3a Upper Park Road
London Borough of Camden

Energy & Sustainability

Prepared for:

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Issue Status

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Company Name:	Green Tiger Sustainability
Signature:	**RS**

Revision Number	Issue Date:	Issue by:
Revision 1	31.07.2024	Ross Standaloft

DISCLAIMER

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Contents

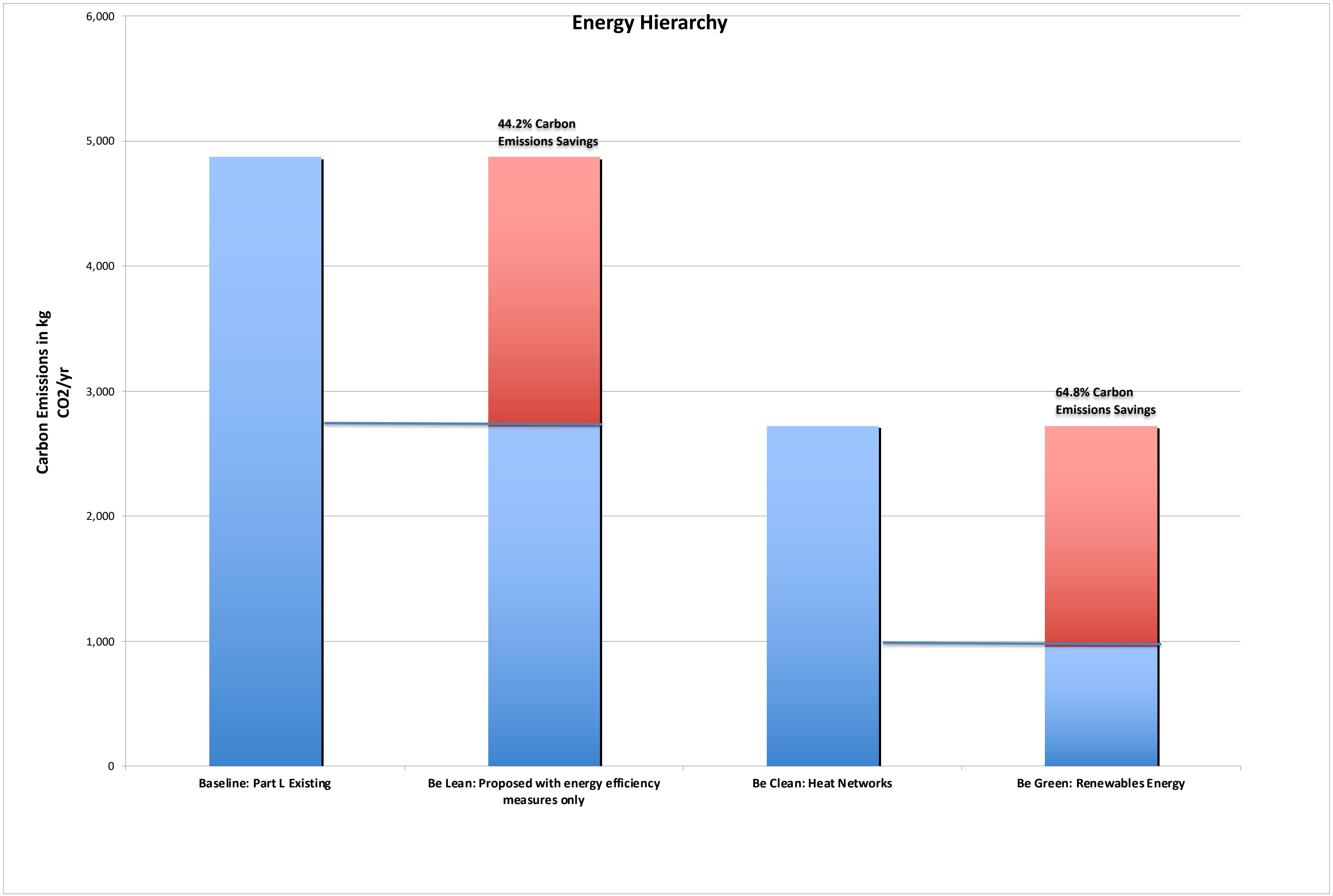
Executive Summary

INTRODUCTION	The proposed residential scheme is required to produce an Energy and Sustainability statement in support of the planning application for the refurbishment and extension at the address: '3a Upper Park Road' in Camden, London. Carbon emission reductions will be measured in accordance with Local Policy CC1: Climate Change Mitigation and the London Plan 2021's Policy SI 2 'Minimising Greenhouse Gas Emissions' – using the energy hierarchy and target a minimum 35% CO2 reduction over Part L for existing buildings baseline.
AIM OF THIS STUDY	This energy and sustainability statement should be used as a supporting document to the planning application to demonstrate that CO2 emissions, and the overall energy and sustainability strategy of the proposed development will meet and surpass requirements set out by London Borough of Camden Planning Policies: CC1, CC2, D1, CC3 and CC5 – namely in relation to Energy, Design, Water use and Waste Management. A This report also details the proposed high-performance fabric towards 'Passivhaus' fabric standard is targeted by the design team. The aim of the energy study specifically is to assess the feasible carbon emission reductions through building fabric, efficient services and low or zero carbon technologies AND target the London Plan 35% carbon reduction on-site target. If feasible, aiming for 10% from fabric and energy efficiency measures first before renewables or offsets are assessed. This report demonstrates how the site has followed the London Plan's energy hierarchy by reducing energy demand through passive design, energy efficiency measures, i.e. 'Be Lean' and utilizing low carbon technology to further reduce the overall carbon emissions of the development i.e. 'Be Green'.
ENERGY TARGETS	Camden Council requires all developments to reduce CO2 reduction over Part L as much as is feasible, or 35%, as per the London Plan Policy SI 2. The proposed extension and renovation property is under 500m^2 and is a minor existing development. Therefore requirements are to demonstrate Energy hierarchy has been considered.
