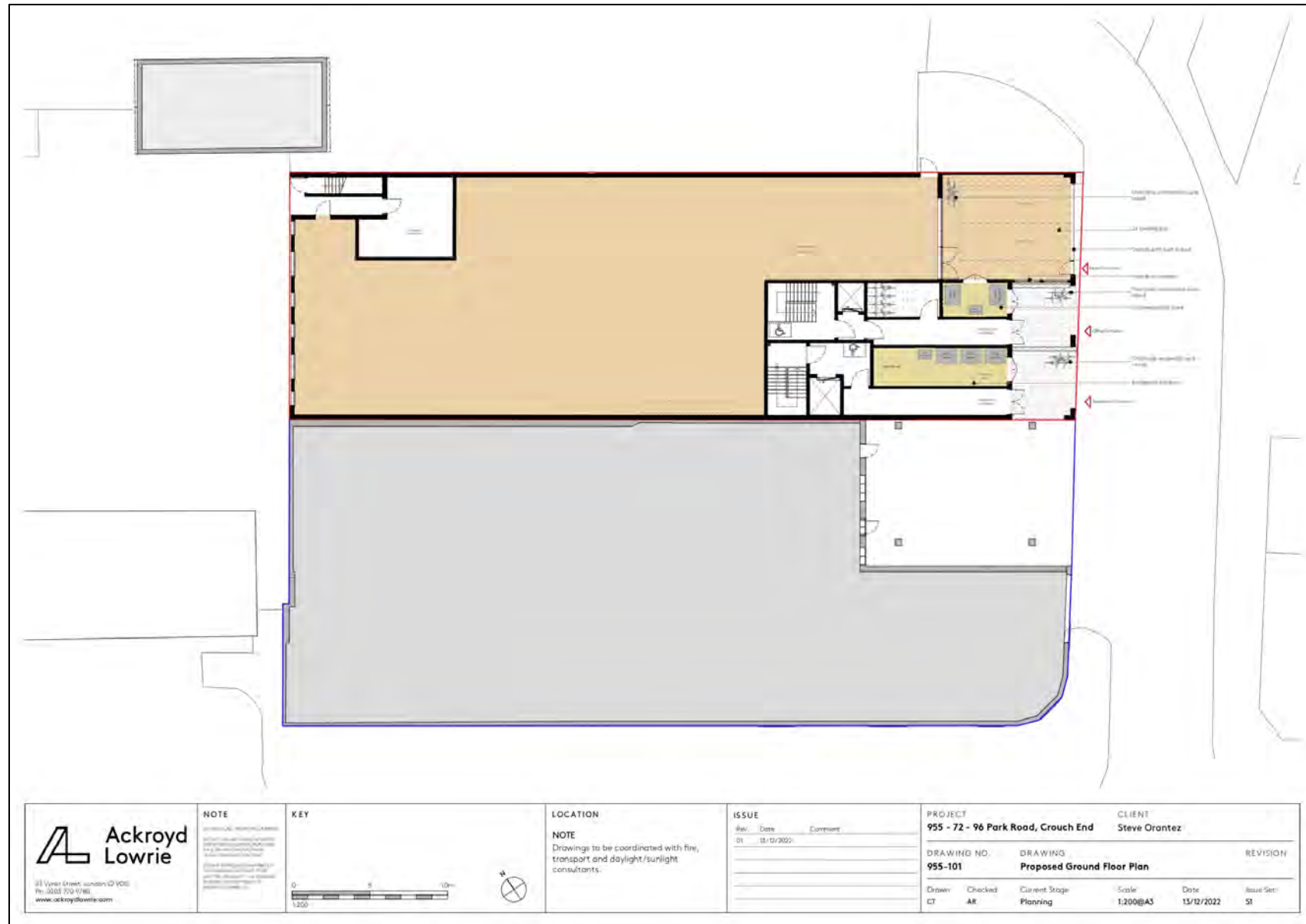
8.9 A range of sustainable design and construction features are proposed including:

- Highly thermally efficient building fabric.
- Highly efficient lighting.
- Air Source Heat Pumps for the residential hot water and space heating, as well as for space heating in the commercial.
- Site wide carbon reductions >35% are estimated.
- Water saving sanitary fittings and appliances to deliver a water efficient development (<105litre / person / day).
- The use of materials with a low lifecycle environmental impact and embodied carbon.
- Consideration of the principles of Secured by Design.
- Efficient construction and operational waste management.
- A BREEAM “Very Good” rating will be targeted as a minimum for the commercial spaces, with aspiration for BREEAM “Excellent”.

8.10 Overall, the proposals for the scheme are in line with the overarching principles of sustainable development as well as the policy requirements of the planning authority.

Appendices

A. Site Plans



B. Key Local Planning Policy Requirements

London Plan (2021)

Policy D2 Infrastructure requirements for sustainable densities

- A) The density of development proposals should:
- 1) consider, and be linked to, the provision of future planned levels of infrastructure rather than existing levels
 - 2) be proportionate to the site's connectivity and accessibility by walking, cycling, and public transport to jobs and services (including both PTAL and access to local services).
- B) Where there is currently insufficient capacity of existing infrastructure to support proposed densities (including the impact of cumulative development), boroughs should work with applicants and infrastructure providers to ensure that sufficient capacity will exist at the appropriate time. This may mean that if the development is contingent on the provision of new infrastructure, including public transport services, it will be appropriate that the development is phased accordingly.
- C) When a proposed development is acceptable in terms of use, scale, and massing, given the surrounding built form, uses and character, but it exceeds the capacity identified in a site allocation or the site is not allocated, and the borough considers the planned infrastructure capacity will be exceeded, additional infrastructure proportionate to the development should be delivered through the development. This will be identified through an infrastructure assessment during the planning application process, which will have regard to the local infrastructure delivery plan or programme, and the CIL contribution that the development will make. Where additional required infrastructure cannot be delivered, the scale of the development should be reconsidered to reflect the capacity of current or future planned supporting infrastructure.

Policy D3 Optimising site capacity through the design-led approach

The design-led approach

- A) All development must make the best use of land by following a design-led approach that optimises the capacity of sites, including site allocations. Optimising site capacity means ensuring that development is of the most appropriate form and land use for the site. The design-led approach requires consideration of design options to determine the most appropriate form of development that responds to a site's context and capacity for growth, and existing and planned supporting infrastructure capacity (as set out in Policy D2 Infrastructure requirements for sustainable densities), and that best delivers the requirements set out in Part D.
- B) Higher density developments should generally be promoted in locations that are well connected to jobs, services, infrastructure, and amenities by public transport, walking and cycling, in accordance with Policy D2 Infrastructure requirements for sustainable densities. Where these locations have existing areas of high-density buildings, expansion of the areas should be positively considered by Boroughs where appropriate. This could also include expanding Opportunity Area boundaries where appropriate.
- C) In other areas, incremental densification should be actively encouraged by Boroughs to achieve a change in densities in the most appropriate way. This should be interpreted in the context of Policy H2.
- D) Development proposals should:

Form and layout

- 1) enhance local context by delivering buildings and spaces that positively respond to local distinctiveness through their layout, orientation, scale, appearance, and shape, with due regard to existing and emerging street hierarchy, building types, forms and proportions
- 2) encourage and facilitate active travel with convenient and inclusive pedestrian and cycling routes, crossing points, cycle parking, and legible entrances to buildings, that are aligned with peoples' movement patterns and desire lines in the area
- 3) be street-based with clearly defined public and private environments
- 4) facilitate efficient servicing and maintenance of buildings and the public realm, as well as deliveries, that minimise negative impacts on the environment, public realm, and vulnerable road users

Experience

- 5) achieve safe, secure, and inclusive environments
- 6) provide active frontages and positive reciprocal relationships between what happens inside the buildings and outside in the public realm to generate liveliness and interest
- 7) deliver appropriate outlook, privacy, and amenity
- 8) provide conveniently located green and open spaces for social interaction, play, relaxation, and physical activity
- 9) help prevent or mitigate the impacts of noise and poor air quality
- 10) achieve indoor and outdoor environments that are comfortable and inviting for people to use

Quality and Character

- 11) respond to the existing character of a place by identifying the special and valued features and characteristics that are unique to the locality and respect, enhance and utilise the heritage assets and architectural features that contribute towards the local character
 - 12) be of high quality, with architecture that pays attention to detail, and gives thorough consideration to the practicality of use, flexibility, safety and building lifespan through appropriate construction methods and the use of attractive, robust materials which weather and mature well
 - 13) aim for high sustainability standards (with reference to the policies within London Plan Chapters 8 and 9) and take into account the principles of the circular economy
 - 14) provide spaces and buildings that maximise opportunities for urban greening to create attractive resilient places that can also help the management of surface water.
- E) Where development parameters for allocated sites have been set out in a Development Plan, development proposals that do not accord with the site capacity in a site allocation can be refused for this reason.

Policy S1 Developing London's social infrastructure

- A) When preparing Development Plans, boroughs should ensure the social infrastructure needs of London's diverse communities are met, informed by a needs assessment of social infrastructure. Assessments should consider the need for cross-borough collaboration where appropriate and involve relevant stakeholders, including the local community.
- B) In areas of major new development and regeneration, social infrastructure needs should be addressed via area-based planning such as Opportunity Area Planning Frameworks, Area Action Plans, Development Infrastructure Funding Studies, Neighbourhood Plans or master plans.
- C) Development proposals that provide high quality, inclusive social infrastructure that addresses a local or strategic need and supports service delivery strategies should be supported.
- D) Development proposals that seek to make best use of land, including the public-sector estate, should be encouraged and supported. This includes the co-location of different forms of social infrastructure and the rationalisation or sharing of facilities.
- E) New facilities should be easily accessible by public transport, cycling and walking and should be encouraged in high streets and town centres.
- F) Development proposals that would result in a loss of social infrastructure in an area of defined need as identified in the borough's social infrastructure needs assessment required under Part A should only be permitted where:
 - 1) there are realistic proposals for re-provision that continue to serve the needs of the neighbourhood and wider community, or;
 - 2) the loss is part of a wider public service transformation plan which requires investment in modern, fit for purpose infrastructure and facilities to meet future population needs or to sustain and improve services.
- G) Redundant social infrastructure should be considered for full or partial use as other forms of social infrastructure before alternative developments are considered, unless this loss is part of a wider public service transformation plan (see Part F2).

Policy G1 Green Infrastructure [extract]

[...]

- D) Development proposals should incorporate appropriate elements of green infrastructure that are integrated into London's wider green infrastructure network.

Policy G4 Open Space [...]

[...]

- B) Development proposals should:
 - 1) not result in the loss of protected open space
 - 2) where possible create areas of publicly accessible open space, particularly in areas of deficiency.

Policy G5 Urban Greening

- A) Major development proposals should contribute to the greening of London by including urban greening as a fundamental element of site and building design, and by incorporating measures such as high-quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage.
- B) Boroughs should develop an Urban Greening Factor (UGF) to identify the appropriate amount of urban greening required in new developments. The UGF should be based on the factors set out in Table 8.2, but tailored to local circumstances. In the interim, the Mayor recommends a target score of 0.4 for developments that are predominately residential, and a target score of 0.3 for predominately commercial development (excluding B2 and B8 uses).
- C) Existing green cover retained on site should count towards developments meeting the interim target scores set out in (B) based on the factors set out in Table 8.2.

Policy G6 Biodiversity and access to nature [extract]

[...]

- D) Development proposals should manage impacts on biodiversity and aim to secure net biodiversity gain. This should be informed by the best available ecological information and addressed from the start of the development process.
- E) Proposals which reduce deficiencies in access to nature should be considered positively.

Policy SI1 Improving air quality [extract]

[...]

- B) To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:
 - 1) Development proposals should not:
 - a) lead to further deterioration of existing poor air quality [...]

