

DOWN LANE PARK HUB



RIBA STAGE 3 ENERGY STATEMENT

September 2023 | Rev D

Energy strategy

Introduction

This document is part of the planning application for a new community hub building within the Down Lane Park in the Haringey Borough of Tottenham Hale. The hub will be a single storey building of approximately 401m² floor area which will primarily be a large multi-use community space, a café and kitchen and park maintenance office spaces.

Energy strategy in support of planning

This report provides justification as to why the proposal should be deemed acceptable in terms of energy and carbon emissions policy. Although a small minor development, the design adheres to Passivhaus principles and is designed to minimise carbon and energy consumption.

Work undertaken by the project team at RIBA stages 1-3:

- How environmental design has shaped the architectural design
- The proposed approach to low carbon heat
- How the design has sought to maximise PV generation

It includes the summary results of calculations and assessments which demonstrate how well the scheme is likely to perform. It should be noted that SBEM calculations have been undertaken using Part L 2021, accounting for SAP 10.2 carbon factors.

A small update to the East/West elevation and glazing has been proposed following the energy calculations presented here. It is considered that this is a minor change and can be evaluated at the next design stage, the changes are unlikely to significantly impact the outcome of the results.

Revision history

A	10/08/2023	Draft issue to design team
B	23/08/2023	Update to PV quantity
C	06/09/2023	Additional pages reviewing changes to the design
D	27/09/2023	Coordination with architect information

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Review of updated design | GA's

Following a Value Engineering process undergone by the team, an updated pack of drawings has been produced highlighting a few changes in plan and elevation. This and the following page provide comments on the revised design and the likelihood of any impact on the energy modelling.



Previous design – GF plan

Area reduction in the kitchenette and meeting room which can function as one if needed



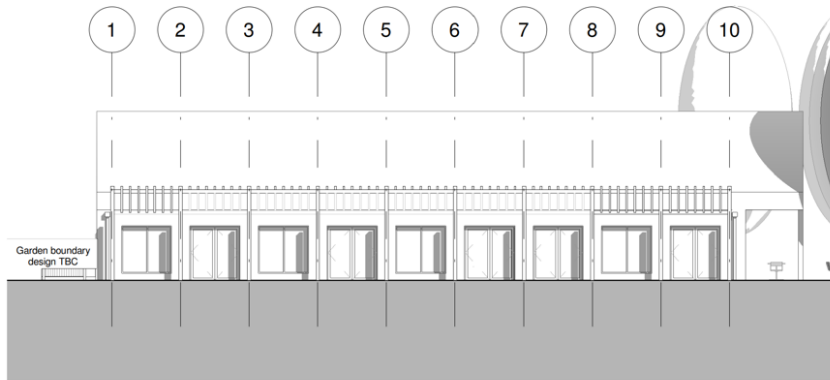
Planning changes – GF plan

Impact on Energy modelling

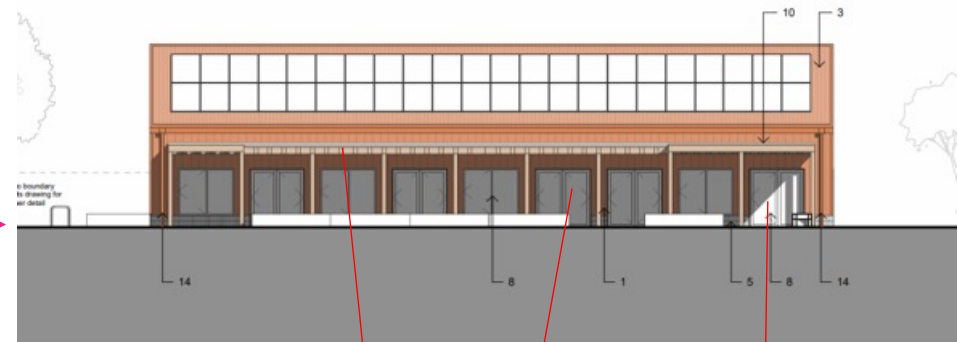
The area changes will have a negligible impact on the energy modelling results.

Regarding the kitchenette and the meeting room, they will run on a mixed ventilation mode in case these are merged into one space.

Review of updated design | Elevations



Previous design – South Elevation



Planning changes – South Elevation

External doors and
window head heights
reduced from 2.4m to
2.25m

Timber pergola
height reduced to
2.8m and pitch laid
flat (still covered to
provide shading to
the building)

Reduction in the
fenestration sizes in
line with Passivhaus
target ratios

Impact on Energy modelling

The window changes will be beneficial to the energy modelling results. More specifically, reduced glazing areas will offer less solar gains and will positively contribute to the reduction of the cooling demand.

The shading from the pergola is expected to still have a similar impact as per the previous design in reducing the cooling demand as much as possible.

Executive Summary | Compliance with planning policy

Delivering Haringey's Passivhaus vision

It is the vision of Haringey Council and the project team to create a highly efficient and sustainable building as response to the climate emergency, Down Lane Park Hub will be an exemplar project for the Council and local area.

Meeting statutory energy efficiency requirements

The building is less than 500m² and considered a minor development. The scheme meets the targets set by the the London Plan, Haringey Local Plan and Part L 2021 of the Building Regulations.

- **Energy efficiency (Be Lean).** The building achieves a **7% improvement** over Part L from energy efficiency measures
- **Low carbon heat (Be Clean).** The baseline heating system is considered as renewable technology, therefore there are **no further improvements** over Part L for this step.
- **Roof-mounted PVs (Be Green).** Heating is provided by an air to air heat pump (VRF and Fan Coil Units) to the main spaces. There is 26.5kWp of solar PV on the roof. This gives a total **95% improvement** over Part L.

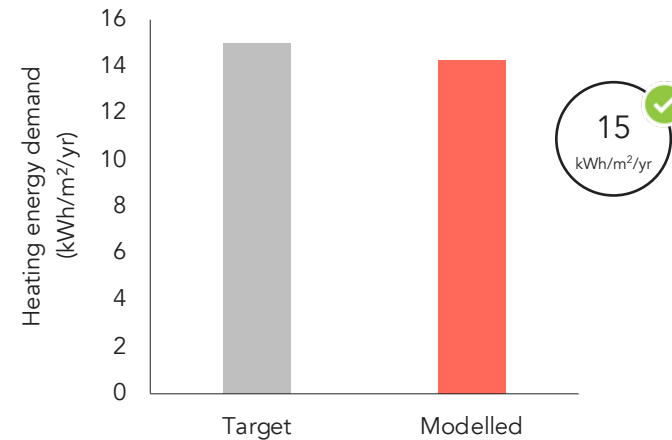
Based on the initial Part L calculations undertaken an overall **102% improvement over Part L** is targeted assuming the SAP 10.2 carbon factor for electricity of 136 gCO₂/kWh.

BREEAM and Passivhaus

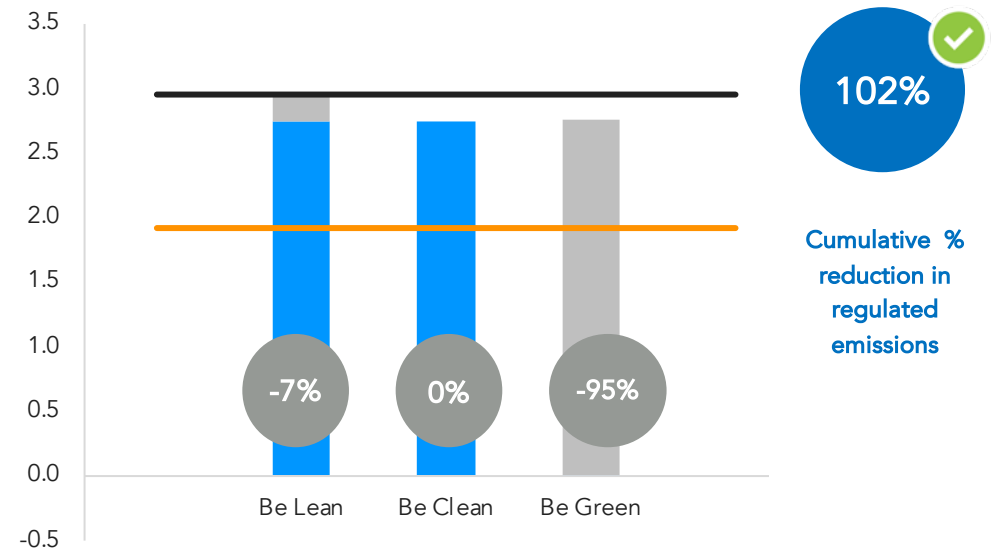
Non-domestic buildings should achieve BREEAM 'Very Good'. This project proposes going further and demonstrating 'Net Zero' carbon by targeting Passivhaus certification instead of a BREEAM assessment.