SITE DESCRIPTION	The proposed scheme is a refurbishment and extension in Camden with associated basement and garden area. The scheme is oriented South from the street facade. The scheme is in-keeping with aesthetic of the street.

ENERGY STRATEGY RECOMMENDATION	The energy strategy for the proposed scheme is to work towards 'Passivhaus' advanced energy efficiency fabric measures, utilising mechanical ventilation with heat recovery (MVHR) and a highly efficient Air Source Heat Pump as the main heating and DHW system. The proposal is to build surpassing Part L 2021 requirements. The thermal performance targets of the new areas of the dwelling are as follows: U-Values of 0.12 W/m2K for new ground floor, 0.10 W/m2K for the roof, 0.15 W/m2K for walls and high-performance triple-glazed standard windows of 0.85 W/m2K (average across site). A maximum air permeability of 1 ach/hr (approx. 2 m3/m2/hr at 50 pa) is targeted. Existing elements will be insulated to Part L standards or beyond, subject to detailed design. Full MVHR ventilation will surpass Part F requirements.
CO2 SAVINGS SUMMARY	The baseline carbon emissions for the scheme are 4,874 kgCO2/yr. Following implementation of measures within this report; a total saving of 2,514 kgCO2/yr will be made, a **80.4% overall carbon reduction over baseline**. These measures include: - **Be Lean** (44.2% savings over baseline): Energy efficiency measures to improve the building fabric and services: U-Values 0.15 for new walls, 0.10 for roof, 0.12 for the ground floor and 0.85 for windows - in W/m2K, ultra-low air tightness (approx 2 m3/m2/hr at 50 Pa). - **Be Clean** (0% savings over Lean case); No further savings through the use of heat networks are planned. - **Be Green** (64.8% savings over clean case): Low carbon heating and hot water through an Air Source Heat Pump. The figures are summarised and represented in graphical form on the following page.
Part L 2021	The scheme will meet Building Regulations (Part L 2021) on both a carbon emission and fabric efficiency basis.

GLA's Energy Hierarchy

	Baseline	Be Lean: Energy Efficiency Measures	Be Clean: Heat Networks	Be Green: Renewable
Carbon emissions in $kgCO_2/yr$	4,874	2,720	-	957
Carbon emission savings in $kgCO_2/yr$	-	2,154	-	1,762
Percentage reduction in carbon emissions over the previous stage	-	44.2%	0%	64.8%