Policy SI 2 Minimising greenhouse gas emissions

- A) Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:
 - 1) be lean: use less energy and manage demand during operation

- 2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly
 - 3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
 - 4) be seen: monitor, verify and report on energy performance.
- B) Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.
- C) A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:
- 1) through a cash in lieu contribution to the borough's carbon offset fund, or
 - 2) off-site provided that an alternative proposal is identified and delivery is certain.
- D) Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.
- E) Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.
- F) Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Policy SI3 Energy infrastructure

- A) Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.
- B) Energy masterplans should be developed for large-scale development locations (such as those outlined in Part A and other opportunities) which establish the most effective energy supply options. Energy masterplans should identify:
- 1) major heat loads (including anchor heat loads, with particular reference to sites such as universities, hospitals and social housing)
 - 2) heat loads from existing buildings that can be connected to future phases of a heat network
 - 3) major heat supply plant including opportunities to utilise heat from energy from waste plants
 - 4) secondary heat sources, including both environmental and waste heat
 - 5) opportunities for low and ambient temperature heat networks
 - 6) possible land for energy centres and/or energy storage
 - 7) possible heating and cooling network routes
 - 8) opportunities for futureproofing utility infrastructure networks to minimise the impact from road works
 - 9) infrastructure and land requirements for electricity and gas supplies
 - 10) implementation options for delivering feasible projects, considering issues of procurement, funding and risk, and the role of the public sector
 - 11) opportunities to maximise renewable electricity generation and incorporate demand-side response measures.
- C) Development Plans should:
- 1) identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure
 - 2) identify existing heating and cooling networks, identify proposed locations for future heating and cooling networks and identify opportunities for expanding and inter-connecting existing networks as well as establishing new networks.

- D) Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system:
- 1) the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
 - a) connect to local existing or planned heat networks
 - b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
 - c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
 - d) use ultra-low NOx gas boilers
 - 2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality
 - 3) where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.
- E) Heat networks should achieve good practice design and specification standards for primary, secondary and tertiary systems comparable to those set out in the CIBSE/ADE Code of Practice CP1 or equivalent.

Policy SI 4 Managing heat risk

- A) Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.
- B) Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:
- 1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
 - 2) minimise internal heat generation through energy efficient design
 - 3) manage the heat within the building through exposed internal thermal mass and high ceilings
 - 4) provide passive ventilation
 - 5) provide mechanical ventilation
 - 6) provide active cooling systems.

Policy SI 5 Water infrastructure [extract]

[...]

- C) Development proposals should:
- 1) through the use of Planning Conditions minimise the use of mains water in line with the Optional Requirement of the Building Regulations (residential development), achieving mains water consumption of 105 litres or less per head per day (excluding allowance of up to five litres for external water consumption)
 - 2) achieve at least the BREEAM excellent standard for the 'Wat 01' water category or equivalent (commercial development)
 - 3) incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future-proofing.

Policy SI 7 Reducing waste and supporting the circular economy

- A) Resource conservation, waste reduction, increases in material reuse and recycling, and reductions in waste going for disposal will be achieved by the Mayor, waste planning authorities and industry working in collaboration to:
- 1) promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible
 - 2) encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products
 - 3) ensure that there is zero biodegradable or recyclable waste to landfill by 2026
 - 4) meet or exceed the municipal waste recycling target of 65 per cent by 2030
 - 5) meet or exceed the targets for each of the following waste and material streams:
 - a) construction and demolition – 95 per cent reuse/recycling/recovery
 - b) excavation – 95 per cent beneficial use
 - 6) design developments with adequate, flexible, and easily accessible storage space and collection systems that support, as a minimum, the separate collection of dry recyclables (at least card, paper, mixed plastics, metals, glass) and food.
- B) Referable applications should promote circular economy outcomes and aim to be net zero-waste. A Circular Economy Statement should be submitted, to demonstrate:
- 1) how all materials arising from demolition and remediation works will be re-used and/or recycled
 - 2) how the proposal's design and construction will reduce material demands and enable building materials, components and products to be disassembled and re-used at the end of their useful life
 - 3) opportunities for managing as much waste as possible on site
 - 4) adequate and easily accessible storage space and collection systems to support recycling and re-use
 - 5) how much waste the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy
 - 6) how performance will be monitored and reported.
- C) Development Plans that apply circular economy principles and set local lower thresholds for the application of Circular Economy Statements for development proposals are supported.

Policy SI 12 Flood risk management [extract]

[...]

- C) Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses. [...]

Policy SI 13 Sustainable drainage [extract]

[...]

- B) Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:
- 1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
 - 2) rainwater infiltration to ground at or close to source
 - 3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
 - 4) rainwater discharge direct to a watercourse (unless not appropriate)

- 5) controlled rainwater discharge to a surface water sewer or drain
- 6) controlled rainwater discharge to a combined sewer.

Haringey's Local Plan (2013, updated 2017)

Policy SP0 Presumption in Favour of Sustainable Development

When considering development proposals the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework (NPPF). The Council will always work proactively with applicants to find solutions, which mean that proposals can be approved wherever possible and to secure development that improves the economic social and environmental conditions in Haringey. Planning applications that accord with the policies in Haringey's Local Plan (and, where relevant, with policies in neighbourhood plans) will be approved without delay, unless material considerations indicate otherwise.

Where there are no policies relevant to the application or relevant policies are out of date at the time of making the decision, then the Council will grant permission unless material considerations indicate otherwise taking into account whether:

- Any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies of the NPPF taken as a whole; or
- Specific policies in the NPPF indicate that development should be restricted.

Policy SP2 Housing [extract]

The Council will aim to provide homes to meet Haringey's housing needs and to make the full use of Haringey's capacity for housing by maximising the supply of additional housing to meet and exceed the minimum target of 19,802 homes from 2011-2026 (820 units per annum from 2011-2014 and 1,502 units per annum).

Density and design standards to deliver quality homes

Excellence in design quality and sustainability will be required for all new homes. [...]

Policy SP4 Working Towards a Low Carbon Haringey

Over the life time of the Local Plan, reducing energy use in buildings and working towards a low carbon borough will be one of the key challenges facing Haringey. The Council will promote the measures outlined below to reduce carbon emissions from new and existing buildings.

1. In line with London Plan policy, the Council will promote and require all new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation, by incorporating the following measures:
 - a. From 2011 onwards, all new residential development will achieve a minimum 25% reduction in total (regulated) CO2 emissions in line with Code for Sustainable Homes Level 4 energy standards, and should aim to achieve Level 6. All new residential development shall be zero carbon from 2016 onwards; and
 - b. From 2011 onwards all new non-residential development shall be built to at least BREEAM "very good" standard and should aim to achieve BREEAM "excellent" or the current nationally agreed standard. All new non-residential development shall be zero carbon from 2019.
2. The Council will promote low- and zero-carbon energy generation through the following measures:
 - a. Requiring all developments to assess, identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network;
 - b. Establishing local networks of decentralised heat and energy facilities by requiring developers to prioritise connection to existing or planned networks where feasible;
 - c. Working with neighbouring boroughs and other partners to explore ways of implementing sub-regional decentralised energy networks including the potential in the Upper Lee Valley Opportunity Area; and
 - d. All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

Policy SP5 Water Management and Flooding

The Council will require all development in Haringey to be water efficient during construction and operation and to reduce all forms of flood risk. All development shall:

- Improve the water environment, water quality and drainage systems;
- Minimise water use and illustrate how development would contribute to general and flash flooding;
- Take account of flood risk vulnerability classification as set out in paragraph 100 of the NPPF and will apply the NPPF Sequential Test and Exception Test;
- Implement measures to prevent (or mitigate as last resort) local surface water and downstream flooding;
- Implement Sustainable Drainage Systems from strategic to individual site level to improve water attenuation, quality and amenity;
- Restore and enhance the Blue Ribbon Network including Pymmes Brook, Moselle Brook, the River Lee and its tributaries, deculverting wherever feasible, to improve water quality and amenity of these waterways and to help reduce flood risk (in line with London River Action Plan); and Require higher resilience and levels of flood protection for critical infrastructure to ensure the protection of essential services such as water and power.

In order to facilitate this, the Council:

- Has carried out a joint SFRA (Strategic Flood Risk Assessment) Stage 1 for the whole borough;
- Has carried out a Sequential Test for the Areas of Development (Growth Areas and Areas of Change);
- Is carrying out, in association with other north London boroughs in the Drain London sub-region, a Surface Water Management Plan to identify issues with drainage networks and the effects of new development.

Policy SP6 Waste and Recycling

The Council supports the objectives of sustainable waste management set out by the Government in PPS10 Planning for Sustainable Waste Management and the Mayor's London Plan. To achieve these, the Council shall:

- Safeguard existing waste sites unless compensatory provision is made;
- Maximise self-sufficiency in waste management capacity;
- Seek to minimise waste creation, increase recycling rates in relation to commercial, industrial and municipal waste in order to achieve the Mayor's recycling targets;
- Address waste as a resource and look to disposal as the last option, in line with the Mayor's waste hierarchy;
- Require integrated, well-designed recycling facilities to be incorporated into all new developments;
- Monitor changes in the stock of waste management facilities, waste arisings, and the amount of waste recycled, recovered and going for disposal; and
- Continue working with its partners in the North London Waste Authority to adopt the North London Waste Plan (NLWP) which has identified locations suitable for waste management facilities to meet the London Plan apportionment of 1.9 2.1m tonnes and the Haringey apportionment of 237,000 182,000 tonnes.

Haringey will require Site Waste Management Plans for all major applications to identify volume and types of demolition and construction waste and to demonstrate how waste will be minimised and managed during construction and occupation.

New waste management facilities will be required to take into account and minimise pollution and nuisance issues. This is addressed in more detail in the Development Management Policies document.

Haringey's Development Management DPD (June 2017)

Policy DM1: Delivering High Quality Design

Haringey Development Charter

- A. All new development and changes of use must achieve a high standard of design and contribute to the distinctive character and amenity of the local area. The Council will support design-led development proposals which meet the following criteria:
- a. Relate positively to neighbouring structures, new or old, to create a harmonious whole;
 - b. Make a positive contribution to a place, improving the character and quality of an area;
 - c. Confidently address feedback from local consultation;
 - d. Demonstrate how the quality of the development will be secured when it is built; and
 - e. Are inclusive and incorporate sustainable design and construction principles.

Design Standards

Character of development

- B. Development proposals should relate positively to their locality, having regard to:
- a. Building heights;
 - b. Form, scale & massing prevailing around the site;
 - c. Urban grain, and the framework of routes and spaces connecting locally and more widely;
 - d. Maintaining a sense of enclosure and, where appropriate, following existing building lines;
 - e. Rhythm of any neighbouring or local regular plot and building widths;
 - f. Active, lively frontages to the public realm; and
 - g. Distinctive local architectural styles, detailing and materials.

Landscaping

Character of development

- C. Development proposals shall demonstrate how the landscaping and planting are integrated into the development as a whole. The Council will expect development proposals to respond to:
- a. Landform;
 - b. Levels, slopes and the fall of the ground;
 - c. Trees on and close to the site;
 - d. Landscaped boundary and treatments; and
 - e. Any other significant biodiversity (including prioritising native over invasive species) on or close to the site.

Privacy and Amenity

- D. Development proposals must ensure a high standard of privacy and amenity for the development's users and neighbours. The Council will support proposals that:
- a. Provide appropriate sunlight, daylight and open aspects (including private amenity space where required) to all parts of the development and adjacent buildings and land;
 - b. Provide an appropriate amount of privacy to their residents and neighbouring properties to avoid overlooking and loss of privacy detrimental to the amenity of neighbouring residents and the residents of the development; and

- c. Address issues of vibration, noise, fumes, odour, light pollution and microclimatic conditions likely to arise from the use and activities of the development.

Policy DM4 Provision and Design of Waste Management Facilities

- A. All proposals should consider how to sustainably manage waste arising from the development during the design, construction and occupation phases of new developments.
- B. All proposals will be required to make on-site provision for general waste, the separation of recyclable materials and organic material for composting. The on-site provision must:
 - a. Ensure adequate dedicated internal and external storage space to manage the volume of waste arising from the site;
 - b. Provide accessible and safe access to onsite storage facilities, both for occupiers and collection operatives, including vehicles, having regard to the Council's Refuse Collection Strategy;
 - c. Be located and screened to avoid nuisance and adverse impact on visual and other amenity to occupiers and neighbouring uses, and are within the maximum permitted carrying and reversing distances; and
 - d. For mixed-use development, suitably separate household and commercial waste.
- C. In addition, proposals for new multi-storey flatted residential development will be required to make provision for:
 - a. Adequate temporary storage space within each flat, allowing for separate storage of recyclable materials;
 - b. Adequate communal storage for waste, including separate storage for recyclables, pending its collection; and
 - c. Storage and collection systems at each floor (such as dedicated rooms, storage areas and chutes or underground waste collection systems) which are sensitively integrated into the development, with the Council giving preference to basement servicing over the use of forecourts or ground floor internal storage.