Carbon offsetting

No carbon offsetting is required as the design exceeds the Baseline Target Emission Rate.



ABOVE: The space heating demand from a PHPP calculation demonstrating that the building can meet the Passivhaus space heating demand requirements. BELOW: Site-wide energy hierarchy and targets for Down Lane Park Community Hub



Site-wide emissions
(tonnes CO₂ / year)

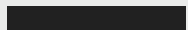
Carbon savings
(tonnes CO₂ / year)

Part L 2021 Target Emissions Rate

Minimum 35% saving on site

1.0

Policy and background



Introduction and policy requirements

Reducing the climate impact of buildings

There is a climate emergency

Climate change is happening and needs urgent action to slow down unknown and unprecedented impact. In 2019 the UK Government amended the Climate Change Act to adopt the recommendations of the Committee on Climate Change, and adopted a target for achieving net zero emissions by 2050.

Buildings are one of the few areas with significant opportunity for reducing emissions without impacting the quality of experience for those that use them.

Energy efficiency and a change in approach to design are required to achieve these ambitions. **New buildings not achieving these measures now will require retrofit to do so in the period 2030-2040.**

The cost of changing from 'business as usual' to ultra low energy

A technical study undertaken by Currie & Brown and AECOM for the CCC's report illustrates that a switch to low carbon heating must be supported by significant improvements in energy efficiency in order to manage running costs and avoid external costs to the wider energy system. **Achieving carbon savings in new buildings costs less than reducing emissions in other areas**, for example retrofit of existing buildings, or of this building in the future.

The study indicates that significant reductions in space heating demand can be achieved at lower cost than smaller improvements, as it enables savings in the size and extent of the heating system.



The UK Government has committed in June 2019 to Net Zero emissions by 2050



Key Actions

1. **Assessing need.** Ensuring that there is sufficient need, and a new building or refurbishment is required to provide the function in the brief.
2. **Reduce embodied energy.** Reducing the amount of carbon needed to produce, transport and construct the building.
3. **Reduce operational energy.** Reducing how much energy the building needs to function.
4. **Low carbon heat.** Maximising the efficiency of the building systems, particularly heating and cooling, and ensuring they are from low carbon sources (low carbon heat).
5. **Renewable electricity generation.** Maximising the potential for renewable generation.

Policy | London Borough of Haringey Local Plan and the Client Brief

London Borough of Haringey Local Plan was published in 2013 and updated in 2017. It is the key set of planning documents for the borough. It sets out the vision for the Borough up to 2026 and puts in place a policy framework to deliver that vision.

The New Local Plan for the Borough, intended to be implemented in 2022, is currently being prepared. The new plan will respond to the Climate Emergency and support the **Haringey Climate Change Action Plan** which was adopted in 2021.

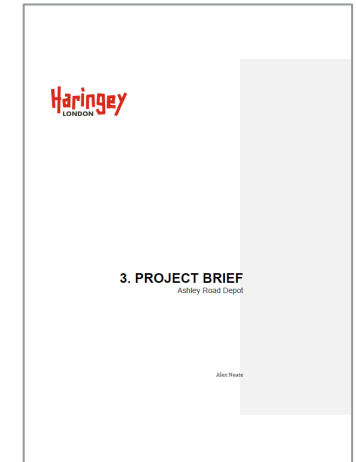
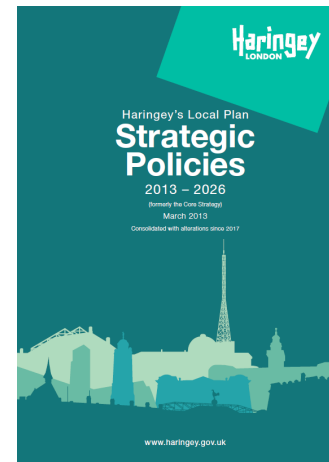
Of particular relevance from the Climate Change Action Plan is **Objective W5 - Achieve zero carbon in all new build non-residential developments**. Ensuring new buildings are built to the highest fabric and energy efficiency standards the first-time round, will circumvent these buildings needing to be retrofitted in the future.

The Haringey Local Plan (2017) Policy SP4 states that new developments in the Borough will be expected to comply with the requirements of the London Plan for energy efficiency and reductions in carbon emissions relative to national minimum standards.

SP4 also states that all new non-residential developments should achieve BREEAM 'very good'. Given the smaller scale of the scheme and strength of the project's energy and carbon ambitions it is proposed that Passivhaus certification is targeted instead of this requirement. This has been discussed with Haringey Council during pre-application meetings.

The client's brief for the Down Lane Park redevelopment states 10 key objectives for the Community Hub, including:

10. Sustainable: Embed exemplary sustainability and climate change resilience credentials, striving for net zero carbon



SUSTAINABLE COMMUNITY STRATEGY
The policies in this chapter contribute to the spatial aspects of the following priorities in Haringey's Sustainable Community Strategy.
SCS priorities:
• Tackle climate change; • Manage our environmental resources more effectively; • Increase recycling and reduce waste; • Promote sustainable transport; and • Encourage our future citizens to be our first green generation.

Key planning requirements

- SP4: All new non-residential developments shall be zero carbon from 2019.
- SP4: Passivhaus certification is proposed as an alternative to BREEAM 'Very Good'.

Policy | The London Plan 2021 and National Policy

The London Plan (2021)

The key policies on energy and sustainability are:

Policy SI 1 – Requires developments to protect and improve the air quality in London.

Policy SI 2 - Requires major developments to be net zero carbon.

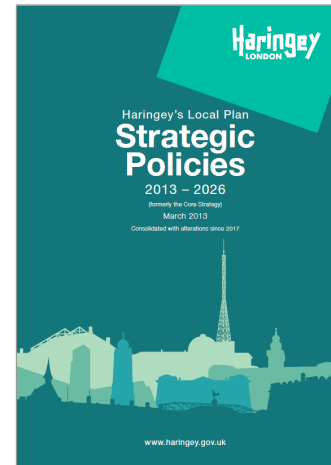
Policy SI 4 - Requires development proposals to minimise adverse impacts on the urban heat island and also to reduce the risk of internal overheating.

Space Heating Demand and Energy Use Intensity

Additionally the GLA energy assessment guidance asks to report the space heating demand, a measure of the effectiveness of the envelope, massing and form of the design along with the Energy Use Intensity, which assesses operational energy consumption. These are to be reported using the Gross Internal Area.

Building Regulations

Updates have been published to Approved documents L - conservation of fuel and power – and F – ventilation, both of which have impacts on the design of commercial buildings after June 2022. These updates are an interim standard, requiring better minimum energy efficiency standards in all new buildings



Key planning requirements

- 100% on site reduction in carbon emissions compared to a Part L 2021 baseline case

Policy I National policy direction - Mission Zero

Independent report to Government on how and why to deliver Net Zero in the UK

The report was commissioned in 2022 and reported in 2023 on the progress made so far and opportunities that Net Zero Carbon emissions targets in the UK present for business and economic growth. The report also assesses the risks of not achieving the goals or of not moving rapidly enough.

The report considers all sectors of the UK economy that are driven or influenced by Government policy and action and makes 129 recommendations to Government for changes to regulation, taxation and spending.

The Construction Industry

Construction is seen in the report as a key early mover that should be making rapid progress towards the Net Zero goals.

The following key recommendations affecting construction generally and new homes in particular are suggested to be actioned within the current Parliament (2019 to 2024), to set a clear framework for businesses:

1. Legislate by 2025 the minimum energy efficiency rating to EPC B for all non-domestic buildings, both rented and owned, by 2030.
2. Consider a Net Zero Performance Certificate as future benchmarks for an energy efficient home.
3. Mandate solar PV on all new homes from 2025 (implementation of the Future Homes Standard).
4. Consider innovative green finance products and catalyse heat pump investment.