Energy Planning Requirement

PLANNING REQUIREMENT	The latest London Plan 2021, Policy SI 2 'Greenhouse Gas Emissions' requires developments to achieve 35% minimum carbon reduction on site through fabric efficiency and implementations of renewables. The 2021 London Plan also requires a 10% reduction through fabric and energy efficiency enhancements only, and then a further 25% carbon reduction through the use of local heat networks 'Be Clean' or on-site renewable energy technologies 'be Green.
REQUIREMENTS FOR AN ENERGY STATEMENT	The Greater London Authority defines in the London Plan Supplementary Planning Guidance that applications for major developments should be accompanied by an energy statement, which provides information as set out below: • Calculation of baseline energy demand and carbon dioxide emissions showing the contribution of emissions from building regulations • Proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services; • Proposals to further reduce carbon dioxide emissions through the use of decentralized energy where feasible, such as district heating and cooling; • Proposals to further reduce carbon dioxide emissions through the use of on-site low or zero carbon technologies, and; • Major developments should propose to Offset the remaining emissions to reduce the site to Zero Carbon. • In addition, major developments (over 1000m^2) should report their building performance to the GLA. An assessment of the feasibility of different renewable technologies on the site and the potential contribution to CO_2 reduction from each option, explaining which technologies have been investigated and why any technologies have been ruled out, (i.e. technical and practical limitations etc.). We will also assess the likelihood of overheating in the project and measures to reduce, where necessary.

London Plan Methodology

METHODOLOGY	The methodology followed in this report follows the guidance set out in GLA Energy Team Guidance on Planning Energy Assessments, 2020, as set out below. Energy consumption figures are based on SAP modeling data produced under Building Regulations Part L compliant software (SAP 10), as per the GLA guidance. The analysis of the house has been undertaken to show the compliance with the Building Regulations Part L 2021.
LONDON PLAN ENERGY HIERARCHY Taken from GLA Energy Assessment Guidance , 2020	The London Plan's energy hierarchy takes a 'whole energy' approach and addresses energy efficiency use, energy supply efficiency and use of low or zero carbon technologies. The purpose is to demonstrate that climate change mitigation measures are integral to the scheme's design and evolution, and that they are appropriate to the context of the development. The below summarises the guidance for each stage.
BASELINE CALCULATIONS	Baseline calculations for existing buildings are in line with Part L for existing buildings in the London Plan.
BE LEAN	Demand reduction (Be Lean) measures specific to the scheme are encouraged at the earliest design stage of a development and aim to reduce to demand for energy. Measures typically include passive design: both architectural and building fabric measures, and active design: energy efficient services. Building Regulations (Part L 2021) should be exceeded by 10% through demand reduction (Be Lean) measures alone.
BE CLEAN	A 'clean' energy supply refers to utilising the energy efficiency of heating infrastructure networks. Planning applications should demonstrate how the their energy systems will exploit local energy resources and secondary heat to minimize CO_2 emissions in accordance with the order of preference in Policy SI 3 – Heating Infrastructure, using the Heat Network Priority Areas (HNPA).
BE GREEN	Use of Low Zero Carbon technologies in developments is encouraged at the 'Be Green' third stage. Each low or zero carbon technologies in the London Plan should be deemed to be technically feasible or not and considered in the Energy Assessment.
OFFSET	After carbon emissions are reduced through 'Be Lean, Be Clean and Be Green' – the residual carbon emissions on site are to be calculated and offset through an off site scheme OR via the Local Borough's Offset scheme at a recommended cost of £95/tonne/year. For major development only.

"Be Lean" Energy Efficiency measures

ENERGY EFFICIENCY TARGETS

Energy efficiency measures for the building fabric will be incorporated to reduce the energy demand and carbon footprint of the proposed scheme. The below measures surpass the minimum 10% carbon saving from this step of the London Plan guidance, giving a total of 44.2% through fabric alone.

All new u-values have been pushed far beyond Part L minimum standards.

U-VALUES TARGETED ACROSS SITE

Element	Building Regulations Part L 2021 U-Value (W/m^2K)	Proposed U-Value (W/m^2K) (new / existing)
Roof	0.16	0.10 / 0.16
Floor	0.18	0.12 / 0.25
Walls	0.18	0.15 / 0.30
Window/Doors	1.6	0.85 (Average)

AIR-TIGHTNESS

In addition to excellent u-values, Passivhaus philosophy requires outstanding air tightness levels. The target here will be slightly relaxed at 1 ach/hour, approx. 2 $m^3/hr/m^2$ at 50pa.

This will be achieved through ensuring that sensitive areas are accounted for in the design and construction phases to make certain that a fully sealed building is constructed and all punctures through the seal are airtight. In particular, attention will be paid to openings such as services and down lighters at roof level.

ENERGY EFFICIENCY

In this scenario, a highly efficient gas boiler (SEDBUK 90%) is specified, for this scenario with interlock and weather compensator included. Heating will be delivered via efficient under floor heating and radiator mix.

In addition, 100% of internal lighting will be energy efficient.