Policy DM21: Sustainable Design, Layout and Construction

- A. All new development, including building and landscape works, will be expected to consider and implement sustainable design, layout and construction techniques. Proposals should:
 - a. Apply the energy hierarchy to minimise energy use in order to meet, and if possible exceed, minimum carbon dioxide reduction requirements;
 - b. Apply the cooling hierarchy to reduce the potential for overheating and limit reliance on mechanical air conditioning systems;
 - c. Maximise opportunities to enhance biodiversity on-site, including through appropriate landscaping, Sustainable Drainage Systems, living roofs and green walls
 - d. Wherever possible, use building materials with high environmental performance ratings; and
 - e. Seek opportunities for locally sourced labour.
- B. The Council will support appropriate measures to sustainably retrofit existing homes and non-residential buildings.
- C. Proposals that fail to demonstrate adequate consideration for sustainable design, layout and construction techniques will be resisted.
- D. Consideration will be given to the use of carbon offset payments, to be secured by planning obligations, where it can be demonstrated that proposals are unable to meet carbon dioxide emission reduction targets on-site.

Policy DM22 Decentralised Energy

- A. Subject to other policy requirements, proposals that contribute to the provision and use of Decentralised Energy network infrastructure will be supported.

Communal energy systems

- B. All development that incorporates site-wide communal energy systems should examine opportunities for extending such systems, irrespective of whether it is connected to a DE network.
- C. All development that incorporates site-wide communal energy systems should optimise opportunities for extending such systems beyond the site boundary to supply energy to neighbouring existing and planned future developments.

Existing and planned future DE networks

- D. All development proposals should prioritise connection to existing or planned future DE networks.
- E. All major development located within 500 metres of an existing DE Network, and minor new-build development located within 25 metres, will be expected to secure connection to that network subject to demonstration of technical feasibility and financial viability.
- F. All major development located within 500 metres of a planned future DE Network, which is considered by the Council likely to be operational within 3 years of a grant of planning permission, will be expected to secure connection to that network subject to demonstration of technical feasibility and financial viability.

DE network 'connection zones'

- G. All major development located within 500 metres of a DE network 'connection zone' should be designed for connection to a DE network.
- H. All minor new-build development located within 25 metres of a DE network 'connection zone' should be designed for connection to a DE network.

Customer charters

- I. Where site-wide communal and district heating systems are operational, the Council will strongly encourage heat and energy service providers to enter into customer charters with domestic and micro-business customers.

Policy DM23 Environmental Protection

Air Quality

- A. All development proposals should consider air quality and be designed to:
 - a. Improve or mitigate the impact on air quality in the Borough; and
 - b. Improve or mitigate the impact on air quality for the occupiers of the building or users of the development.
- B. Air quality assessments will be required for all major development and other development proposals, where appropriate.
- C. Where necessary, adequate mitigation must be provided.

Noise and Vibration

- D. The Council will seek to ensure that new noise sensitive development is located away from existing or planned sources of noise pollution. Proposals for potentially noisy development must suitably demonstrate that measures will be implemented to mitigate its impact.
- E. A noise assessment will be required to be submitted if the proposed development is a noise sensitive development, or an activity with the potential to generate noise.

Light Pollution

- F. Development proposals that include external lighting must mitigate potential adverse impacts from such lighting. Where appropriate, proposals will be required to submit details demonstrating that external lighting is:
 - a. Appropriate for its purpose in its setting;
 - b. Designed to minimise and provide protection from glare and light spillage, particularly to sensitive receptors such as residential properties and natural habitats, including watercourses; and
 - c. Energy efficient.

Contaminated Land

- G. Proposals for new development will only be permitted where it is demonstrated that any risks associated with land contamination, including to human health and the environment, can be adequately addressed in order to make the development safe.
- H. All proposals for new development on land which is known to be contaminated, or potentially contaminated, will be required to submit a preliminary assessment to identify the level and risk of contamination and, where appropriate, a risk management and remediation strategy.

Hazardous Substances

- I. Proposals for development of new hazardous installations, or development of sites located within the vicinity of existing installations, will only be permitted where it is demonstrated that necessary safeguards are incorporated to ensure the development is safe.

Policy DM24 Managing and Reducing Flood Risk

- A. The Council will ensure that all proposals for new development avoid and reduce the risk of flooding to future occupants and do not increase the risk of flooding.
- B. All proposals for new development within Flood Zone 2 and 3a will be required to provide sufficient evidence for the Council to assess whether the requirements of the Sequential Test and Exception Test, where required, have been satisfied. Proposals must be informed by a site specific Flood Risk Assessment (FRA) taking account of all potential sources of flooding and should:
 - a. Demonstrate the application of a sequential approach for the development of individual sites to ensure that the most vulnerable land uses are located in areas of the site that are at lowest risk of flooding;
 - b. Preserve overland flood and flow routes and ensure there is no net loss of flood storage. Adequate flood storage and compensation should be provided on site, or if this is not possible, provided off site where circumstances allow;
 - c. Where appropriate, set out the mitigation measures that will be incorporated on site to manage residual flood risk including:
 - i. Finished floor levels set no lower than 300mm above the 1 in 100 chance in any given year, including an allowance for climate change, flood level; and
 - ii. Ensure safe access and egress for future users of the development or an appropriate emergency evacuation plan.
 - d. Contribute to naturalising watercourses where opportunities arise.
- C. All proposals for new development will be required to:
 - a. Manage and reduce surface water run-off; and
 - b. Manage water and waste water discharges.
- D. With the exception of water compatible uses and essential infrastructure, development in areas designated in Haringey's Strategic Flood Risk Assessment as being within Flood Zone 3b will not be permitted.

Policy DM25 Sustainable Drainage Systems

- A. All proposals for new development must seek to manage surface water as close to its source as possible in line with the London Plan drainage hierarchy.
- B. The Council will require Sustainable Drainage Systems (SuDS) to be sensitively incorporated into new development by way of site layout and design, having regard to the following requirements:
 - a. All major development proposals will be required to reduce surface water flows to a greenfield run-off rate for a 1 in 100 year critical storm event;
 - b. All minor development proposals should aim to achieve a greenfield run-off rate and, at a minimum, achieve a 50 per cent reduction on existing site run-off rates;
 - c. All other development should seek to achieve a greenfield run-off rate and include at least one 'at source' SuDS measure resulting in a net improvement in water quantity or quality discharging to a sewer; and

- d. For all development where a greenfield runoff rate cannot be achieved justification must be provided to demonstrate that the run-off rate has been reduced as much as possible.
- C. Where Sustainable Drainage Systems are implemented they will be expected to:
 - a. Meet the requirements set out in the Council's relevant local standards and guidance, or national standards where agreed;
 - b. Incorporate measures identified in the Surface Water Management Plan;
 - c. Be designed to maximise biodiversity and local amenity benefits, and where appropriate, ensure that SuDS techniques provide for clean and safe water at the surface;
 - d. Improve water quality; and
 - e. Function effectively over the lifespan of the development.
- D. Where SuDS cannot be implemented due to site constraints (such as land contamination or space limitations) robust justification must be provided along with proposed alternative sustainable approaches to surface water management.

C. BREEAM Pre-Assessment (Office)

Issue ID	Issue ID/ Description/Aim	Credit Requirements	Available Credits	Predicted Credits	Contingency Credits	Available Score	Predicted Score	Contingency Credits	RIBA Stage - Critical	Responsibilities/Comments
Man01	Project brief and design Encouraging an integrated design process and considering BREEAM performance targets early to influence decision-making and optimise building performance, while avoiding unnecessary costs.	Project Delivery Planning (1 Credit) 1. Responsibilities Matrix 2. Project directory and project brief 3. Design and Access Statement 4. Key meeting minutes Stakeholder Consultation (interested parties) (1 Credit) 1. Copy of the consultation plan 2. Meeting Minutes/Consultation report summary 3. List of design changes as a result of consultation BREEAM AP (concept design) (1 Credit) 1. BREEAM pre-assessment + any additional sustainability targets and requirements 2. Meeting minutes BREEAM AP demonstrating regular attendance to DTM (monthly) BREEAM AP (developed design) (1 Credit) As above	4	4	0	2.44%	2.44%	0.00%	Early Action RIBA Stage 2	Responsibilities Client Project Manager Architect BREEAM AP Comments Early actions required Ensphere to provide letter template
Man02	Life cycle cost and service life planning Promoting the business case for sustainable buildings through the enhanced understanding of capital cost. Improving design, specification, maintenance and operation, by encouraging the use of life cycle costing.	Elemental Life Cycle Cost (LCC) (2 Credits) 1. A copy of Elemental Life Cycle Cost Report 2. List of design changes as a result of the LCC Component Level LLC Option Appraisal (1 Credit) 1. A copy of component Life Cycle Cost Report 2. List of design changes as a result of the LCC Capital Cost Reporting (1 Credit) 1. Predicted Capital Cost report	4	4	0	2.44%	2.44%	0.00%	Early Action RIBA Stage 2	Responsibilities Client Contractor Comments Early actions required
Man03	Responsible Construction Practices Encouraging construction sites to be managed in an environmentally and socially considerate and responsible manner. Monitoring to encourage continuous improvements and utility consumption reduction.	Pre-requisite 1. All specification containing timber products to have the relevant timber requirements Environmental Management (1 Credit) 1. Copy of EMS certificates from Principal contractor and completed PPG6 BREEAM AP Site (1 Credit) 1. Appointment of AP for construction and a copy of agreed targets during construction Responsible Construction Management (Up to 2 credits) 1. A copy of Environmental Management Plan 2. Template of environment site inspection that will be used during construction Monitoring of Construction Site Impacts (1 Credit) 1. Commitment to monitor, record energy and water consumption Monitoring of Construction Site Impacts - Transport of construction materials & waste (1 Credit) 1. Target and commitment to monitor, record CO2e emissions associated with material and waste transport	6	6	0	3.67%	3.67%	0.00%		Responsibilities Contractor Comments Ensphere to provide letter templates
Man04	Commissioning and handover Encouraging a well-managed handover and commissioning process, which will ensure building services and fabric defects are identified and rectified. Ensuring that the building responds to the needs of the occupants.	Pre-Requisite 1. Commitment letter from client to produce two BUGs. Commissioning - Testing Schedule and Responsibilities (1 Credit) 1. Appointment letter for commissioning manager. Commissioning - Design and Preparation (1 Credit) 1. Appointment letter for commissioning manager at RIBA stage 2/3. 2. Meeting minutes from commissioning manager showing input during design stage. Evidence the commissioning manager has the relevant qualification Testing and Inspecting Building Fabric (1 Credit) 1. Commitment letter from client to undertake thermographic survey and rectify any issues Handover (1 Credit) Commitment letter from client to undertake two BUGs and corresponding trainings.	4	3	1	2.44%	1.83%	0.61%		Responsibilities Commissioning Manager M&E Client Comments Ensphere to provide letter templates