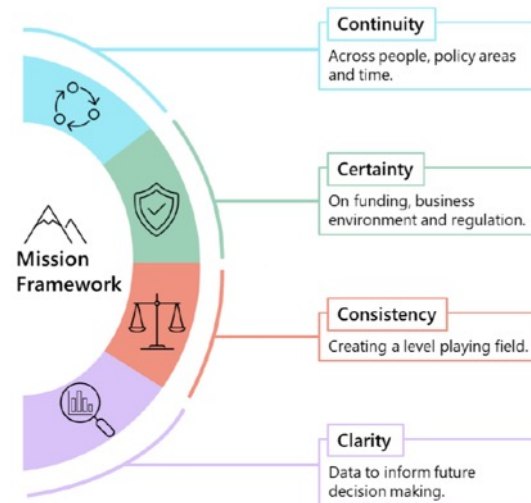
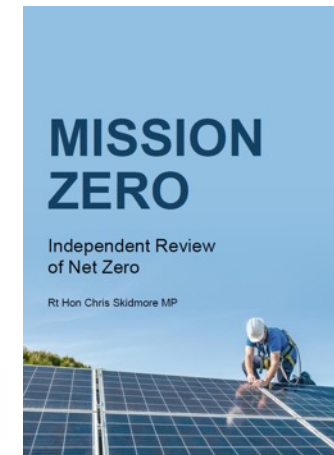


Figure 1.1 – This Review takes a mission-led approach



Key proposals

- Apply a minimum energy performance to all buildings, domestic and non-domestic, new build and existing that applies at the point of sale/rent.
- Ban all gas boilers, new and replacement, by 2033

What is Passivhaus and how can it help?

The Passivhaus Building standard

Passivhaus is an energy efficiency and comfort standard for buildings. It sets a target for the amount of heat and electrical energy that a building can use and provides a process to ensure that target is achieved.

The Passivhaus criteria for energy efficiency are in line with the recommendations of the Committee on Climate Change for new buildings. Passivhaus is simple, it focusses on these core principles:

Reducing heating energy. A radical reduction of heating energy is the largest opportunity for reducing energy consumption and carbon emissions from buildings.

Best practice construction fabric performance. The energy efficiency of the building fabric and design is tested. The focus is not on technology, and simpler designs and strategies often work best. A fixed target in kWh/m²/year is set, rather than a % reduction.

Consider all energy uses. All energy consumers in the building must be considered and reported against. There is a target, but the intention is for the lowest energy consumption realistically possible.

Robust energy calculations. Passivhaus uses open source excel based software that is transparent about assumptions and limitations. It has been proven against real buildings. The software is called PHPP (Passivhaus Planning Package).

Quality assurance during design and construction. Passivhaus provides a process up to the end of construction to ensure that targets for heating demand and total energy consumption are achieved. Similar to quality control for product manufacture, Passivhaus works only to the end of construction, so the 'factory gate'.

Benefits for building users:

- + Simpler control and use for each room or space.
- + Improved comfort. More consistent and improved air quality.
- + Less requirement to change habits in order to be sustainable, building can be used as is needed.
- + Knowledge that their work place is as sustainable as possible.

Benefits for Haringey Council:

- + Reduced carbon emissions.
- + Improve build quality, reduce risk of performance gap and improve quality assurance of construction design.
- + Low fuel bills for the life of the building. Reduce exposure to energy price volatility.
- + Demonstrates commitment to acting on climate change in the context of a major new development.
- + Aspirational and attractive to prospective students concerned about climate issues.
- + No requirement to retrofit or improve performance to meet future carbon requirements. Reduce risk of becoming a stranded asset.
- + Improve access to capital funding.

Passivhaus building certification requirements

The Passivhaus building standard

The Passivhaus standard is a construction standard for comfort and energy efficiency of buildings. Passivhaus buildings minimise energy consumption and carbon emissions and are the first step to net zero carbon.

An impartial Passivhaus certifier carries out the assessment. The Passivhaus certifier will be appointed before construction starts.

Full Passivhaus requirements published on Passivhaus website

https://passiv.de/downloads/03_building_criteria_en.pdf

The key quantified requirements are listed opposite. Other relevant requirements for this project are:

1. All rooms must be actively ventilated in winter. This is mechanical ventilation with heat recovery in any occupied room. It includes circulation, plant areas and walk-in store rooms.
2. All rooms with prolonged occupancy should have opening windows for occupant satisfaction and purge or summery ventilation.
3. Minimum surface temperature for moisture is fRSI >0.7 for all details including window frames.

Passivhaus certified components

The Passivhaus Institute also certifies building components such as windows, ventilation systems and façade products.

Certified Passivhaus buildings do not need to use Passivhaus certified components. The component certification is a useful way to get the relevant data.

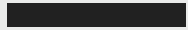
The Passivhaus requirements

1. **Space heating energy demand** of less than 15kWh/m²/yr calculated using PHPP software and based on as-built construction evidence.
2. **Primary Energy Renewable demand** of less than 60kWh/m²/yr, plus an additional allowance for special building uses and PV generation. Systems must be demonstrated to be the most efficient available for the use type.
3. **Summer comfort** demonstrating rooms have less than 10% of the year above 25C.
4. **Air infiltration of less than 0.6ach**, a lower air permeability of at least less than 1.0 m³/m²/h@50Pa is required for buildings greater than 1,500m³.
5. All further requirements in the latest Criteria for the Passive House, EnerPHit and PHI Low Energy Building Standards must be met. The criteria are available from www.passiv.de



2.0

Energy strategy results



Calculation summary outputs

Be Lean | Key energy efficiency measures and performance

Reducing space heating demand at Down Lane Park

The adjacent icons summarise the key energy efficiency measures. They summarise the efforts made by the project team to design buildings which are inherently energy-efficient (e.g. building form, window proportions, location of MVHR unit) as well as indicative specifications (e.g. U-values, triple-glazed windows, best practice airtightness).

Similarly the services have been designed to be highly efficient, such as high efficacy LED luminaires throughout and ventilation systems with low specific fan powers.

Full details on the modelling assumptions can be found in Appendix A.

Estimated performance and Passivhaus

The Hub has been modelled with PHPP (Passive House Planning Package) as it is more accurate at predicting likely future space heating demand and energy use than Part L assessments.

These Stage 3 PHPP assessments indicate that:

- The building currently achieve a space heating demand of <15 kWh/m²/yr, which means that they would be able to seek Passivhaus certification.
- Passivhaus certification could be challenging as there is a large exposed surface area inherent for a single storey building.



Building form

The form factors has been optimised given the site constraints and low density of the development.



Elevation design

The proportions of windows is exemplar. On average it ranges **between 15% and 25%** with more windows on the East elevation. All windows will be triple-glazed.



Insulation and airtightness

A well insulated envelope is proposed with low U-values (e.g. **0.13 W/m².K for the main external wall elements**). A best practice airtightness is targeted (i.e. **0.6 m³/h/m² at 50Pa**) at a building level.



Mechanical ventilation

Mechanical Ventilation with Heat Recovery is provided in each unit, close to an external wall. A **heat recovery efficiency of >80%** is targeted.

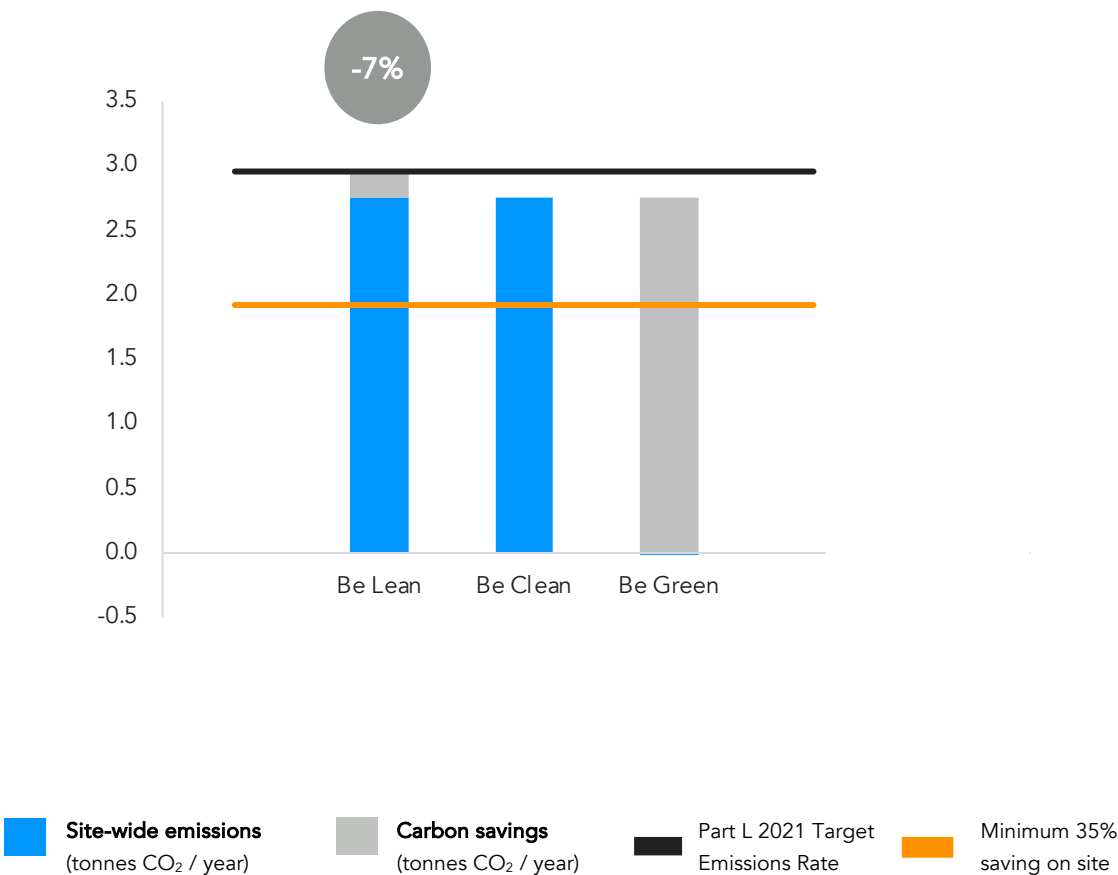
Be Lean | Compliance with planning policy