VENTILATION

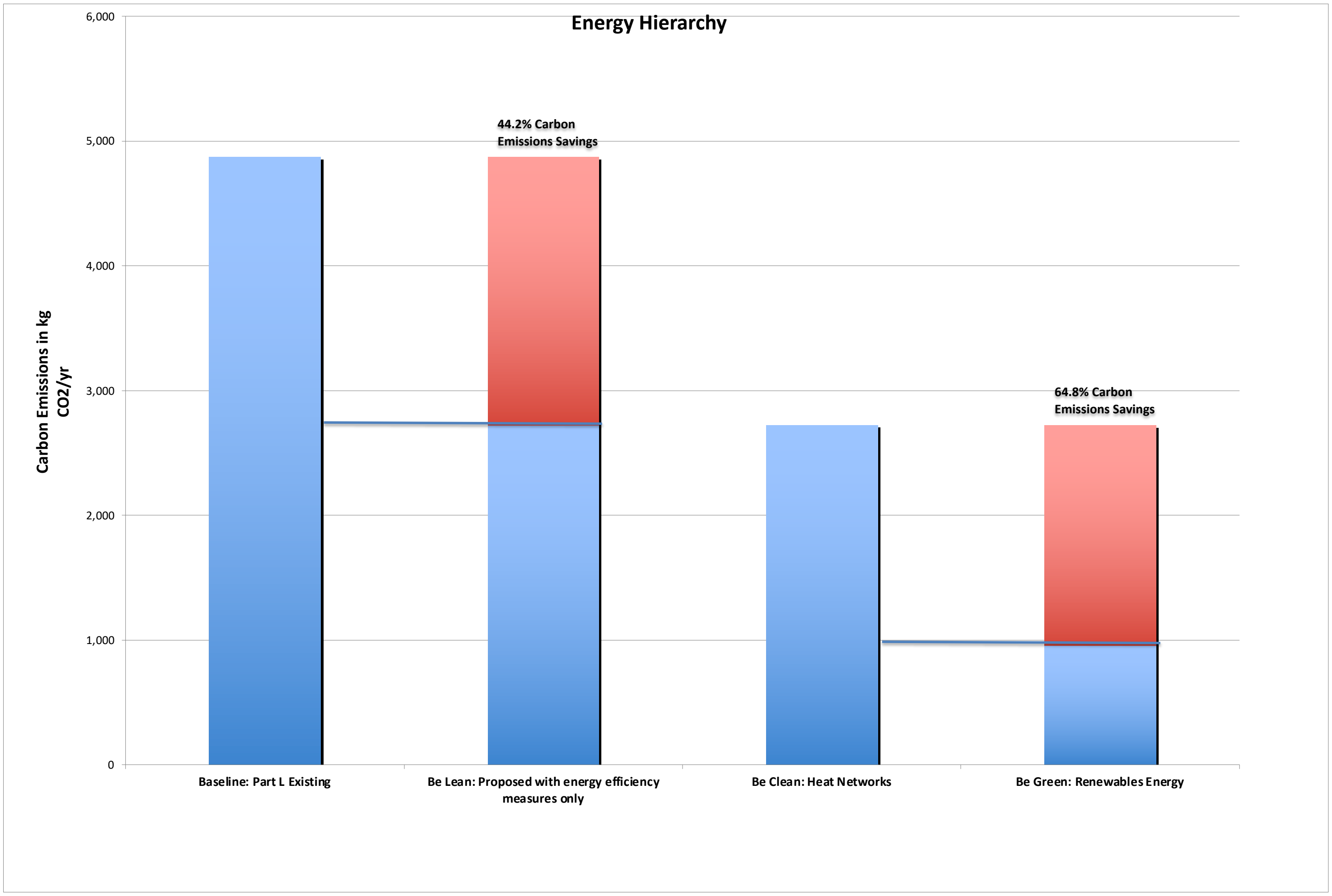
MVHR ventilation will be supplied in the house and to meet the full requirements of Part F.