Hea00	Aftercare Encouraging aftercare support during the first year of the building operation, to ensure the building operates in accordance with the design intent and in response to the building occupants' needs.	Aftercare Support (1 Credit) 1. Commitment letter from client to provide appropriate aftercare support Commissioning Implementation (1 Credit) 1. Commitment letter from client to provide the following seasonal commissioning activities Post Occupancy Evaluation (1 Credit) 1. Commitment letter from client/building occupier to undertake POE	0	0	0	0.00%	0.00%	0.00%		Responsibilities Client Building Occupier Comments Ensphere to provide letter templates
Hea01	Visual comfort Providing occupants with the conditions that facilitate good visual comfort by designing out the potential for glare, achieving good practice daylight factors and having an adequate view out. Designing internal and external lighting systems to provide appropriate illuminance (lux) levels, thereby giving a more comfortable environment for occupants. Internal lighting is zoned to allow for occupant control.	Glare Control (1 Credit) 1. Copy of the glare strategy covering areas deemed at risk and measures to minimise/avoid glare. Daylighting (building type dependent) (Up to 2 Credits) 1. Report from specialist confirming the targeted daylight ratio View Out (1 Credit) 1. Drawings confirming view out calculations. Internal Lighting, External Lighting and Zoning and Occupant Control (1 Credit) 1. Internal lighting strategy and modelling demonstrating compliance with the different standards 1. Light fittings schedule 2. Product datasheet confirming luminance of light fittings install 1.. Zoning and control strategy - drawing showing it	4	4	0	2.91%	2.91%	0.00%		Responsibilities Daylight Consultant Architect M&E Comments Ensphere to provide letter template
Hea02	Indoor air quality Facilitating good indoor air quality by considering indoor air pollution early in the design process so that a mitigation strategy can be put in place. Managing harmful emissions from construction products by specifying finishes and products that have been tested in accordance with the appropriate standards. Specifying an appropriate ventilation strategy that maintains good indoor air quality.	Pre-requisite - Indoor Air Quality (IAQ) plan 1. Indoor Air Quality Plan Ventilation (1 Credit) 1. Drawings confirming calculations Emissions from Construction Products (Up to 2 Credits) 1. Relevant specifications Post-construction Indoor Air Quality Measurement (1 Credit) 1. Commitment letter from client to undertake post-construction air quality test	1	1	0	0.73%	0.73%	0.00%	Early Action RIBA Stage 2	Responsibilities Air Quality Consultant M&E Architect Contractor Comments Ensphere to provide letter template
Hea03	Safe containment in laboratories This is no longer assessed as a separate issue within BREEAM UK New Construction 2018.	N/A	0	0	0	0.00%	0.00%	0.00%		
Hea04	Thermal comfort Thermal modelling informs the building design to provide a comfortable thermal environment that considers current climatic conditions, and projected climate change scenario conditions. Giving occupants control over their environment through appropriate temperature control strategies and thermal zoning.	Thermal Modelling (1 Credit) 1. Thermal Modelling and full dynamic thermal analysis Design for Future Thermal Comfort (1 Credit) 1. Thermal Modelling and full dynamic thermal analysis Thermal Zoning and Controls (1 Credit) 1. Thermal Modelling and full dynamic thermal analysis	2	2	0	1.45%	1.45%	0.00%		Responsibilities M&E
Hea05	Acoustic performance Enabling occupants to experience best practice acoustic performance levels appropriate to the functional activities in occupied spaces.	Acoustic Performance (Up to 4 Credits) 1. Acoustic report	1	0	1	0.73%	0.00%	0.73%		Responsibilities Acoustician
Hea06	Security Designing the building to consider and take into account security needs to ensure occupants safety and wellbeing.	Security of Site and Building (1 Credit) 1. Meeting minutes with SQSS 2. Drawings, technical memos showing that the recommendations have been incorporated	1	1	0	0.73%	0.73%	0.00%	Early Action RIBA Stage 2	Responsibilities Security Specialist Architect Comments Early actions required

Hea07	Safe and healthy surroundings Providing external site areas that are safe for occupant use. Enhancing the wellbeing of building users by giving access to an outdoor space.	Safe Access (1 Credit) 1. Construction drawings showing cycle and pedestrian paths Outside Space (1 Credit) 1. Construction drawings showing external spaces and amenities	2	1	1	1.45%	0.73%	0.73%		Responsibilities Security Specialist Architect
Ene 01	Reduction of energy use and carbon emissions Encouraging the design of energy efficient buildings with energy performance above national building regulations. Encouraging the accurate modelling of operational energy consumption.	Energy Performance (Up to 9 Credits) 1. RIBA stage 4 BRUKL 2. Energy statement Prediction of Operational Energy Consumption (4 Credits) 1. RIBA stage 4 BRUKL 2. Energy statement	13	4	2	8.67%	2.67%	1.33%	Early Action RIBA Stage 2	Responsibilities Energy Specialist Comments Early actions required
Ene02	Energy monitoring Helping to identify and reduce high energy demands where possible by accurate measurement of the energy consumption of the building by end use.	Sub-metering of End Use Categories (1 Credit) 1. Schematics showing metering of space heating, cooling, ventilation, lighting, small power etc. 2. Table Ene 02 filled out Sub-metering of High Energy Load and Tenancy Areas (1 Credit) 1. Schematics showing metering of space heating, cooling, ventilation, lighting, small power etc. 2. Table Ene 02 filled out	2	2	0	1.33%	1.33%	0.00%		Responsibilities M&E
Ene03	External lighting Reducing the building's energy consumption through the specification of energy efficient external lighting.	External Lighting (1 Credit) 1. Product datasheet confirming that the product specified achieves 70 luminaire lumens per circuit Watt 2. Specification confirming control (e.g. daylight, movement etc.) installed for external lighting	1	1	0	0.67%	0.67%	0.00%		Responsibilities M&E
Ene04	Low carbon design Reducing the building's energy consumption through the adoption of passive design solutions, free cooling and low or zero carbon (LZC) energy sources.	Passive Design Analysis (PDA) (1 Credit) 1. Passive design analysis (PDA) 2. Thermal modelling and BRUKL with passive design measures 3. Evidence that a suitably qualified energy specialist has quantified the CO2e reduction Free Cooling (1 Credit) 1. Passive design analysis with cooling analysis 2. Evidence for suitably qualified energy specialist 3. Dynamic simulation model demonstrating that the cooling demand can be met by free cooling Low and Zero Carbon Technologies (1 Credit) 1. LZC analysis and BRUKL Report 2. Evidence for suitably qualified energy specialist	3	1	2	2.00%	0.67%	1.33%	Early Action RIBA Stage 2	Responsibilities M&E Comments Early actions required
Ene05	Energy efficient cold storage Reducing the building's operational greenhouse gas emissions (CO ₂ -eq) through the design, installation and commissioning of energy efficient refrigeration systems.	Refrigeration Energy Consumption (1 Credit) 1. Product data sheets for the refrigeration system 2. Written commitment that Commissioning of the refrigeration system will take place Indirect Greenhouse Gas Emissions (1 Credit) 1. Demonstration of savings in indirect greenhouse gas emissions	0	0	0	0.00%	0.00%	0.00%		Responsibilities M&E
Ene06	Energy efficient transportation systems Reducing the building's energy consumption by specifying the optimum number and size of energy efficient transportation systems.	Energy Consumption (1 Credit) 1. Lift analysis that meet BREEAM requirements Energy Efficient Features (1 Credit) 1. Lift specification with corresponding datasheet that confirm the requirements are met	2	2	0	1.33%	1.33%	0.00%		Responsibilities Lift Consultant
Ene07	Energy efficient laboratory systems Reducing the building's operational greenhouse gas emissions (CO ₂ -eq) by specifying best practice energy efficient laboratory equipment.	Design Specification (1 Credit) 1. Minutes of meetings to confirm consultation with relevant stakeholders 2. Project brief that includes laboratory performance criteria Best Practice Energy Efficient Features (Up to 4 Credits) 1. Energy Demand Assessment 2. Laboratory system specification and drawings	0	0	0	0.00%	0.00%	0.00%		Responsibilities M&E

Ene08	Energy efficient equipment Demonstrating a meaningful reduction in the total unregulated energy demand of the building by using energy efficient equipment.	Energy Efficient Equipment (2 Credits) 1. Fill in energy 08 table 2. Specification confirming targeted requirements.	0	0	0	0.00%	0.00%	0.00%		Responsibilities M&E
Tra01	Transport assessment and travel plan Recognising developments in proximity of, and accessible to, local amenities which are likely to be frequently required and used by building occupants.	Travel Plan (2 Credits) 1. Travel Plan 2. Drawings showing travel plan proposals	2	2	0	1.92%	1.92%	0.00%		Responsibilities Transport Consultant
Tra02	Sustainable transport measures Recognising developments in close proximity of, and accessible to, local amenities which are likely to be frequently required and used by building occupants.	Sustainable Transport Measures (Up to 10 Credits) 1. Evidence to demonstrate the measures targeted	10	7	3	9.58%	6.71%	2.88%		Responsibilities Transport Consultant
Wat01	Water consumption Reducing the demand for potable water through the provision of efficient sanitary fittings, rainwater collection and water recycling systems.	Water Consumption (Up to 5 Credits) 1. Water 01 Calculator 2. Specifications 3. Product data sheet confirming flow rates	5	3	1	3.89%	2.33%	0.78%		Responsibilities BREEAM Assessor Architect
Wat02	Water monitoring Specification of water meters to allow for management and monitoring of water use in the building. This encourages reductions in water use by identifying areas of high usage and investigating potential causes.	Pre-requisite 1. Drawing showing location of water meter Water Monitoring (1 Credit) 1. Schematics showing submetering 2. Specification and corresponding product datasheet of the product 3. Specification highlighting connection to BMS or ability to be connected	1	1	0	0.78%	0.78%	0.00%		Responsibilities M&E
Wat03	Water leak detection Reducing the unintended water consumption due to leaks by installing leak detection systems and flow control devices.	Leak Detection System (1 Credit) 1. Specification detailing leak detection system 2. Product datasheet for the leak detection system Flow Control Devices (1 Credit) 1. Mechanical Specification 2. Drawings to show the location if the flow control systems	2	2	0	1.56%	1.56%	0.00%		Responsibilities M&E
Wat04	Water efficient equipment Reducing water consumption for non-domestic scale, non-sanitary water uses by specifying efficient systems and improving the design efficiency of any water-using processes.	Unregulated Water Demand (1 Credit) 1. Letter template	1	1	0	0.78%	0.78%	0.00%		Responsibilities Contractor Comments Ensphere to provide a letter template
Mat01	Environmental impacts from construction products Building life cycle assessment (LCA) Reducing buildings' environmental life cycle impacts through conducting Life Cycle Assessment and integrating its outcomes in the design decision-making process.	Life Cycle Impacts 1. Specifications 2. Allocation to undertake the material assessment 3. Cost plan Substructure and Hard Landscaping Options Appraisal during Concept Design (Up to 6 Credits) 1. Specifications 2. Allocation to undertake the material assessment Core Building Services Options Appraisal during Concept Design (1 Credit) 1. Specifications 2. Allocation to undertake the material assessment	7	5	0	8.75%	6.25%	0.00%	Early Action RIBA Stage 2	Responsibilities Architect Structural Engineer LCA modeller Comments Early actions required