The development achieves a **7% improvement** over Part L 2021 Baseline from energy efficiencies measures.

As per the GLA guidance the Lean model has been compared with the Notional using the same system types and performance as the Baseline. This means the improvement is only due to an improvement of efficiency in the heat pump, the model utilises a heat pump for both heating and hot water with COPs of 2.64 and 2.86 respectively.

The 7% reduction in carbon is primarily driven by Heating, Lighting and DHW savings. However, the cooling and auxiliary energy consumption exceed the notional and reduce the savings. This is due to the smaller size of the building and excellent insulation level that causes the cooling load and fan coil usage to increase relative to the Notional model.

Site-wide energy hierarchy and targets for Down Lane Park



	Total regulated emissions (Tonnes CO ₂ /year)	CO ₂ savings (Tonnes CO ₂ /year)	Percentage saving (%)
Part L 2021 baseline	3.0	-	-
Be lean	2.7	0.2	7%

Be Clean | Summary of Proposals

Planned future network

There is no existing district heat network, however a new district heating network is planned for this area, connecting through Down Lane Park to Harris Academy Tottenham. The HDEN, operated by the Tottenham Hale Energy Centre could potentially run directly across the proposed Community Hub.

The operators have been contacted and their correspondence has been included in Appendix C of this report.

Provision for connection

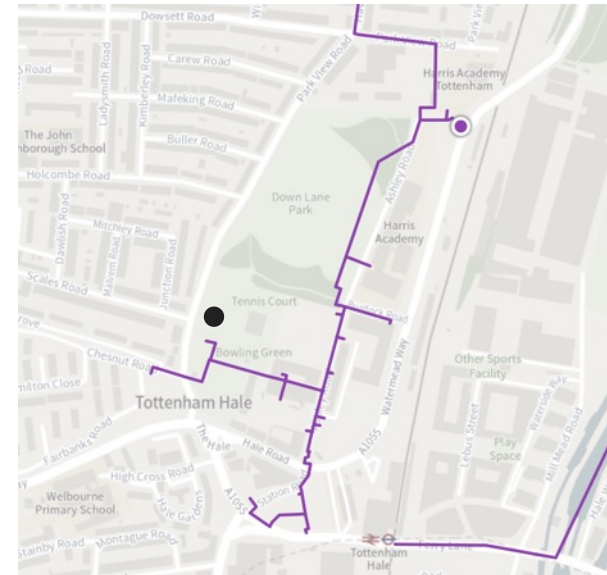
Local policy requires the building to allow sufficient space for a future connection. The building will include space for a future buffer tank or heat exchanger.

Low carbon heat

The heat source for the district heat network is unknown. To be comparable to the proposed heat pump system, a heat source with a 30 year average carbon content of heat of less than **30gCO₂/kWh** would be required. If the carbon content of heat provided by the DEN is higher than this, then a connection is not recommended. A heat network including waste to energy or gas CHP would be considerably higher carbon than the proposal.

Down Lane Park Proposals

Due to the size of the proposed Hub, it is likely that the overall heating energy consumption will be relatively low, which may mean that connection to the network is unfeasible. In addition, the likely pipe losses from any connection to the network could mean that connecting to the network in the future does not provide any benefit to the overall carbon emissions of the project.



Screenshot of the planned district heat network from the London Heat map retrieved July 2023.

Be Green | Renewable energy generation

Heat Pumps

The hub is designed to be supplied by high efficiency Variable Refrigerant Flow (VRF) heat pump that will generate heating, hot water and cooling throughout. The Mitsubishi unit will be able to provide a Heating SCOP of 3.6 and a Cooling SEER of 5.27, it also supplies the DHW load of the building.

Roof PV layout

The current plans shows the roofs can accommodate approximately 53 PV panels across approximately 112m² of roof area (assuming 500W panels). This arrangement uses all available space on the roof that is pitched southerly.

In summary, our assessment indicates that this PV layout gives an energy yield of of 48.2 kWh/m².

Best practice solar technology is also assumed: high efficiency monocrystalline silicone panels with microinverters or DC optimisers.



Nominal array
power



Annual energy
generation



Example of roof mounted solar PV panels on a standing seam zinc roof © Rhienzink



Indicative roof plan PV layout showing the optimised panel locations

Part L 2021 Summary | Compliance with planning policy

The scheme meets the targets set by the the London Plan, Haringey and Part L 2021 of the Building Regulations.

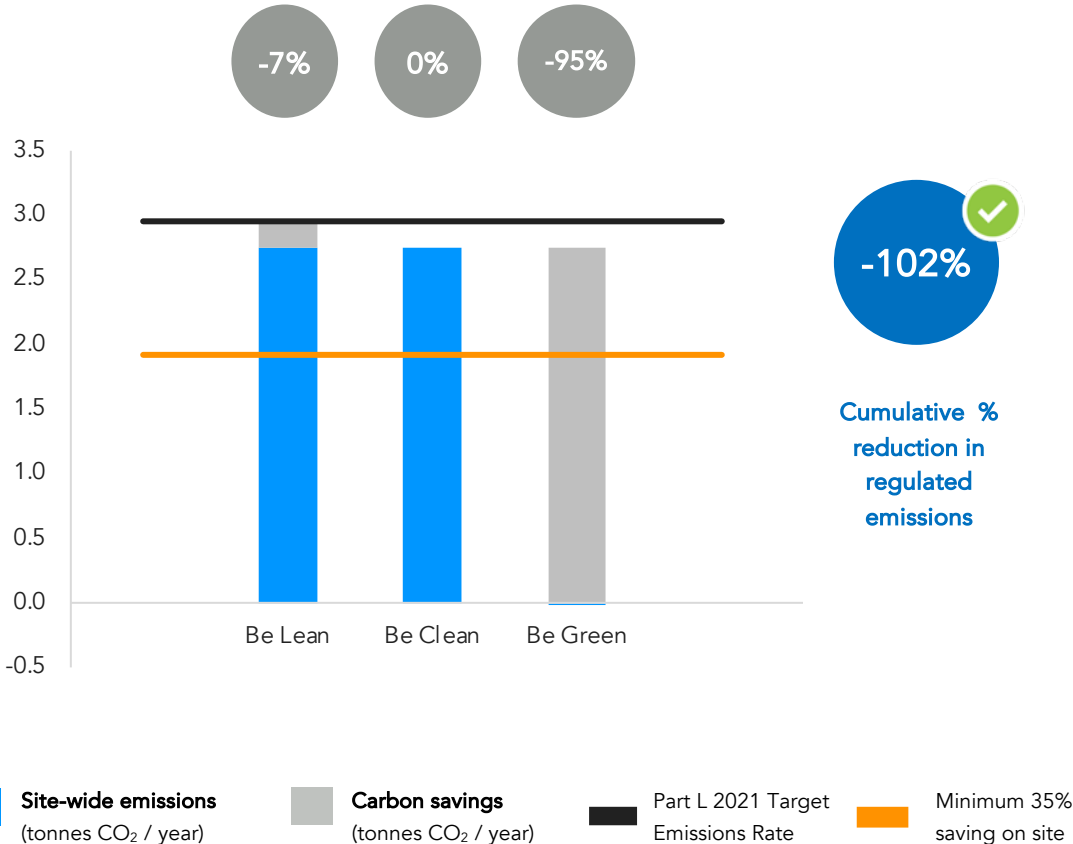
- **Energy efficiency (Be Lean).** The building achieves a **7% improvement** over Part L from energy efficiency measures
- **Low carbon heat (Be Clean).** The proposed heating system is considered as renewable technology, therefore there are **no further improvements** over Part L.
- **Roof-mounted PVs (Be Green).** Heating is provided by efficient VRF and Fan Coil Units to the main spaces and photovoltaic panels on the roof (26.5 kWp) are proposed. Based on the initial Part L assessment, this will lead to a further **95% improvement** over Part L.