"Be Clean" Use of heat networks

USE OF DECENTRALIZED POWER & HEAT NETWORKS	Inline with London Plan Policy SI 3, Heat Infrastructure, major development should aim to use waste heat or secondary heat, exploit existing heat / cooling networks where possible or future proof utility infrastructure to minimize the impact from roadworks. There are various heating networks already established in London and the mayor has identified Heat Network Priority areas (HNPA) – these will be assessed to determine of the site should be considered, alongside combined heat and power (CHP) on site also: **Connection to existing CCHP/CHP/Heat networks** This option is deemed infeasible in this instance due to the lack of an existing CCHP/CHP/Heat networks in the vicinity of the proposed development. **Site wide CCHP/CHP/Heat generation powered by renewables** CCHP/CHP/Heat generation powered through renewables such as biomass is considered infeasible in this instance due to issues relating to air quality. The site is also not communal and too small for this. **Heat Network Priority Area (HNPA)** The site is in a HNPA and has the potential to connect to future heat networks.
FRAMEWORK TO ANALYSE MICRO CHP ON SITE	A micro CHP on site has been analysed along the following points: • The technical feasibility of CHP on a site-wide basis and for portions of the scheme. • The viability of the CHP in terms of capital expenditure per unit. • The carbon emissions reductions from the CHP as compared to an alternative system.
CHP ANALYSIS	Micro combined heat and power (CHP) has been assessed in terms of feasibility. It is considered that CHP unit is inappropriate for this development, as there is not a sufficient heat load and DHW requirements to make this a better option than an Air Source Heat Pump. This is primarily due to the fabric first approach to energy saving, pushing the heating demand down and gas becoming an obsolete energy source.

"Be Green" renewable energy target

INTRODUCTION	The predicted carbon emission savings of the proposed scheme following energy efficiency measures and fabric values will be 2,720 kgCO2/yr or 44.2% saving. Technically no further CO_2 emissions reductions are required to meet 35% on-site minimum emission savings. However, the site will use on-site renewable technologies. ASHP has been identified as the ideal renewable energy sources for the following reasons: • The ASHP supplies electricity-only heat and hot water • Gas is banned from 2026 and gas price will rise • The development needs will be easily met with ASHP
RENEWABLES & OVERALL EMISSIONS REDUCTION	This renewable solution gives a **1,762 kg/CO_2/yr** saving or **64.8% -** over the 20% London Plan renewables only target. This gives a total project saving of **3,917 kgCO_2/yr** carbon saving over baseline building regulations or **80.4%.**



Feasible Renewable Energy technologies

FEASIBLE LOW OR ZERO CARBON TECHNOLOGIES	A reduction in carbon emissions through the use of on-site low or zero carbon technologies can be achieved through several technologies to generate either heat or power. Following the analysis of the carbon emissions related to the scheme, the objective of this section is to determine the feasible low or zero carbon technologies options that provide cost-effective and practical emissions reductions. The low or zero carbon technologies options for the proposed scheme are provided in the table below. Each technology is also assessed as either feasible or rejected based on its implications for the scheme in terms of their implementation, cost-effectiveness, site-related constraints, planning issues or others. The following sections will explore the feasible technologies in depth and explain why certain technologies have been rejected.
Technology and feasibility	**Rationale**
BIOMASS / REJECTED	Biomass would be able to provide a 35% overall reduction in carbon emissions. However, this technology would have a significant impact on local air quality in the Borough and development access restraints preclude the possibility of biomass pellet delivery.
LIQUID BIOFUEL/ REJECTED	Although biofuel has the capability to heat the house, as with solid biomass, liquid biofuel has air quality implications in addition to delivery and sourcing issues in a city/town location.
AIR SOURCE HEAT PUMP (ASHP) / FEASIBLE – ACCEPTED	An air source heat pump can supply heating and hot water to the proposed scheme. There is space available for the condenser and cylinder required for the Air Source Heat Pump (ASHP) and for the external unit also. The high efficiency and electrical source of ASHP makes this a good choice to lower carbon emissions and meet the targets.
GROUND SOURCE HEAT PUMP / MAYBE FEASIBLE – NOT ACCEPTED	A ground source heat pump would be capable of heating the house and providing hot water; however capital cost and disruption of drilling vertical boreholes make this technology potentially undesirable on the site until further investigation.
PHOTOVOLTAIC (PV) / REJECTED	There is very limited roof area available for PV, as the main roof is used for a balcony / patio area for the adjoined property – the limited space available is also considerably overshaded. Therefore the solution is not a highly feasible option on this property.
SOLAR HOT WATER (SHW) / REJECTED	There is very limited roof area available for Solar Thermal, as the main roof is used for a balcony / patio area for the adjoined property – the limited space available is also considerably overshaded. Therefore the solution is not a highly feasible option on this property.
WIND TURBINE / REJECTED	Turbulence created from surrounding buildings makes this an inefficient solution and it would make a large visible impact.

Proposed Renewables

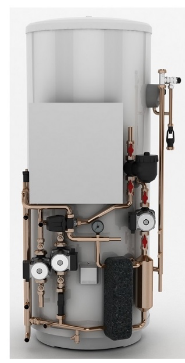
INTRODUCTION

It is proposed that in order to meet the London Plan requirements on production of clean 'Green' energy, an Air Source Heat Pump (ASHP) is deemed feasible and viable.