Mat02	Environmental impacts from construction products Environmental Product Declarations (EPD) To encourage availability of robust and comparable data on the impacts of construction products by rewarding the specification of products with environmental products declarations.	Specification of Products with a Recognised Environmental Product Declaration (EPD) (1 Credit) 1. Specification 2. EDPs 3. Allocation to undertake the material assessment	1	0	1	1.25%	0.00%	1.25%		Responsibilities Architect Structural Engineer Building Services
Mat03	Responsible sourcing of construction products Recognising and encouraging responsible sourcing of construction products. This includes the source of products and the intermediary companies processing and transporting the product to site.	Pre-requisite 1. All relevant specification susceptible to contain timber products to have the relevant timber requirements. Sustainable Procurement Plan (1 Credit) 1. Procurement plan in place by RIBA stage 2 Measuring Responsible Sourcing (Up to 3 Credits) 2. Responsible Sourcing of materials	4	2	2	5.00%	2.50%	2.50%	Early Action RIBA Stage 2	Responsibilities Architect Structural Engineer M&E Comments Early actions required
Mat04	Insulation This is no longer assessed as a separate issue within BREEAM LK New Construction 2019.	N/A	0	0	0	0.00%	0.00%	0.00%		
Mat05	Designing for durability and resilience Increasing the lifespan of the building through designing for durability and protection from degradation and specifying appropriate construction products.	Protecting Vulnerable Parts of the Building from Damage (0.5 Credit) 1. Marked up drawings Protecting Exposed Parts of the Building from Material Degradation (0.5 Credit) 1. Completed Mat 05 spreadsheet and supporting drawings	1	1	0	1.25%	1.25%	0.00%		Responsibilities Architect
Mat 06	Material efficiency Encouraging the reduction of environmental impacts through optimising the use of materials during all stages of the project.	Material Efficiency (1 Credit) 1. Material efficiency technical memo/report (must include quantities of materials saved)	1	1	0	1.25%	1.25%	0.00%	Early Action RIBA Stage 1/2	Responsibilities Architect Structural Engineer M&E Comments Early actions required
Wst01	Construction waste management Improving resource efficiency through developing a pre-demolition audit and a Resource Management Plan, maximising the recovery of material during demolition and diverting non-hazardous waste from landfill.	Pre-demolition Audit (1 Credit) 1. Pre-demolition Audit Construction Resource Efficiency (Up to 3 Credits) 1. Site Waste Management Plan Diversion of Resources from Landfill (1 Credit) 1. Site Waste Management Plan	5	3	2	3.18%	1.91%	1.27%	Early Action RIBA Stage 2	Responsibilities Waste Consultant Contractor Comments Early actions required
Wst02	Use of recycled and sustainably sourced aggregates Encouraging the use of recycled or secondary aggregate or aggregate types with lower environmental impact to reduce waste and optimise material efficiency.	Recycled Aggregate (1 Credit) 1. Recycled content calculator 2. Specification 3. Letter of commitment from Contractor	1	0	0	0.64%	0.00%	0.00%		Responsibilities Structural Engineer Contractor
Wst03	Operational Waste Encouraging the diversion of operational waste from landfill through the provision of space and facilities allowing the segregation and storage of recyclable waste.	Operational Waste (1 Credit) 1. Drawings/Specifications to demonstrate the location of the operational waste facility 2. Confirmation for the likely waste streams for the site.	1	1	0	0.64%	0.64%	0.00%		Responsibilities Architect Waste Consultant
Wst04	Speculative finishes (Offices only) Specification of floor and ceiling finishes only where agreed with the occupant or, for tenanted areas where the future occupant is unknown, installation in a show area only, to reduce wastage.	Speculative Floor and Ceiling Finishes 1. Drawings showing that floor and ceiling finishes have been installed in a show area only.	1	1	0	0.64%	0.64%	0.00%		Responsibilities Architect

Wst05	Adaptation to climate change Encouraging consideration and implementation of measures to mitigate the impact of more extreme weather conditions arising from climate change over the lifespan of the building.	Resilience of Structure, Fabric, Building Services and Renewables Installation (1 Credit) 1. Climate Change Adaptation Strategy 2. Appraisal or Structural and fabric resilience 3. Systematic risk assessment	1	1	0	0.64%	0.64%	0.00%	Early Action RIBA Stage 2	Responsibilities Architect Structural Engineer M&E Comments Early actions required
Wst06	Design for disassembly and adaptability Encouraging consideration and implementation of measures design options related to adaptability and disassembly, which can accommodate future changes to the use of the building and its systems over its lifespan.	Design for Disassembly and Functional Adaptability - Recommendations (1 Credit) 1. Building-specific functional adaptation strategy study Disassembly and Functional Adaptability – Implementation (1 Credit) 1. Building-specific functional adaptation strategy study	2	2	0	1.27%	1.27%	0.00%	Early Action RIBA Stage 2	Responsibilities Architect Structural Engineer M&E Comments Early actions required
LE01	Site selection Recognising the reuse of previously developed and contaminated land where appropriate remediation has taken place.	Previously Occupied Land (1 Credit) 1. Photograph/Exiting site plan of the site or Design and Access Statement describing the previous use Contaminated Land (1 Credit) 1. Contaminated site investigation and risk assessment/report 2. Commitment letter from the contractor that the remediation strategy will be implemented	2	1	1	2.31%	1.15%	1.15%		Responsibilities Client Contractor Contaminated land consultant
LE02	Identifying and understanding the risks and opportunities for the project Identifying and understanding the ecological risks and opportunities associated with the site to inform the determination of the strategic outcome for the site.	Pre-requisite - Ecological Value of Site 1. Risk evaluation checklist completed 2. Appointment of ecologist if going through Route 2 3. EMP detailing the processes in place during construction to monitor ecology Route 1 - Low Risk and Opportunities Defined in GN34 (1 Credit) Completed Assessment using GN35 OR Route 2 - Complex Ecological Systems (2 Credits) Ecologist's Survey and recommendation following hierarchy	2	2	0	2.31%	2.31%	0.00%	Early Action RIBA Stage 1	Responsibilities Ecologist Selected team member Comments Early actions required
LE03	Managing negative impacts on ecology Recognition of steps taken to avoid impacts on existing site ecology as far as possible.	Identification and Understanding the Risks and Opportunities for the Site (1 Credit) 1. Ecologists report 2. Confirmation that the Ecologist is suitably Qualified Managing Negative Impacts of the Project (Up to 2 Credits) 1. Ecologists report 2. Confirmation that the features of value will be protected in line with the Ecologist's recommendations	3	3	0	3.46%	3.46%	0.00%	Early Action RIBA Stage 1	Responsibilities Ecologist Selected team member Comments Early actions required
LE04	Change and enhancement of ecological value Recognition of steps taken to enhance site ecology.	Identification and Understanding the Risks and Opportunities for the Site 1. Ecology Report Change and Enhancement of Ecology - Route 1 ONLY (1 Credit) 1. Confirmation that the project team have implemented local ecological solutions and measures to enhance the site Change and Enhancement of Ecology - Route 2 ONLY (Up to 3 Credits) 1. Calculation of the Ecological value	4	3	1	4.62%	3.46%	1.15%		Responsibilities Ecologist Selected team member
LE05	Long term ecology management and maintenance Encouraging the long term maintenance and management of ecology on site to ensure both new and existing ecological features continue to thrive.	Long Term Impact on Biodiversity 1. As above Planning Liason, Data, Monitoring and Review Management and Maintenance (1 Credit) 1. Ecology report 2. Confirmation of additional measures 3. Confirm Ecology and Biodiversity section in Building User Guide Landscape and Ecology Plan (1 Credit) 1. Landscape and Ecology Plan	2	2	0	2.31%	2.31%	0.00%		Responsibilities Ecologist Selected team member Client
Pol01	Impact of refrigerants Rewarding buildings that reduce the impact of refrigerant gas emissions.	Impact of Refrigerants (2 Credits) 1. Specification and/or manufacturer's literature to confirm the design/type of system to be installed 2. Drawings to show the positioning of the units Leak Detection (1 Credit) 1. Specification and/or manufacturer's literature to confirm the design/type of system to be installed 2. Drawings to show the positioning of the units	3	1	2	2.25%	0.75%	1.50%		Responsibilities M&E

Pol02	Local air quality Recognising buildings which limit their impact on local air quality, by consideration of the combustion plant and fuel used on site.	Local Air Quality (Up to 2 Credits) 1. Data sheets and/or manufacturer emails confirming NOx emissions for each piece of equipment 2. Boiler/CHP/Heat Emitter/Cooling/Heater schedules	2	1	1	1.50%	0.75%	0.75%		Responsibilities M&E
Pol03	Flood and surface water management Rewarding buildings and their sites that limit on-site and off-site local flooding and hence the damage this can cause.	Flood Resilience (Up to 2 Credits) 1. Site Specific Flood Risk Assessment Pre-requisite - Surface Water Run-off 1. Calculations and Drainage Plan Surface Water Run-off Rates (1 Credit) 1. Calculations and Drainage Plan Surface Water Run-off Volume (1 Credit) 1. Calculations and Drainage Plan Minimising Water Course Pollution (1 Credit) 1. Drainage Plan	5	3	2	3.75%	2.25%	1.50%		Responsibilities Flood Risk Consultant Drainage Engineer
Pol04	Reduction of night time light pollution Avoiding or reducing the impact of night time light pollution, through careful design and specification of light sources.	Night Time Light Pollution (1 Credit) 1. Completed letter template 2. Drawings to show the location of the external lighting, time switches and photo-cells	1	1	0	0.75%	0.75%	0.00%		Responsibilities M&E
Pol05	Reduction of noise pollution Avoiding or reducing the impact of external noise from the building.	Reduction of Noise Pollution (1 Credit) 1. Noise Impact Assessment	1	1	0	0.75%	0.75%	0.00%		Responsibilities Acoustician
Inn01	Innovation Test out new ideas which, if successful, could change the status quo of the industry. Allow the industry to explore new opportunities and evolve its processes.	Up to 10 Credits	10	0	0	10.00%	0.00%			
Total							71.95%	19.47%		

D. GLA Spreadsheet

SAP 2012 Performance

Domestic

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	15.4	6.8
After energy demand reduction (be lean)	14.2	6.8
After heat network connection (be clean)	14.2	6.8
After renewable energy (be green)	16.0	6.8

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	1.2	8%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	-1.8	-12%
Cumulative on site savings	-0.6	-4%
Annual savings from off-set payment	16.0	-
(Tonnes CO ₂)		
Cumulative savings for off-set payment	480	-
Cash in-lieu contribution (£)	45,640	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SAP 10.0 Performance

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	13.7	6.8
After energy demand reduction (be lean)	12.1	6.8
After heat network connection (be clean)	12.1	6.8
After renewable energy (be green)	7.2	6.8

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: Savings from energy demand reduction	1.6	12%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	4.9	36%
Cumulative on site savings	6.5	48%
Annual savings from off-set payment	7.2	-
(Tonnes CO ₂)		
Cumulative savings for off-set payment	216	-
Cash in-lieu contribution (£)	20,490	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Part L 2021 Performance

Residential

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Cumulative on site savings	0.0	0%
Annual savings from off-set payment	0.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	0	-
Cash in-lieu contribution (£)	0	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development

Non-residential

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	5.4	6.2
After energy demand reduction (be lean)	4.9	6.2
After heat network connection (be clean)	4.9	6.2
After renewable energy (be green)	1.3	6.2

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.5	10%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	3.6	66%
Total Cumulative Savings	4.1	76%
Annual savings from off-set payment	1.3	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	39	-
Cash in-lieu contribution (£)	3,669	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development

E. Indicative Energy Model Outputs (SBEM - Be Lean)

BRUKL Output Document

HM Government
Compliance with England Building Regulations Part L 2021

Project name

Orantez House As designed

Date: Tue Sep 20 16:40:17 2022

Administrative information

Building Details

Address: 72 - 96 Park Road, Crouch End, London, -

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

BRUKL compliance check version: v6.1.b.0

Certifier details

Name: Pete Jaavons

Telephone number: -

Address: -, London, -

Foundation area [m²]: 693.98

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.95
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.55
Target primary energy rate (TPER), kWh/m ² annum	42.55
Building primary energy rate (BPER), kWh/m ² annum	38.26
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

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

Fabric element	U _{lim}	U _{calc}	U _{calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	CR000000_W1
Floors	0.18	0.12	0.12	CR000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	CR000000_C
Windows** and roof windows	1.6	1.4	1.4	CM000000_W1_O0
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	CR000000_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U_{lim} = Limiting area-weighted average U-values [W/(m²K)]
U_{calc} = Calculated area-weighted average U-values [W/(m²K)]
* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/(m²K)
NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- ASHP (Be Lean)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	5	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A

Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- SYST0002-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	-	-
WC	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire		Display light source	
Zone name	Standard value	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]	
Refuse Store	95	115	-	-	-
Cycle Store	95	115	-	-	-
Commercial	95	115	100	1.5	-
Circulation Space	95	115	-	-	-
Circulation Space	95	115	-	-	-
Circulation Space	95	115	-	-	-
WC	95	115	-	-	-
Circulation Space	95	115	-	-	-
Office	95	115	-	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Refuse Store	N/A	N/A
Cycle Store	N/A	N/A
Commercial	NO (-60.3%)	NO
Circulation Space	N/A	N/A
Circulation Space	N/A	N/A
Circulation Space	N/A	N/A
WC	N/A	N/A
Circulation Space	N/A	N/A
Office	NO (-62.8%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m²]	1388	1388	100	Retail/Financial and Professional Services
External area [m²]	1938.4	1938.4		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	LON	LON		Offices and Workshop Businesses
Infiltration [m³/hm² @ 50Pa]	3	3		General Industrial and Special Industrial Groups
Average conductance [W/K]	444.29	763.29		Storage or Distribution
Average U-value [W/m²K]	0.23	0.39		Hotels
Alpha value* [%]	40.59	21.7		Residential Institutions: Hospitals and Care Homes
				Residential Institutions: Residential Schools
				Residential Institutions: Universities and Colleges