Based on the initial Part L calculations undertaken an overall **102% improvement over Part L** is targeted assuming the SAP 10.2 carbon factor for electricity of 136 gCO₂/kWh.

Carbon offsetting

No carbon offsetting is required as the design exceeds the Baseline Target Emission Rate.

Site-wide energy hierarchy and targets for Down Lane Park Community Hub



	Total regulated emissions (Tonnes CO ₂ /year)	CO ₂ savings (Tonnes CO ₂ /year)	Percentage saving (%)
Part L 2021 baseline	3.0	-	-
Be lean	2.7	0.20	7%
Be clean	2.7	0.00	0%
Be green	0.01	2.8	102%
Offset			£0

Energy metering (Be Seen) | London Plan 'Be Seen' metering requirements for major developments

Policy requirements

Policy SI 2 in the London Plan introduces a fourth tier of the energy hierarchy - 'be seen'. This requires post-construction monitoring for all 'major developments'.

The diagram to the right shows the requirement at each stage, and who is responsible. The final responsibility for reporting energy data lies with the building owner.

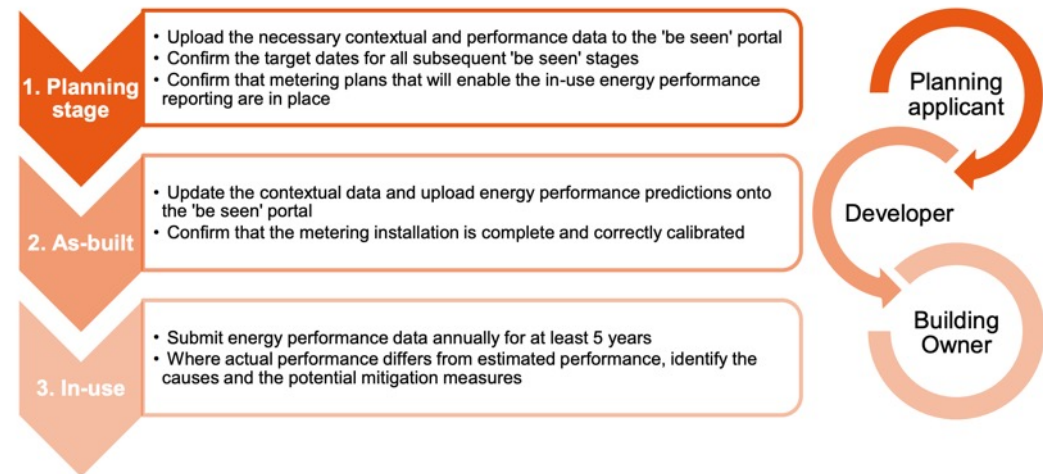
Reporting data

For the purposes of energy metering the buildings on the site are split into 'reportable units' (RU) which aggregate data between homes.

Planning stage submission

The applicant will submit all required data associated with the Be Seen policy via the webform. The data expected at this stage is shown in the table on this page.

All affected parties should be made aware of the requirements at the as-built stage and the S106 negotiations will be used to set out the arrangements for providing this ongoing information.



Performance indicator group	Description
 Contextual data	- Location Unique Property Reference Number (UPRN) or Address (if no UPRN available) - Site plan - Typology/use (all included) - GIA (m²) for each typology/use - Anticipated target dates for each 'be seen' reporting stage (that is – as-built and in-use as per Figure 2.1)
 Building energy use	- Grid electricity consumption (kWh) - Gas consumption (kWh) - Other fuels consumption (kWh) - District heating/cooling consumption(kWh) (if applicable)
 Renewable energy	Energy generation (kWh)
 Carbon emissions	- Carbon emissions estimates (tonnes CO₂/m²) for residential and non-residential uses separately as well as the whole development - Carbon shortfall for the entire development (tonnes CO₂) - Estimated carbon offset amount (£)

Energy metering (Be Seen) | The purpose of collecting data

The purpose of metering energy use in new buildings

There are clear benefits for setting up a clear metering strategy and enable the building users to monitor energy use:

- Spot potential set up and commissioning issues by comparing measured energy consumption to predictions or identify faulty equipment during operation.
- Help tenants understand their use patterns and diagnose high bills, e.g. at energy clinics.
- Report aggregated or average energy consumption to feedback into design calculations on future schemes.
- Report real energy consumption, generation and carbon emissions to the design team, the client, and building owner as demonstration of meeting climate change objectives.
- Report aggregated energy consumption and carbon emission data to compare against design targets. comply with the London Plan 'Be Seen' requirement.

Data that should be collected

Any data that is stored must adhere to data protection legislation.

The minimum metering would be the annual energy consumption, communal lighting, and the generation for PV.

For each meter the **monthly energy consumption** should be stored. The datalogger or system should ensure that there is enough storage for at least 5 years of data.

It is highly recommended that energy monitoring is carried out alongside a more comprehensive building performance evaluation.

Further information is available in: **RIBA Plan for use guide 2021;**

Wood Knowledge Wales – Building Performance Evaluation Guide

Useful submetering

Submetering the heating and hot water energy consumption.

Meter measuring heat consumption

Submetering generation from PV before the consumer unit, so that total generation can be reported (and doesn't offset consumption).

Submetering electric vehicle charging. This can wildly distort building level data and needs to be separated out.

Internal temperature and humidity. Context data can help understand reasons for different energy consumption and spot issues early.



Smart meters offer remote monitoring opportunities, but often a separate monitoring system is more reliable.



© Switcher offers a smart thermostat could monitors temperature and RH for landlords.

Cooling and Overheating

Cooling strategy

While an active cooling strategy has been proposed, the design of the community hub has been developed to minimize its use as far as practicable.

- 1. External shading through the pergola and eastern façade shades has been designed to minimize excessive solar gains in the summer.
- 2. The major facades have large openable elements that allow for cross ventilation where possible.
- 3. Mechanical ventilation through Air Handling Units will supply free cooling in the summer months.

Due to varied use of the main community space, that is designed to be segmented and modular, a VRF system with Fan Coil Units has been specified to be used during excessively hot summer periods and where the usage of the space is either at maximum occupancy or where, due to privacy or nuisance the windows and doors need to be closed.

Overheating

A dynamic CIBSE TM52 overheating analysis has been undertaken for all habited spaces to assess the risk of overheating during the summer months. As per GLA guidance the building has been assessed against the three TM52 Criteria for London Weather Centre DSY 1, DSY 2 and DSY 3 weather files. (It should be noted the DSY 2 and 3 results are reported for information only).

Due to the significant openable facades for the Community Space and Café, as well as the presence of cooling via Fan Coil Units in, the results indicate that all spaces pass TM52 analysis. Full details of this simulation can be found in the accompanying Overheating report.

	Area weighed average cooling demand (MJ/m2)	Total area weighted cooling demand (MJ/year)
Actual	120.3	52,330
Notional	39	16,965

It is likely the Actual cooling exceeds the Notional due to a combination of the large amount of glazing compared to the Notional as well as significant increase in fabric U-value and air tightness.

It should be also noted that the proposed overheating strategy presented as part of the detailed thermal modelling and the accompanying Overheating report has been reducing the cooling demand as much as practicable.