AIR SOURCE HEAT PUMPS

An air source heat pump (ASHP) absorbs heat from outside a building and release it inside using the vapor-compression refrigeration process, in the opposite direction. The heat usually goes to a buffer tank before radiators or UFH distribution. ASHP's are around 250-400% efficient (meaning 2.5-4KW of power for every 1KW put in) and are best suited to modern, well insulated properties.

POTENTIAL SPECIFICATION



A suggested specification for the Air Source Heat Pump (ASHP) would consist of a 6-8KW Mitsubishi Ecodan heat pump and underfloor heating.

A 250 litre water tank would be installed alongside the Heat Pump to supply consistent hot water and heating in winter months.

DISCLAIMER

Note that ASHP installation requires full design and installation from the electric sub-contractor and/or a renewables installer.

Energy Strategy Summary

RECOMMENDATION	The energy strategy for the proposed scheme is to work towards 'Passivhaus' advanced energy efficiency fabric measures, utilising mechanical ventilation with heat recovery (MVHR) and a highly efficient Air Source Heat Pump as the main heating and DHW system. The proposal is to build surpassing Part L 2021 requirements. The thermal performance targets of the new areas of the dwelling are as follows: U-Values of 0.12 W/m2K for new ground floor, 0.10 W/m2K for the roof, 0.15 W/m2K for walls and high-performance triple-glazed standard windows of 0.85 W/m2K (average across site). A maximum air permeability of 1 ach/hr (approx. 2 m3/m2/hr at 50 pa) is targeted. Existing elements will be insulated to Part L standards or beyond, subject to detailed design. Full MVHR ventilation will surpass Part F requirements.
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Part L 2021	The scheme will meet Building Regulations (Part L 2021) and subsequent revisions.

Reuse and Resource Efficiency

INTRODUCTION

The proposed development aims to optimise resource efficiency and use circular economy principles. The Camden Council Section 9 of Energy efficiency CPG (Jan 2021) will be addressed in this section to investigate if the existing property can be successfully retained.

The guidance notes that a condition / feasibility assessment and the potential development options assessment be undertaken.

ORIENTATION AND BUILDING FORM

The aim of the proposed development is to:

1. Create a larger dwelling
2. Deliver an low-carbon dwelling

The following development types will be assessed and with regards to the above:

Refit

With a refit, none of the above development aims can be met.

Refurbish

A highly sustainable refurbishment would allow the property to become low carbon, however, further floorspace would be lost insulating the existing dwelling to levels required. Furthermore, a refurbishment would not remodel or add any additional space.

Substantial refurbishment and extension

A substantial refurbishment and extension would allow the development to become low carbon AND create a better and larger useable family space. Windows would be replaced, existing elements insulated and new servicing installed. This option is also inline with Camden policy on lowering carbon emissions AND keeping existing building stock.

Reclaim and recycle

The option of demolition and rebuilding is considered excessive and wasteful to the development needs, which can be achieved through refurbishing and extending.

The refurbish and extension option is the preferable route to meet development goals and is inline with Camden policy on retaining existing building stock.

Reuse and Resource Efficiency

CONDITION AND FEASIBILITY ASSESSMENT

Existing Building uses	- The current property operates as an average size 2 bedroom dwelling built in 1985. - The properties layout is tight and inefficient in terms of useable floorspace and circulation. - There is no current building survey, but there are no immediate signs of structural issues or damp form the design team. - The property is poorly insulated.
Servicing	- Standard Gas boiler and radiator distribution network. In need of upgrading. - No renewables or alternative energy sources. - Mains water at standard pressure.
Technical Review	- **Upgrades** – Full insulation to floors, walls, roof and replacement windows/doors required to reach Part L for existing building. - **Material audit and estimate of embodied carbon** – Property in decent condition for age. Embodied carbon is considered average for 1980’s traditional build, no large amounts of steel or concrete. - **Energy performance of facade** - extremely poor – poorly OR uninsulated brick. Roof insulation – unsure. Poor boiler. - **SBEM** - N/A as this is a residential building - **Air Tightness / thermal bridging** – poor - assumed to be default worst possible as unknown. - **Condensation Analysis** – med/high – the property will potentially have condensation and moisture issues when insulating existing brick. This will need to be designed out.
Site Capacity	- The site is capable to have add the side extension proposed - and new basement within the guidelines set out in Camden CPG on Basements.