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	6.64	7.87
Cooling	7.26	7.8
Auxiliary	0.02	0.03
Lighting	8.83	9.93
Hot water	3.04	3.04
Equipment*	32.79	32.79
TOTAL**	25.79	28.68

* Energy used by equipment does not count towards the total for consumption or calculating emissions

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

Energy Production by Technology [kWh/m²]

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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	159.51	198.35
Primary energy [kWh/m ²]	38.26	42.55
Total emissions [kg/m ²]	3.55	3.95

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	61.9	97.6	6.6	7.3	0	2.59	3.74	2.64	5
Notional	74.8	123.5	7.9	7.8	0	2.64	4.4	----	----

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

F. Indicative Energy Model Outputs (SBEM - Be Green)

BRUKL Output Document

HM Government
Compliance with England Building Regulations Part L 2021

Project name

Orantez House (Be Green) As designed

Date: Tue Sep 20 16:45:58 2022

Administrative information

Building Details

Address: 72 - 96 Park Road, Crouch End, London, -

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

BRUKL compliance check version: v6.1.b.0

Certifier details

Name: Pete Jeavons

Telephone number: -

Address: -, London, -

Foundation area [m²]: 693.98

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.95
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	1.05
Target primary energy rate (TPER), kWh/m ² annum	42.55
Building primary energy rate (BPER), kWh/m ² annum	10.19
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

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

Fabric element	U _o Limit	U _o Calc	U _i Calc	First surface with maximum value
Walls*	0.26	0.18	0.18	CR000000_W1
Floors	0.18	0.12	0.12	CR000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	CR000000_C
Windows** and roof windows	1.6	1.4	1.4	CM000000_W1_O0
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	CR000000_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U_o Limit = Limiting area-weighted average U-values [W/(m²K)]
U_o Calc = Calculated area-weighted average U-values [W/(m²K)]
U_i Calc = Calculated maximum individual element U-values [W/(m²K)]
* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system	YES				

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- SYST0002-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
WC	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire		Display light source	
Zone name	Standard value	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]	
Refuse Store		115	-	-	
Cycle Store		115	-	-	
Commercial		115	100	1.5	
Circulation Space		115	-	-	
Circulation Space		115	-	-	
Circulation Space		115	-	-	
WC		115	-	-	
Circulation Space		115	-	-	
Office		115	-	-	

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Refuse Store	N/A	N/A
Cycle Store	N/A	N/A
Commercial	NO (-60.3%)	NO
Circulation Space	N/A	N/A
Circulation Space	N/A	N/A
Circulation Space	N/A	N/A
WC	N/A	N/A
Circulation Space	N/A	N/A
Office	NO (-62.8%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Type	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	1388	1388	100	Retail/Financial and Professional Services
External area [m ²]	1938.4	1938.4		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	LON	LON		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	3		General Industrial and Special Industrial Groups
Average conductance [W/K]	444.29	763.29		Storage or Distribution
Average U-value [W/m ² K]	0.23	0.39		Hotels
Alpha value* [%]	40.59	21.7		Residential Institutions: Hospitals and Care Homes
				Residential Institutions: Residential Schools
				Residential Institutions: Universities and Colleges
				Secure Residential Institutions
				Residential Spaces
				Non-residential Institutions: Community/Day Centre
				Non-residential Institutions: Libraries, Museums, and Galleries
				Non-residential Institutions: Education
				Non-residential Institutions: Primary Health Care Building
				Non-residential Institutions: Crown and County Courts
				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

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.38	7.87
Cooling	7.26	7.8
Auxiliary	0.02	0.03
Lighting	8.83	9.93
Hot water	3.04	3.04
Equipment*	32.79	32.79
TOTAL **	23.54	28.68

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	16.71	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>16.71</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	159.51	198.35
Primary energy [kWh/m ²]	10.19	42.55
Total emissions [kg/m ²]	1.05	3.95

HVAC Systems Performance									
System Type	Heat dem MJ/m ²	Cool dem MJ/m ²	Heat con kWh/m ²	Cool con kWh/m ²	Aux con kWh/m ²	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	61.9	97.6	4.4	7.3	0	3.92	3.74	4	5
Notional	74.8	123.5	7.9	7.8	0	2.64	4.4	----	---

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

G. Sample Energy Model Outputs (SAP – Be Lean)

DER WorkSheet: New dwelling design stage

User Details

Assessor Name: Stroma FSAP 2012 Stroma Number: Version: 1.0.5.56
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.5.56

Property Address: Be Lean + 2nd Floor

Address: 72 - 96 Park Road, London

1. Overall dwelling dimensions:

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground floor	63.1 (1a) x	3.1 (2a) =	195.61 (3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	63.1 (4)		
Dwelling volume	(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =		195.61 (5)

2. Ventilation rate:

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0	0 (6a)
Number of open flues	0	0	0	0	0 (6b)
Number of intermittent fans				0	0 (7a)
Number of passive vents				0	0 (7b)
Number of flueless gas fires				0	0 (7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	0 (8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)		
Number of storeys in the dwelling (ns)		0 (9)
Additional infiltration [(9)-1]x0.1 =		0 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal use 0.35		0 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0 (12)
If no draught lobby, enter 0.05, else enter 0		0 (13)
Percentage of windows and doors draught stripped		0 (14)
Window infiltration 0.25 - [0.2 x (14) + 100] =		0 (15)
Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =		0 (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3 (17)
If based on air permeability value, then (18) = [(17) + 20]x(8), otherwise (18) = (16)		0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used		
Number of sides sheltered		1 (19)
Shelter factor (20) = 1 - [0.075 x (19)] =		0.92 (20)
Infiltration rate incorporating shelter factor (21) = (18) x (20) =		0.14 (21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

Wind Factor (22a)m = (22)m ÷ 4

	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18
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DER WorkSheet: New dwelling design stage

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.18	0.17	0.17	0.15	0.15	0.13	0.13	0.13	0.14	0.15	0.16	0.16
------	------	------	------	------	------	------	------	------	------	------	------

Calculate effective air change rate for the applicable case

If mechanical ventilation:

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)

If balanced with heat recovery, efficiency in % allowing for in-use factor (from Table 4h) =

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) x [1 - (23c) + 100]

(24a)m =	0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.23	0.24	0.25	0.26	0.27
----------	------	------	------	------	------	------	------	------	------	------	------	------

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m =	0	0	0	0	0	0	0	0	0	0	0	0
----------	---	---	---	---	---	---	---	---	---	---	---	---

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 x (23b), then (24c) = (23b); otherwise (24c) = (22b)m + 0.5 x (23b)

(24c)m =	0	0	0	0	0	0	0	0	0	0	0	0
----------	---	---	---	---	---	---	---	---	---	---	---	---

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m =	0	0	0	0	0	0	0	0	0	0	0	0
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Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m =	0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.23	0.24	0.25	0.26	0.27
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3. Heat losses and heat loss coefficient

ELEMENT	Gross area (m ²)	Openings m ²	Net Area A _n m ²	U-value W/m ² K	A x U (W/K)	k-value kJ/m ² .K	A x k kJ/K
Doors			1.89	1.6	3.024		
Windows Type 1			1.89	1.4	2.646		
Windows Type 2			1.89	1.4	2.646		
Walls	72.54	7.56	64.98	0.18	11.7		
Total area of elements, m ²			72.54				

* for windows and roof windows, use effective window U-value calculated using formula 1/[1/U-value + 0.04] as given in paragraph 3.2

** include the areas on both sides of internal walls and partitions

Fabric heat loss, W/K = S (A x U)

Heat capacity Cm = S(A x k)

Thermal mass parameter (TMP) = Cm + TFA in kJ/m².K

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss

Ventilation heat loss calculated monthly

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m =	18.18	17.96	17.73	16.61	16.39	15.27	15.27	15.05	15.72	16.39	16.84	17.29

Heat transfer coefficient, W/K

	42.8	42.57	42.35	41.23	41.01	39.89	39.89	39.66	40.34	41.01	41.46	41.9
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Heat loss parameter (HLP), W/m².K

	0.68	0.67	0.67	0.65	0.65	0.63	0.63	0.63	0.64	0.65	0.66	0.66
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DER WorkSheet: New dwelling design stage

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement kWh/year:

Assumed occupancy, N (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)²)] + 0.0013 x (TFA - 13.9)

if TFA ≤ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more than 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(44)m=	91.64	88.31	84.98	81.64	78.31	74.98	71.64	68.31	64.98	61.64	58.31	54.98	(44)

Total = Sum(44) = (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(45)m=	135.9	118.86	122.65	108.93	102.6	88.54	82.04	94.15	95.27	111.03	121.2	131.61	(45)

Total = Sum(45) = (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(46)m=	20.39	17.63	18.4	15.04	15.39	13.28	12.31	14.12	14.29	15.85	18.18	19.74	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): (48)

Temperature factor from Table 2b (49)

Energy lost from water storage, kWh/year (48) x (49) = (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) (51)

If community heating see section 4.3

Volume factor from Table 2a (52)

Temperature factor from Table 2b (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = (54)

Enter (50) or (54) in (55) (55)

Water storage loss calculated for each month ((55)m = (55) x (41)m)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x ((50) - (H11)) - (50), else (57)m = (56)m where (H11) is from Appendix H

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 (58)

Primary circuit loss calculated for each month (59)m = (58) + 365 x (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) + 365 x (41)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(61)m=	46.7	40.65	43.3	40.26	39.91	36.98	38.21	39.91	40.26	43.3	43.55	46.7	(61)

DER WorkSheet: New dwelling design stage

Total heat required for water heating calculated for each month (62)m = 0.85 x (45)m + (46)m + (57)m + (59)m + (61)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(62)m=	182.6	159.51	165.96	147.19	142.51	125.51	120.25	134.05	135.53	154.33	164.75	178.31	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHS and/or WWHRS applies, see Appendix G)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(64)m=	182.6	159.51	165.96	147.19	142.51	125.51	120.25	134.05	135.53	154.33	164.75	178.31	(64)

Output from water heater (annual) = (64)

Heat gains from water heating, kWh/month 0.25 x [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(65)m=	56.86	49.68	51.61	45.62	44.09	38.68	36.83	41.28	41.74	47.74	51.19	55.44	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(67)m=	19.01	16.89	13.73	10.4	7.77	6.56	7.09	9.22	12.37	15.71	18.33	19.54	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(68)m=	180.69	182.57	177.84	167.78	155.09	143.15	135.16	133.3	138.03	148.09	160.79	172.72	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(69)m=	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	(69)

Pumps and fans gains (Table 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

Losses e.g. evaporation (negative values) (Table 5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(71)m=	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	(71)

Water heating gains (Table 5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(72)m=	78.43	73.93	69.37	63.36	59.26	53.73	49.51	55.48	57.98	64.17	71.09	74.51	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(73)m=	333.15	330.4	317.96	298.56	279.14	260.46	248.79	255.02	265.39	284.98	307.23	323.79	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	Area m²	Flux Table 6a	g _L Table 6b	FF Table 6c	Gains (W)	
Northeast 0.9x	0.77	1.89	11.28	0.4	0.7	4.14	(75)
Northeast 0.9x	0.77	1.89	22.97	0.4	0.7	8.42	(75)
Northeast 0.9x	0.77	1.89	41.38	0.4	0.7	15.18	(75)
Northeast 0.9x	0.77	1.89	67.96	0.4	0.7	24.92	(75)
Northeast 0.9x	0.77	1.89	91.35	0.4	0.7	33.5	(75)
Northeast 0.9x	0.77	1.89	97.38	0.4	0.7	35.71	(75)
Northeast 0.9x	0.77	1.89	91.1	0.4	0.7	33.41	(75)
Northeast 0.9x	0.77	1.89	72.63	0.4	0.7	26.63	(75)