EUI and Space Heating Demand | GLA Energy Assessment Guidance

Space Heating Demand

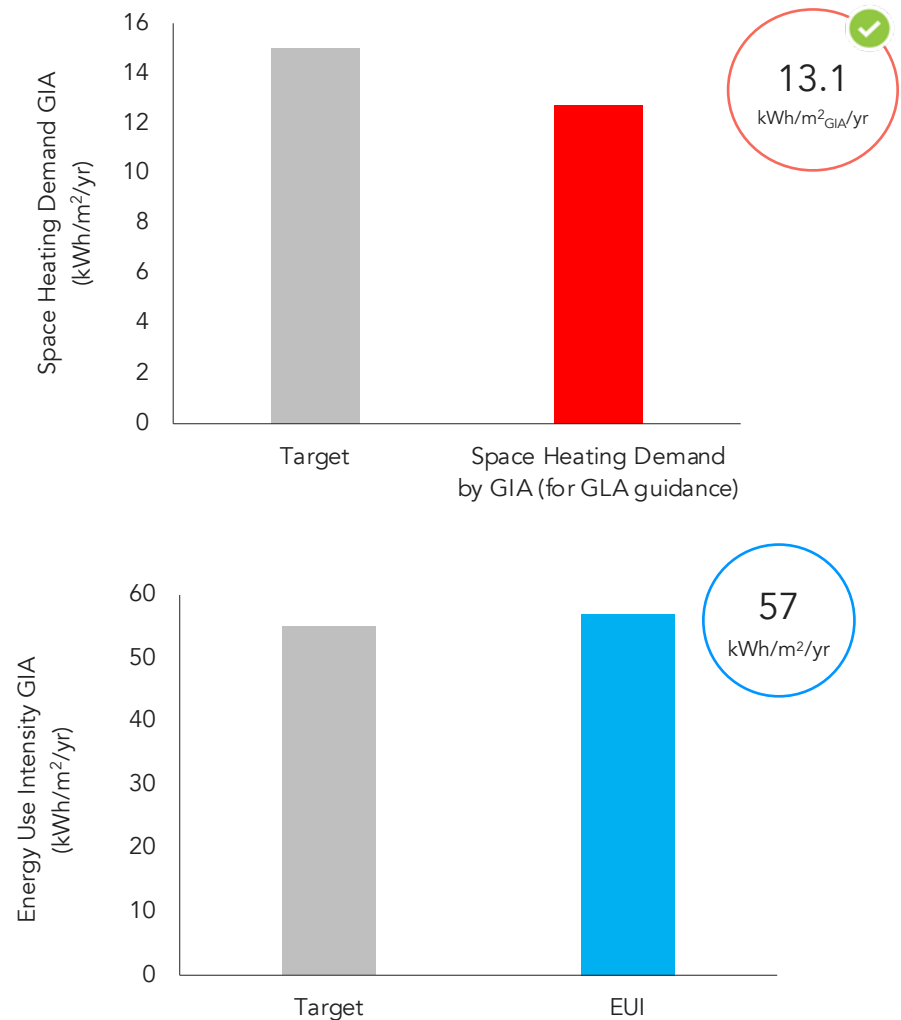
As part of the Passivhaus design process the space heating demand has been assessed using PHPP software. Using a Gross Internal Area of 435m² the Hub achieves 13.1 kWh/m².

The floor area of the proposed scheme has reduced slightly, however the specific space heating demand is likely to be very similar. This demonstrates the effectiveness of the envelope's design and is below the GLA target value of 15 kWh/m².

Please note that this is different to the Passivhaus space heating demand reported as it is to a different floor area basis.

Energy Use Intensity

The EUI is a measure of total operational energy consumption that considers not just regulated energy but also unregulated sources such as equipment and cooking. The GLA target value for non-residential buildings is 55 kWh/m². The current Stage 3 design is still being developed and more detail is required to be able to accurately predict the EUI for the building, however a preliminary value has been calculated using assumptions modelled within PHPP.



Achieving Passivhaus certification

PHPP calculations

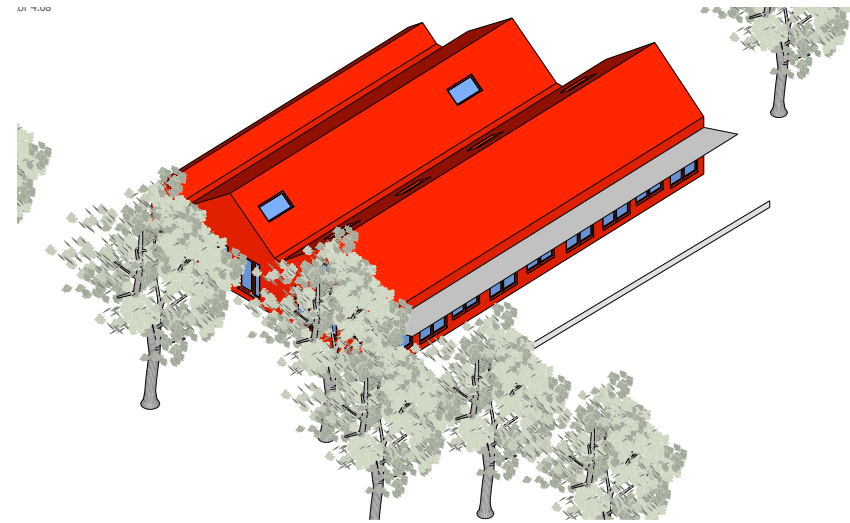
Predicted heating energy consumption calculations have been carried out using PHPP v10.4. Calculations are based on design information issued before 21/06/23. PHPP gives a more realistic estimate of actual consumption to statutory energy calculations and is used to assess buildings against the Passivhaus and AECB standards.

The Space Heating demand is reported using the Passivhaus 'Treated Floor Area', this is calculated as 398m² and is slightly lower than the GIA.

Down Lane Park Hub is capable of achieving Passivhaus

Based on the Stage 3 design information the Down Lane Park Community Hub can meet the major requirements to achieve Passivhaus.

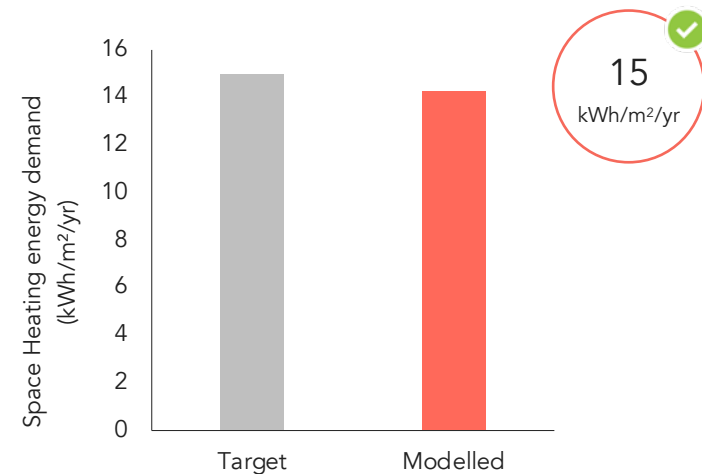
Further work will need to be undertaken at the next stages to assess the additional criteria such as Primary Energy Renewable.



Screenshot of the 3D model used for PHPP calculations showing the heat loss area for Down Lane Park in red.

Further requirements to achieve Passivhaus certification

- Further develop the PHPP model and define robust assessment of PER.
- Building achieves the air tightness requirement of 0.6ach@50Pa.
- Commercial kitchen equipment meets specific Passivhaus energy efficiency requirements.
- Commercial kitchen extract has variable volume flow rate, and potentially heat recovery run around coil.



Calculated space heating demand comparable to the Passivhaus building standard for Down Lane Park compared to the Passivhaus target of 15 kWh/m²/yr

3.0

Summary of assumptions

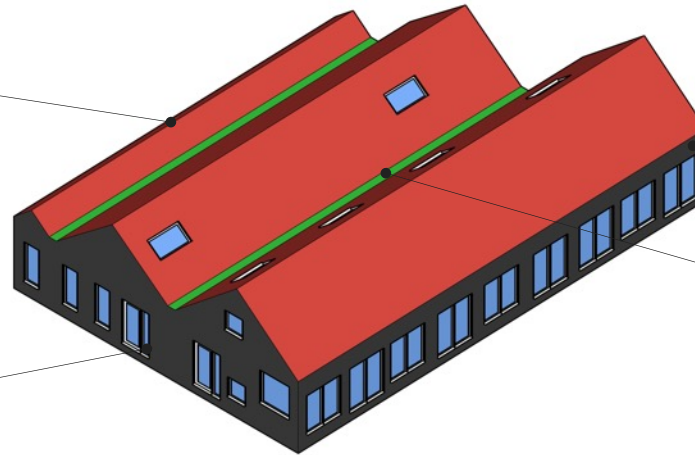
██████████

Fabric efficiency assumptions used for calculations

Insulation requirements

The recommended U-value and indicative insulation type and thickness for each external construction is shown. These have been tested in a concept stage PHPP calculation to achieve a space heating demand of 14kWh/m²/yr (target figure for a Passivhaus building at this stage of design). Adjustment between the U-value of elements to achieve the same outcome is possible.