Reuse and Resource Efficiency

Design	Measures	Comment
	Energy efficiency building design	The proposal aims to design highly energy efficient building by incorporation passive design measures and renewables (Air source heat pump). Refer to page 12 of this report
	Material efficiency	The reuse of existing materials from the demolition of westerly wall (brickwork) - Crushed and used as aggregate in new development. Low impact insulation throughout (EPS, Rockwool or Cellulose). At least 20% of the total value of materials used should derive from recycled and reused content (i.e. brick façades and crushed aggregate in the substructure) in the products and materials selected (and divert the remainder from landfill). Any new steel and concrete will have a high recycled content (50% concrete)
Construction	Minimise the use of resources (energy, water, land)	Monitor the water and energy consumption and report the equivalent carbon emissions.
	Resource efficiency	Pre-demolition audit to be carried out and target benchmark of ≤ 11.1 tonnes of construction waste per 100m2.
	Minimise waste generation	Reusable packing solutions with key product manufacturers will be explored at the earliest opportunity. Solutions may include flat pallets, bulk bags, steel stillages and returnable cable drums; Pre-fabrication of new materials/elements wherever possible.
	Diversion of waste from landfill	Construction waste – minimum 80% diversion from landfill rate; Demolition waste – 90% diversion from landfill rate.
	Sustainable Sourcing	All timber used in the development will come from a legal Source (FSC Scheme). At least 80% of the new building materials will be responsibly sourced and will use suppliers who can provide an EMS certificate or equivalent. New materials rated with an A or B in the BRE Green Guide to Specification will be preferred.
Operations	Maintenance	Implement a good maintenance/ repair strategy to maximise life of materials. Always consider repair before replacement. When replacements required select high durability materials with low maintenance requirements.
End of Life	Deconstruction	Design for deconstruction and reuse of materials. Divert waste from landfill (via reuse, recycling or recovery) Demolition and construction waste - 90% to reuse, recycling, recovery

Overheating Analysis

INTRODUCTION

Climate change and the heat-island effect is increasing overheating in the UK – and makes a much larger problem in London in recent years and a potential huge problem in decades to come. Under London Plan policy SI 2 'Minimising greenhouse gas emissions' & SI 4 'Managing Heat Risk', it is noted that the GHA overheating risk tool and the 'overheating hierarchy' should be followed in design to reduce unneeded overheating.

ANALYSIS

Overheating Hierarchy: The below measures have been taken into account in the design:

1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure

- The property is has excellent U-values that help keep it cool. The partial south-facing rear façade will have green roofs, low G-value glass to limit heat radiation and sufficient overhang for summer sun.

2) minimise internal overheating through efficient design

- The property has excellent building fabric control.

3) manage the heat within the building through exposed internal thermal mass and high ceilings

- The property has exposed thermal mass in rear floors

4) provide passive ventilation

- Openable windows throughout for summer.

5) provide mechanical ventilation

- MVHR throughout the property keeping constant air flow

6) provide active cooling systems.

- Cooling will not be provided.

Taking into account the above, the GHA overheating risk tool, the site is at LOW/MED risk from overheating, and is managed on site.

Water Requirement

INTRODUCTION

In excess of 20% of the UK's water is used domestically with over 50% of this used for flushing WCs and washing (source: Environment Agency). The majority of this comes from drinking quality standard or potable water.

The water efficiency measures included in the house will ensure that the water use target of 110 litres per person per day is achieved using the measures described below. Part G will be surpassed.

RECOMMENDATION

The following water fittings will be provided for the dwelling:

- 4/2.5 litre dual flush WC 's
- Kitchen taps flow aerated taps with flow rate of 4 litres
- Flow aerated taps with flow rate of 3.5 litres
- Showers are average max flow rate mix of max. 6 and 9 litres/minute at supplied pressure.
- Bath 180 litres to overflow
- A/A+ rated washing machines (5kg per litre) and dishwashers (0.68 litre / place).

The above specification will equate to 100 litres per person per day. Alternatively, rainwater recycling may be implemented to allow higher water use figures whilst maintaining the same target.

FLOW RESTRICTORS

Simple flow restrictors will be used to ensure any high spec appliances are water efficient.

Waste Management & Circular Economy

INTRODUCTION

Local Camden and London Plan planning policy states that both construction waste and operational waste should be minimized. Furthermore ‘The Circular Economy’ method of pre-planning how materials will be re-used so to reduce waste and in-turn the need for virgin building materials. Therefore the site aims to practice both the Waste Hierarchy and the principles of the circular economy, within both the design and construction of the development. In addition a site waste management plan will be implemented to ensure minimal waste on site.