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Northeast 0.9x	0.77	x	1.89	x	50.42	x	0.4	x	0.7	=	18.49	(75)
Northeast 0.9x	0.77	x	1.89	x	28.07	x	0.4	x	0.7	=	10.29	(75)
Northeast 0.9x	0.77	x	1.89	x	14.2	x	0.4	x	0.7	=	5.21	(75)
Northeast 0.9x	0.77	x	1.89	x	9.21	x	0.4	x	0.7	=	3.38	(75)
Northwest 0.9x	0.77	x	1.89	x	11.28	x	0.4	x	0.7	=	8.28	(81)
Northwest 0.9x	0.77	x	1.89	x	22.97	x	0.4	x	0.7	=	16.65	(81)
Northwest 0.9x	0.77	x	1.89	x	41.38	x	0.4	x	0.7	=	30.35	(81)
Northwest 0.9x	0.77	x	1.89	x	67.96	x	0.4	x	0.7	=	49.84	(81)
Northwest 0.9x	0.77	x	1.89	x	91.35	x	0.4	x	0.7	=	67	(81)
Northwest 0.9x	0.77	x	1.89	x	97.38	x	0.4	x	0.7	=	71.43	(81)
Northwest 0.9x	0.77	x	1.89	x	91.1	x	0.4	x	0.7	=	66.82	(81)
Northwest 0.9x	0.77	x	1.89	x	72.63	x	0.4	x	0.7	=	53.27	(81)
Northwest 0.9x	0.77	x	1.89	x	50.42	x	0.4	x	0.7	=	36.98	(81)
Northwest 0.9x	0.77	x	1.89	x	28.07	x	0.4	x	0.7	=	20.59	(81)
Northwest 0.9x	0.77	x	1.89	x	14.2	x	0.4	x	0.7	=	10.41	(81)
Northwest 0.9x	0.77	x	1.89	x	9.21	x	0.4	x	0.7	=	6.76	(81)

Solar gains in watts, calculated for each month

(83)m=	12.41	25.27	45.53	74.77	100.5	107.14	100.23	79.9	55.47	30.88	16.62	10.14	(83)
Total gains – internal and solar (84)m = (73)m + (83)m, watts													
(84)m=	345.56	355.67	363.48	373.32	379.64	367.6	349.02	334.93	320.87	315.86	322.84	333.93	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C)

Utilisation factor for gains for living area, h1,m (see Table 9a)	(86)m=	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(86)
		1	1	0.99	0.97	0.89	0.68	0.5	0.54	0.82	0.98	1	1	

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.4	20.46	20.59	20.78	20.93	20.99	21	21	20.97	20.81	20.58	20.4	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.36	20.36	20.37	20.38	20.39	20.4	20.4	20.4	20.39	20.39	20.38	20.37	(88)
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Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	1	1	0.99	0.96	0.86	0.62	0.43	0.47	0.76	0.97	0.99	1	(89)
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Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.54	19.64	19.82	20.11	20.31	20.4	20.4	20.4	20.37	20.15	19.83	19.55	(90)
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Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.98	20.06	20.21	20.45	20.63	20.7	20.71	20.71	20.68	20.49	20.22	19.98	(92)
--------	-------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	-------	------

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.98	20.06	20.21	20.45	20.63	20.7	20.71	20.71	20.68	20.49	20.22	19.98	(93)
--------	-------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	-------	------

8. Space heating requirement

Set T1 to the mean internal temperature obtained at step 11 of Table 9b, so that T1,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Utilisation factor for gains, hm:

(94)m=	1	1	0.99	0.97	0.87	0.65	0.47	0.51	0.79	0.97	0.99	1	(94)
--------	---	---	------	------	------	------	------	------	------	------	------	---	------

Useful gains, hmGm, W = (94)m x (84)m

(95)m=	344.63	354.19	360.08	360.69	331.67	240.69	163.67	170.6	253.84	305.64	320.85	333.21	(95)
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Monthly average external temperature from Table 8

(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)
--------	-----	-----	-----	-----	------	------	------	------	------	------	-----	-----	------

Heat loss rate for mean internal temperature, Lm, W = [(39)m x (93)m - (96)m]

(97)m=	671.11	645.4	580.84	476.33	366.18	243.41	163.83	170.9	265.46	405.49	543.7	661.32	(97)
--------	--------	-------	--------	--------	--------	--------	--------	-------	--------	--------	-------	--------	------

Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m

(98)m=	242.9	195.69	164.25	83.27	25.67	0	0	0	0	74.29	160.45	244.11	(98)
--------	-------	--------	--------	-------	-------	---	---	---	---	-------	--------	--------	------

Total per year (kWh/year) = Sum(98), 1,12 = 1190.64

Space heating requirement in kWh/m²/year

(99)	18.87	(99)
------	-------	------

9a. Energy requirements – Individual heating systems including micro-CHP

Space heating:

Fraction of space heat from secondary/supplementary system

(201)	0	(201)
-------	---	-------

Fraction of space heat from main system(s) (202) = 1 - (201) =

(202)	1	(202)
-------	---	-------

Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] =

(204)	1	(204)
-------	---	-------

Efficiency of main space heating system 1

(205)	90.3	(205)
-------	------	-------

Efficiency of secondary/supplementary heating system, %

(208)	0	(208)
-------	---	-------

Space heating requirement (calculated above)

(211)m =	242.9	195.69	164.25	83.27	25.67	0	0	0	0	74.29	160.45	244.11	(211)
----------	-------	--------	--------	-------	-------	---	---	---	---	-------	--------	--------	-------

Total (kWh/year) = Sum(211), 1,12 = 1318.53

Space heating fuel (secondary), kWh/month

= [(98)m x (201)] x 100 ÷ (205)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0	(215)
---------	---	---	---	---	---	---	---	---	---	---	---	---	-------

Total (kWh/year) = Sum(215), 1,12 = 0

Water heating

Output from water heater (calculated above)

(216)	182.6	159.51	165.98	147.19	142.51	125.51	120.25	134.05	135.53	154.33	164.75	178.31	(216)
-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------

Efficiency of water heater

(217)m=	86.06	85.87	85.37	84.13	82.29	81	81	81	81	83.8	85.34	86.13	(217)
---------	-------	-------	-------	-------	-------	----	----	----	----	------	-------	-------	-------

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	212.18	185.75	194.39	174.96	173.17	154.96	148.46	165.5	167.33	184.16	193.06	207.04	(219)
---------	--------	--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	-------

Total = Sum(219), 1,12 = 2160.94

Annual totals

Space heating fuel used, main system 1

(216)	1318.53	(216)
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Water heating fuel used

(217)	2160.94	(217)
-------	---------	-------

Electricity for pumps, fans and electric keep-hot

(218)		(218)
-------	--	-------

DER WorkSheet: New dwelling design stage

mechanical ventilation - balanced, extract or positive input from outside	116.34	(230a)
central heating pump:	30	(230c)
Total electricity for the above, kWh/year	sum of (230a) .. (230g) =	146.34 (231)
Electricity for lighting		335.79 (232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =		3961.6 (338)

12a CO₂ emissions – Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating (main system 1)	(211) x	0.216	= 284.8 (261)
Space heating (secondary)	(215) x	0.519	= 0 (263)
Water heating	(219) x	0.216	= 466.76 (264)
Space and water heating	(261) + (262) + (263) + (264) =		751.57 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	= 75.95 (267)
Electricity for lighting	(232) x	0.519	= 174.27 (268)
Total CO ₂ , kg/year	sum of (265) .. (271) =		1001.79 (272)
Dwelling CO ₂ Emission Rate	(272) ÷ (4) =		15.88 (273)
EI rating (section 14)			88 (274)

H. Sample Energy Model Outputs (SAP - Be Green)

DER WorkSheet: New dwelling design stage

User Details:

Assessor Name: **Stroma Number:**
Software Name: **Stroma FSAP 2012** Software Version: **Version: 1.0.5.56**

Property Address: **Be Green - 2nd Floor**

Address : **72 - 96 Park Road, London**

1. Overall dwelling dimensions:

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground floor	63.1 (1a) x	3.1 (2a) =	195.61 (3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	63.1 (4)		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	195.61 (5)

2. Ventilation rate:

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0	x 40 = 0 (6a)
Number of open flues	0	0	0	0	x 20 = 0 (6b)
Number of intermittent fans				0	x 10 = 0 (7a)
Number of passive vents				0	x 10 = 0 (7b)
Number of flueless gas fires				0	x 40 = 0 (7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	x 5 =	0 (8)
<i>If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)</i>			
Number of storeys in the dwelling (ns)			0 (9)
Additional infiltration		((9)-1)x0.1 =	0 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction <i>if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings). if equal use 0.35</i>			0 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0			0 (12)
If no draught lobby, enter 0.05, else enter 0			0 (13)
Percentage of windows and doors draught stripped			0 (14)
Window infiltration	0.25 - [(0.2 x (14) + 100) =		0 (15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =		0 (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area <i>If based on air permeability value, then (18) = [(17) + 20]x(8), otherwise (18) = (16)</i>			3 (17)
<i>Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used</i>			0.15 (18)
Number of sides sheltered			1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.92 (20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =		0.14 (21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Monthly average wind speed from Table 7

(22)m =	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
---------	-----	---	-----	-----	-----	-----	-----	-----	---	-----	-----	-----

Wind Factor (22a)m = (22)m ÷ 4

(22a)m =	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18
----------	------	------	------	-----	------	------	------	------	---	------	------	------

DER WorkSheet: New dwelling design stage

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.18	0.17	0.17	0.15	0.15	0.13	0.13	0.13	0.14	0.15	0.16	0.16
------	------	------	------	------	------	------	------	------	------	------	------

Calculate effective air change rate for the applicable case

If mechanical ventilation:

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)

If balanced with heat recovery, efficiency in % allowing for in-use factor (from Table 4h) =

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) x [1 - (23c) + 100]

(24a)m =	0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.23	0.24	0.25	0.26	0.27
----------	------	------	------	------	------	------	------	------	------	------	------	------

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m =	0	0	0	0	0	0	0	0	0	0	0	0
----------	---	---	---	---	---	---	---	---	---	---	---	---

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 x (23b), then (24c) = (23b); otherwise (24c) = (22b)m + 0.5 x (23b)

(24c)m =	0	0	0	0	0	0	0	0	0	0	0	0
----------	---	---	---	---	---	---	---	---	---	---	---	---

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m =	0	0	0	0	0	0	0	0	0	0	0	0
----------	---	---	---	---	---	---	---	---	---	---	---	---

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m =	0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.23	0.24	0.25	0.26	0.27
---------	------	------	------	------	------	------	------	------	------	------	------	------

3. U-values, losses and infiltration loss - meter

ELEMENT	Gross area (m ²)	Openings m ²	Net Area A, m ²	U-value W/m ² K	A x U (W/K)	k-value kJ/m ² K	A x k kJ/K
Doors			1.89	1.6	3.024		
Windows Type 1			1.89	1.4	2.646		
Windows Type 2			1.89	1.4	2.646		
Walls	72.54	7.56	64.98	0.18	11.7		
Total area of elements, m ²			72.54				

* for windows and roof windows, use effective window U-value calculated using formula 1/[1/U-value]+0.04] as given in paragraph 3.2

** include the areas on both sides of internal walls and partitions

Fabric heat loss, W/K = S (A x U) (26)...(30) + (32) = 22.24 (33)

Heat capacity Cm = S(A x k) ((28)...(30) + (32) + (32a)...(32e) = 4548.6 (34)

Thermal mass parameter (TMP = Cm + TFA) in kJ/m²K Indicative Value Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 2.38 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss (33) + (36) = 24.62 (37)

Ventilation heat loss calculated monthly

(38)m =	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	18.18	17.96	17.73	16.81	16.39	15.27	15.27	15.05	15.72	16.39	16.84	17.29

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m =	42.8	42.57	42.35	41.23	41.01	39.89	39.89	39.66	40.34	41.01	41.46	41.9
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Average = Sum(39) / 12 = 41.18 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ 4