RF01 – Main roof	
Indicative construction: Full fill insulated timber frame	
U-value: 0.10W/m²K	Area: 605m²



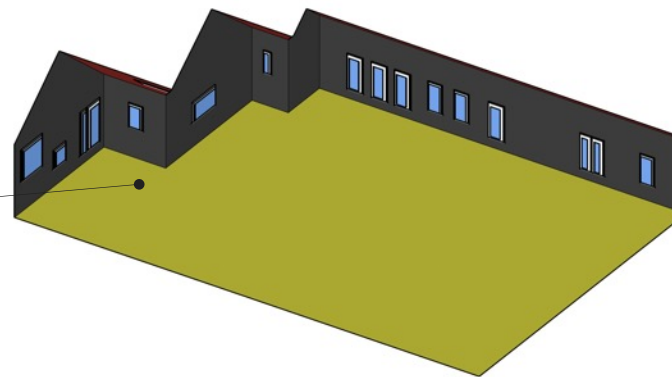
Exposed external envelope: North East perspective

EWS 01 – Timber Frame External Wall	
Indicative construction: Full fill insulated timber frame	
U-value: 0.13W/m²K	Area: 322.1m²

RF01 – Flat roof	
Indicative construction: Full fill insulated timber frame	
U-value: 0.10W/m²K	Area: 236m²

Windows and doors	
Indicative construction: Insulated timber frame with triple glazing	
U-value: <0.9W/m²K	Area: 111.8m²

Rooflights	
Indicative construction: Timber frame with triple glazing	
U-value: <0.9W/m²K	Area: 15.8m²



Below Ground perspective

GF01 – Ground Floor	
Indicative construction: XPS insulation below concrete slab	
U-value: 0.10W/m²K	Area: 527.7m²

Ventilation services assumptions

Air Handling Unit

An Airflow Flexi DV AHU have been specified which supply the ventilated spaces via the the pitched roof ceiling voids. A kitchen extract system, to be finalized by specialist, will also serve the food preparation areas.

The Flexi DV has an assumed specific fan power of 1.6 W/l/s and a heat recovery efficiency of 85%.

Duct Lengths

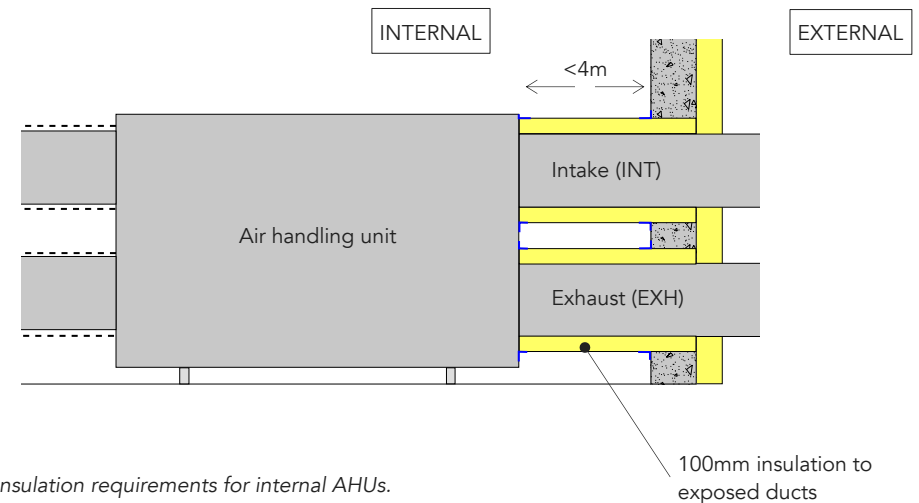
Duct connections to the air handling units carry the whole ventilation air for the building. Any heat loss or gain into this air flow has a significant impact on the energy efficiency of the building.

Duct insulation performance requirements should be incorporated into the MEP specification

Internal AHU



Proposed Airflow AHU with heat recovery



Duct insulation requirements for internal AHUs.

Heating, cooling and hot water services assumptions

Variable Refrigerant Flow Heating and Cooling

Heating and Cooling are to be provided by VRF unit with terminal Fan Coil Units in the Café, Community Space and Parks Offices. The Mitsubishi unit will be able to provide a Heating SCOP of 3.6 and a Cooling SEER of 5.27.

Domestic Hot Water

The VRF system will also supply the DHW load which is supplemented by a Mitsubishi sanitary water heater that will serve the toilets, changing rooms and kitchen spaces.

3.6

sCOP

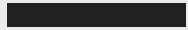
5.3

SEER



4.0

Appendix



Appendix A | Part L Modelling Assumptions

Assumption	Calculation	Notes
General		
Weather file	London TRY	
Floor Area (m ²)	435	
Building Fabric		
Air permeability	1 m ³ /m ² .hr @ 50 Pa	
Average U-values	Ground floor: 0.075 W/m ² .K External wall: 0.09 W/m ² .K Roof: 0.09 W/m ² .K	Ground floor U-value does not include affect of ground External wall U-value does not include affect of structure (e.g. slab edges and masonry shelves)
Window U-value	Area weighted building average U _{window} 1.0 W/m ² .K g-Value 0.5	
Door U-value	1.0W/m ² .K	
Rooflight U-value	Rooflights 1.0 W/m ² K	

Assumption	Calculation	Notes
Lighting		
Lighting efficacy	110 lm/w	
Lighting controls	Manual ON/ Auto Off – Back of House Manual ON/ Auto Dimmed – Community Space and Cafe	

Ventilation Systems		
System	Air Handling Unit and Fan Coil Units	
AHU system efficiency	Heat recovery efficiency = 80% AHU SFP 1.6 W/l.s FCU SFP 0.3 W/l/s	

Space Heating & Domestic Hot Water		
Source	VRF Unit	
Heating SCOP	3.6	
Storage	300L cylinder with Sanitary Heating element	

Cooling		
Source	VRF Unit	
Cooling SEER	5.3	

Appendix B | PHPP Modelling Assumptions

Assumption	Calculation	Notes
General		
Weather file	BRE GB0001a-London	Passivhaus climate file
Occupancy	60 people	Assumed Max at this stage
Floor area (TFA) Floor area (GIA)	398m ² 401m ²	Space heating demand is calculated using Passivhaus treated floor area.
Winter design temperature	20°C	

Building Fabric

Air permeability	0.49 m ³ /m ² .hr @ 50 Pa (0.6 ACH)	Equivalent to Passivhaus. Building should target <0.6m ³ /m ² .hr @ 50 Pa. Margin provided for contractor risk.
Average U-values	Ground floor: 0.10 W/m ² .K External wall: 0.15 W/m ² .K Roof: 0.10 W/m ² .K	Ground floor U-value does not include affect of ground External wall U-value does not include affect of structure (e.g. slab edges and masonry shelves)
Thermal bridging	Additional 1.8 kWh/m ² /yr budget included	
Window U-value	Area weighted building average U _{window} 0.9 W/m ² .K Window frame 1.0 W/m ² .K Glass 0.60W/m ² .K	Triple glazing, frame thickness 110mm Glazing assumed as 21% of external wall U _{window} includes installation thermal bridging
Door U-value	<1.0 W/m ² .K	
Rooflight U-value	Rooflights 0.9W/m ² .K	Triple glazing
Glazing g-value	Generally 0.50	
Fixed shading	Calculated from 3D model including surrounding buildings.	

Heat gains

Internal heat gain	3.5 W/m ²	Standard assumptions used at this stage. Average gains to space.
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Assumption	PHPP calculation	Notes
Lighting		
Lighting efficacy	Not used at this stage	
Lighting controls	Not used at this stage	

Electrical equipment

Equipment & appliances	Not used at this stage	
------------------------	------------------------	--

Ventilation Systems

System	To MEP design. Balanced mechanical ventilation with heat recovery	Unit should be Passivhaus certified
AHU system efficiency	Heat recovery efficiency = 80% SFP <1.5W/l.s Ducts to/from atmosphere insulated to 25mm	SFP includes both fans and controller
Ducts to/from atmosphere	Average duct length of 2m. Pre-insulated, or Insulated to at least 25mm	Intake / exhaust ducts, and ducts external to the thermal envelope must be insulated and minimal in length

Space Heating & Domestic Hot Water

Source	Not used at this stage	
Distribution loss	Not used at this stage	

Estimates of heating energy demand at this stage are based on assumed use, and performance of products, materials, systems and construction quality in the building. There is a substantial margin for error. It is very important that these specification items are maintained through technical design and construction. Small changes in specification could have a disproportionate effect on the performance of the building.

Appendix C | District Heat Network Correspondence

Tottenham Hale Energy Centre has been contacted

The design team reached out on 01/08/23. Still awaiting a response as of 23/08/23

Down Lane Park Heat Network



Josh Flower <josh.flower@etude.co.uk>

Tuesday, 1 August 2023 at 14:49

To: tim.starley-grainger@haringey.gov.uk; **Cc:** Will South

Hi Tim,

I'm working on the energy strategy for a new community building within Down Lane Park in Tottenham Hale.

We're developing the GLA planning application at the moment and I'm looking for any information regarding the proposed network from the Tottenham Hale Energy Centre.

Any information you can provide on the timeline and the carbon intensity/heating source of the network would be greatly appreciated.

Kind Regards

Josh Flower

T 020 8191 0900 | **W** www.etude.co.uk

Etude, 5 Baldwin Terrace, London N1 7RU



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This message is confidential to the intended recipient and is subject to our email terms and conditions: <http://www.etude.co.uk/email-terms-conditions>

Project name

Down Lane Park

As designed

Date: Wed Aug 23 15:56:20 2023

Administrative information

Building Details

Address: London,

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.4"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.4

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

Foundation area [m²]: 389.54The 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	6.79
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	6.32
Target primary energy rate (TPER), kWh/m ² annum	73.49
Building primary energy rate (BPER), kWh/m ² annum	69.18
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 _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.09	0.09	External Wall
Floors	0.18	0.08	0.08	Ground Floor
Pitched roofs	0.16	0.09	0.09	Roof
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	1	1.19	500x1450
Rooflights***	2.2	1	1	2200x1200
Personnel doors^	1.6	1.06	1.13	0.55x2.7 Louvre
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-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

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	1

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- Fan Coil Units (5 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	-	-	1.6	0.8
Standard value	0.93*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

2- Extract Electric Panel Heater (8 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	-	-	0.3	-
Standard value	0.86	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- VRF DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.84	0
Standard value	0.91	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			
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		Zone	Standard
Changing Place	-	-	0.3	-	-	-	-	-	-	-	-	N/A
Entrance	-	-	0.3	-	-	-	-	-	-	-	-	N/A
Community Space	-	-	-	-	-	-	-	0.4	-	-	-	N/A
Cafe	-	-	-	-	-	-	-	0.4	-	-	-	N/A
Kitchen/Servery	-	-	-	-	-	-	-	0.4	-	-	-	N/A
Parks Office	-	-	-	-	-	-	-	0.4	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
WC	-	-	0.3	-	-	-	-	-	-	-	N/A
Office/Meeting Room	-	-	-	-	-	-	-	0.4	-	-	N/A
Parks WC	-	-	0.3	-	-	-	-	-	-	-	N/A
WC 1	-	-	0.3	-	-	-	-	-	-	-	N/A
WC 2	-	-	0.3	-	-	-	-	-	-	-	N/A
WC 3	-	-	0.3	-	-	-	-	-	-	-	N/A
Bookable Kitchen	-	-	0.3	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Changing Place		-	-	-
Entrance		-	-	-
Community Space		-	-	-
Cafe		-	-	-
Kitchen/Servery		-	-	-
Parks Office		110	-	-
Plant		110	-	-
Storage 1		110	-	-
WC		-	-	-
Office/Meeting Room		110	-	-
Parks WC		-	-	-
WC 1		-	-	-
WC 2		-	-	-
WC 3		-	-	-
Storage 2		110	-	-
Storage 3		110	-	-
Storage 4		110	-	-
Storage 5		110	-	-
Kitchen Plant		110	-	-
Bookable Kitchen		-	-	-
Plant Small		110	-	-
Storage 6		110	-	-
Storage 7		110	-	-
Storage 8		110	-	-

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?
Community Space	NO (-4%)	NO
Cafe	YES (+39%)	NO
Kitchen/Servery	NO (-56%)	NO
Parks Office	NO (-71%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Office/Meeting Room	NO (-57%)	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?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	435	435
External area [m ²]	1432	1432
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	1	4
Average conductance [W/K]	238	416
Average U-value [W/m ² K]	0.17	0.29
Alpha value* [%]	29.13	14.13

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

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces

100 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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.73	6.14
Cooling	4.21	1.56
Auxiliary	8.81	7.1
Lighting	4.41	5.75
Hot water	27.83	29.06
Equipment*	35.7	35.7
TOTAL **	46.97	49.62

* 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
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	97.52	87.52
Primary energy [kWh/m ²]	69.18	73.49
Total emissions [kg/m ²]	6.32	6.79

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] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	9.6	120	1	6.6	12.8	2.64	5.03	2.64	5.3
	Notional	51.7	39	5.4	2.5	7.6	2.64	4.4	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	47	0	5	0	3.2	2.64	0	2.64	0
	Notional	113.7	0	12	0	4.3	2.64	0	----	----

Key to terms

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

Project name

Down Lane Park

As designed

Date: Wed Aug 23 15:50:35 2023

Administrative information

Building Details

Address: London,

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.4"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.4

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

Foundation area [m²]: 389.54The 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	3.1
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	-0.01
Target primary energy rate (TPER), kWh/m ² annum	30.79
Building primary energy rate (BPER), kWh/m ² annum	-2.94
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 _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.09	0.09	External Wall
Floors	0.18	0.08	0.08	Ground Floor
Pitched roofs	0.16	0.09	0.09	Roof
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	1	1.19	500x1450
Rooflights***	2.2	1	1	2200x1200
Personnel doors^	1.6	1.06	1.13	0.55x2.7 Louvre
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * 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/m ² K 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	1

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- Fan Coil Units (5 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.6	-	-	1.6	0.8
Standard value	0.93*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

2- Extract Electric Panel Heater (8 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0.3	-
Standard value	0.86	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- VRF DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	3.6	0
Standard value	0.91	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			
Changing Place	-	-	0.3	-	-	-	-	-	-	-	-	N/A
Entrance	-	-	0.3	-	-	-	-	-	-	-	-	N/A
Community Space	-	-	-	-	-	-	-	0.4	-	-	-	N/A
Cafe	-	-	-	-	-	-	-	0.4	-	-	-	N/A
Kitchen/Servery	-	-	-	-	-	-	-	0.4	-	-	-	N/A
Parks Office	-	-	-	-	-	-	-	0.4	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
WC	-	-	0.3	-	-	-	-	-	-	-	N/A
Office/Meeting Room	-	-	-	-	-	-	-	0.4	-	-	N/A
Parks WC	-	-	0.3	-	-	-	-	-	-	-	N/A
WC 1	-	-	0.3	-	-	-	-	-	-	-	N/A
WC 2	-	-	0.3	-	-	-	-	-	-	-	N/A
WC 3	-	-	0.3	-	-	-	-	-	-	-	N/A
Bookable Kitchen	-	-	0.3	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Changing Place		-	-	-
Entrance		-	-	-
Community Space		-	-	-
Cafe		-	-	-
Kitchen/Servery		-	-	-
Parks Office		110	-	-
Plant		110	-	-
Storage 1		110	-	-
WC		-	-	-
Office/Meeting Room		110	-	-
Parks WC		-	-	-
WC 1		-	-	-
WC 2		-	-	-
WC 3		-	-	-
Storage 2		110	-	-
Storage 3		110	-	-
Storage 4		110	-	-
Storage 5		110	-	-
Kitchen Plant		110	-	-
Bookable Kitchen		-	-	-
Plant Small		110	-	-
Storage 6		110	-	-
Storage 7		110	-	-
Storage 8		110	-	-

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?
Community Space	NO (-4%)	NO
Cafe	YES (+39%)	NO
Kitchen/Servery	NO (-56%)	NO
Parks Office	NO (-71%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Office/Meeting Room	NO (-57%)	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?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	435	435
External area [m ²]	1432	1432
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	1	4
Average conductance [W/K]	238	416
Average U-value [W/m ² K]	0.17	0.29
Alpha value* [%]	29.13	14.13

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

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces

100 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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.29	8.64
Cooling	4.22	1.56
Auxiliary	8.81	7.1
Lighting	4.55	5.75
Hot water	21.95	29.06
Equipment*	35.7	35.7
TOTAL **	42.81	52.11

* 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	44.78	31.59
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>44.78</i>	<i>31.59</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	97.67	87.52
Primary energy [kWh/m ²]	-2.94	30.79
Total emissions [kg/m ²]	-0.01	3.1

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] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	9.5	120.3	0.7	6.6	12.8	3.6	5.04	3.6	5.3
	Notional	51.7	39	5.4	2.5	7.6	2.64	4.4	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	47	0	13.1	0	3.2	1	0	1	0
	Notional	113.7	0	23.6	0	4.3	1.34	0	----	----

Key to terms

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