(40)m =	0.68	0.67	0.67	0.65	0.63	0.63	0.63	0.63	0.64	0.65	0.66	0.66
---------	------	------	------	------	------	------	------	------	------	------	------	------

Average = Sum(40) / 12 = 0.65 (40)

DER WorkSheet: New dwelling design stage

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31

(41)

4. Water heating energy requirement kWh/year:

Assumed occupancy, N

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)²)] + 0.0013 x (TFA - 13.9)

if TFA ≤ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more than 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
--	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	91.64	88.31	84.96	81.64	78.31	74.98	71.64	68.31	64.98	61.64	58.31	54.98

Total = Sum(44)_{1..12} = 999.72

(44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(45)m=	135.9	118.86	122.85	106.93	102.6	88.54	82.04	94.15	95.27	111.03	121.2	131.61

Total = Sum(45)_{1..12} = 1310.79

(45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(46)m=	20.39	17.65	18.4	16.04	15.39	13.28	12.31	14.12	14.29	16.85	18.18	19.74

(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(47)	150											

(47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(48)	0											

(48)

Temperature factor from Table 2b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(49)	0											

(49)

Energy lost from water storage, kWh/year (48) x (49) =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(50)	150											

(50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(51)	0.01											

(51)

If community heating see section 4.3

Volume factor from Table 2a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(52)	0.93											

(52)

Temperature factor from Table 2b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(53)	0.54											

(53)

Energy lost from water storage, kWh/year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(54)	0.77											

(54)

Enter (50) or (54) in (55)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(55)	0.77											

(55)

Water storage loss calculated for each month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(56)m=	23.98	21.66	23.98	23.21	23.98	23.21	23.98	23.21	23.98	23.21	23.98	23.21

(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) - (H11)] - (50), else (57)m = (56)m where (H11) is from Appendix H

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(57)m=	23.98	21.66	23.98	23.21	23.98	23.21	23.98	23.21	23.98	23.21	23.98	23.21

(57)

Primary circuit loss (annual) from Table 3

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(58)	0											

(58)

Primary circuit loss calculated for each month (59)m = (58) + 365 x (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	22.51	23.26	22.51	23.26	22.51

(59)

Combi loss calculated for each month (61)m = (60) + 365 x (41)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0

(61)

DER WorkSheet: New dwelling design stage

Total heat required for water heating calculated for each month (62)m = 0.85 x (45)m + (46)m + (57)m + (59)m + (61)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(62)m=	183.15	161.53	169.9	152.65	149.85	134.26	129.29	141.39	140.99	158.27	166.92	178.86

(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRs and/or WWHRS applies, see Appendix G)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0

(63)

Output from water heater

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(64)m=	183.15	161.53	169.9	152.65	149.85	134.26	129.29	141.39	140.99	158.27	166.92	178.86

Output from water heater (annual)_{1..12}

1867.06

(64)

Heat gains from water heating, kWh/month 0.25 x [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(65)m=	82.98	73.66	78.58	72.13	71.91	66.02	65.08	69.1	68.25	74.71	76.87	81.56

(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m=	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39	103.39

(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(67)m=	18.01	16.89	13.73	10.4	7.77	6.56	7.09	9.22	12.37	15.71	18.33	19.54

(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(68)m=	180.69	182.57	177.84	167.78	155.09	143.15	135.18	133.3	138.03	148.09	160.79	172.72

(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(69)m=	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34	33.34

(69)

Pumps and fans gains (Table 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0

(70)

Losses e.g. evaporation (negative values) (Table 5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(71)m=	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71	-82.71

(71)

Water heating gains (Table 5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(72)m=	111.54	109.61	105.62	100.18	96.66	91.69	87.47	92.88	94.8	100.42	106.77	109.62

(72)

Total internal gains =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(73)m=	365.26	363.06	351.21	332.38	313.53	295.42	283.75	289.41	299.21	318.23	339.9	355.9

(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	Area m²	Flux Table 6a	g _L Table 6b	FF Table 6c	Gains (W)
Northeast 0.9x	0.77	1.89	11.28	0.4	0.7	4.14
Northeast 0.9x	0.77	1.89	22.97	0.4	0.7	8.42
Northeast 0.9x	0.77	1.89	41.38	0.4	0.7	15.18
Northeast 0.9x	0.77	1.89	67.96	0.4	0.7	24.92
Northeast 0.9x	0.77	1.89	91.35	0.4	0.7	33.5
Northeast 0.9x	0.77	1.89	97.38	0.4	0.7	35.71
Northeast 0.9x	0.77	1.89	91.1	0.4	0.7	33.41
Northeast 0.9x	0.77	1.89	72.63	0.4	0.7	26.63

DER WorkSheet: New dwelling design stage

Northeast 0.9x	0.77	x	1.89	x	50.42	x	0.4	x	0.7	=	18.49	(75)
Northeast 0.9x	0.77	x	1.89	x	28.07	x	0.4	x	0.7	=	10.29	(75)
Northeast 0.9x	0.77	x	1.89	x	14.2	x	0.4	x	0.7	=	5.21	(75)
Northeast 0.9x	0.77	x	1.89	x	9.21	x	0.4	x	0.7	=	3.38	(75)
Northwest 0.9x	0.77	x	1.89	x	11.28	x	0.4	x	0.7	=	8.28	(81)
Northwest 0.9x	0.77	x	1.89	x	22.97	x	0.4	x	0.7	=	16.65	(81)
Northwest 0.9x	0.77	x	1.89	x	41.38	x	0.4	x	0.7	=	30.35	(81)
Northwest 0.9x	0.77	x	1.89	x	67.96	x	0.4	x	0.7	=	49.84	(81)
Northwest 0.9x	0.77	x	1.89	x	91.35	x	0.4	x	0.7	=	67	(81)
Northwest 0.9x	0.77	x	1.89	x	97.38	x	0.4	x	0.7	=	71.43	(81)
Northwest 0.9x	0.77	x	1.89	x	91.1	x	0.4	x	0.7	=	66.82	(81)
Northwest 0.9x	0.77	x	1.89	x	72.63	x	0.4	x	0.7	=	53.27	(81)
Northwest 0.9x	0.77	x	1.89	x	50.42	x	0.4	x	0.7	=	36.98	(81)
Northwest 0.9x	0.77	x	1.89	x	28.07	x	0.4	x	0.7	=	20.59	(81)
Northwest 0.9x	0.77	x	1.89	x	14.2	x	0.4	x	0.7	=	10.41	(81)
Northwest 0.9x	0.77	x	1.89	x	9.21	x	0.4	x	0.7	=	6.76	(81)

Solar gains in watts, calculated for each month											
(83)m=	12.41	25.27	45.53	74.77	100.5	107.14	100.23	79.9	55.47	30.68	15.62
Total gains – internal and solar (84)m = (73)m + (83)m, watts											
(84)m=	377.67	388.35	396.73	407.15	414.03	402.56	383.58	369.32	354.69	349.11	355.52

7.1 Mean internal temperature (heating system)											
Temperature during heating periods in the living area from Table 9, Th1 (°C)											
(85)m=	21										

Utilisation factor for gains for living area, h1,m (see Table 9a)											
(86)m=	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
(86)m=	1	0.99	0.99	0.96	0.85	0.63	0.46	0.49	0.76	0.96	0.99

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)											
(87)m=	21	21	21	21	21	21	21	21	21	21	21

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)											
(88)m=	20.36	20.36	20.37	20.38	20.39	20.4	20.4	20.4	20.39	20.39	20.38

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)											
(89)m=	1	0.99	0.98	0.94	0.81	0.57	0.39	0.43	0.7	0.94	0.99

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)											
(90)m=	20.36	20.36	20.37	20.38	20.39	20.4	20.4	20.4	20.39	20.39	20.38

fLA = Living area * (4) = 0.51 (91)

Mean internal temperature (for the whole dwelling) = fLA * T1 + (1 - fLA) * T2											
(92)m=	20.69	20.69	20.69	20.7	20.7	20.71	20.71	20.71	20.7	20.7	20.69

Apply adjustment to the mean internal temperature from Table 4e, where appropriate											
(93)m=	20.69	20.69	20.69	20.7	20.7	20.71	20.71	20.71	20.7	20.7	20.69

8. Space heating requirement

Set T1 to the mean internal temperature obtained at step 11 of Table 9b, so that T1,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Utilisation factor for gains, hm:

(94)m=	1	0.99	0.99	0.95	0.83	0.6	0.43	0.46	0.73	0.95	0.99	1
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Useful gains, hmGm, W = (94)m x (84)m

(95)m=	376.29	386.14	391.53	387.5	344.82	242.14	163.77	170.78	259.66	331.79	352.26	364.95
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Monthly average external temperature from Table 8

(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2
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Heat loss rate for mean internal temperature, Lm, W = ((39)m x ((93)m - (96)m)

(97)m=	701.37	672.22	600.99	486.46	369.07	243.62	163.85	170.92	266.4	414.17	563.66	691.14
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Space heating requirement for each month, kWh/month = 0.024 x ((97)m - (95)m) x (41)m

(98)m=	241.86	192.25	155.84	71.25	18.04	0	0	0	61.3	152.21	242.69	
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Total per year (kWh/year) = Sum(98), 1,12 = 1135.43 (98)

Space heating requirement in kWh/m²/year

17.99 (99)

9a. Energy requirements – Individual heating systems including micro-CHP

Space heating:

Fraction of space heat from secondary/supplementary system

0 (201)

Fraction of space heat from main system(s) (202) = 1 - (201) =

1 (202)

Fraction of total heating from main system 1 (204) = (202) * [1 - (203)] =

1 (204)

Efficiency of main space heating system 1

136.75 (205)

Efficiency of secondary/supplementary heating system, %

0 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
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Space heating requirement (calculated above)

(211)m=	241.86	192.25	155.84	71.25	18.04	0	0	0	0	61.3	152.21	242.69	
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(211)m = ((98)m x (204)) * 100 ÷ (206)

(211)m=	176.87	140.59	113.96	52.1	13.19	0	0	0	0	44.63	111.31	177.47	
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Total (kWh/year) = Sum(211), 1,19 = 830.32 (211)

Space heating fuel (secondary), kWh/month

= ((98)m x (201)) * 100 ÷ (206)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0	
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Total (kWh/year) = Sum(215), 1,19 = 0 (215)

Water heating

Output from water heater (calculated above)

(163)m=	183.15	161.53	169.9	152.65	149.85	134.26	129.29	141.39	140.99	158.27	166.92	178.86	
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Efficiency of water heater

(217)m=	133.85	133.85	133.85	133.85	133.85	133.85	133.85	133.85	133.85	133.85	133.85	133.85	
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Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	136.82	120.68	126.93	114.04	111.95	100.3	96.59	105.63	105.33	118.24	124.7	133.62	
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Total = Sum(219), 1,12 = 1394.84 (219)

Annual totals kWh/year kWh/year

Space heating fuel used, main system 1

830.32

Water heating fuel used

1394.84

Electricity for pumps, fans and electric keep-hot

DER WorkSheet: New dwelling design stage

mechanical ventilation - balanced, extract or positive input from outside	116.34	(230a)
Total electricity for the above, kWh/year	sum of (230a) ... (230g) =	116.34 (231)
Electricity for lighting		335.79 (232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =		2677.29 (338)

12a CO₂ emissions – Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating (main system 1)	(211) x	0.519	= 430.94 (261)
Space heating (secondary)	(215) x	0.519	= 0 (263)
Water heating	(219) x	0.519	= 723.92 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1154.86 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	= 60.38 (267)
Electricity for lighting	(232) x	0.519	= 174.27 (268)
Total CO ₂ , kg/year	sum of (265) ... (271) =		1389.51 (272)
Dwelling CO₂ Emission Rate	(272) ÷ (4) =		22.02 (273)
EI rating (section 14)			83 (274)

I. General Notes

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The review of planning policy and other requirements does not constitute a detailed review. Its purpose is as a guide to provide the context for the development and to determine the likely requirements of the Local Authority.

No site visits have been carried out, unless otherwise specified.

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