PREVENTION/ REDUCTION

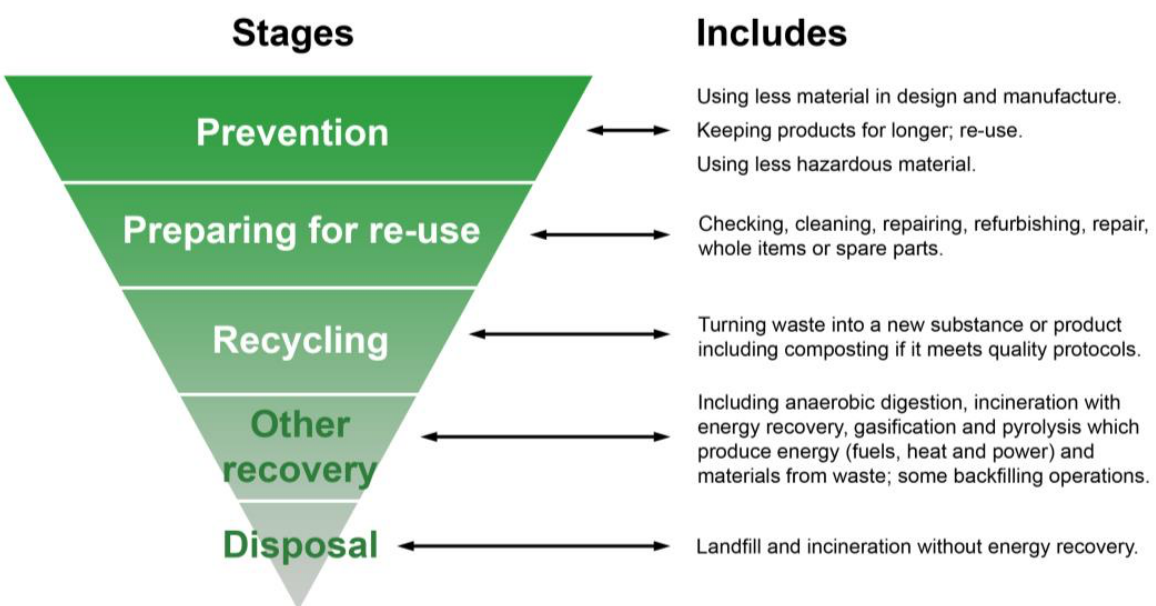
- Pre-fabricated construction elements minimizes waste and time spent on site, further reducing waste
- Natural insulation derived from re-used card, cellulose or cork will be used where possible
- The project will use standard sizes and quantities of materials, and plan ahead to reduce off cuts.
- Over-ordering will be kept to a minimum through detailed quantity surveying as part of the SWMP requirements.
- Deliveries will be arranged to match work stages, to avoid materials being stored on site longer than necessary.
- All storage areas on site will be safe, secure and weatherproof.
- A site induction will aim to brief the construction team on minimising rework from errors and poor workmanship.

REUSE OF MATERIALS.

The following items will be considered in design for circular use:

Layer	Constituent elements	Strategies
Site	The geographical setting, urban location and external works	**Retain and reuse**
Substructure	Excavations, foundations, basements and ground floors	**Longevity** – durable and resilient; readiness for alternative technologies
Superstructure	Load-bearing elements above plinth including roof supporting structure	**Adaptability** – how the current needs might change in the future
Shell/Skin	The layer keeping out water, wind, heat, cold, direct sunlight and noise	**Flexibility** – potential for reconfiguration/future refurbishment of non-structural parts
Services	Installations to ensure comfort, practicality, accessibility and safety	**Reusability** – designed to be redeployed of reused as kit of parts
Space	The layout internal walls, ceilings, floors, finishes, doors, fitted furniture	**Recoverability** – designed to be deconstructed and reused/recycled
Stuff	Anything that could fall if the building was turned upside down	Not applicable
Construction Stuff	Any temporary installations/works/ materials, packaging and equipment	**Reusability** – Use of re-usable hoardings and scaffolding **Waste minimisation, material optimisation**

RECYCLING / FACILITIES	The site will provide appropriate facilities for the storage of separate waste streams – black (landfiull waste) and grouped recycling – metal, plastics, paper and glass. These will be safe and convenient to access for deposit and collection, with sufficient capacity for current and projected future use.
SITE TARGETS	The design team and construction team will procure: • a Sustainable Procurement Plan, • a bespoke Site Waste Management Plan, • a target to divert 90% of construction waste and 90% of the demolition/excavation waste from going into the landfill. • a benchmark target for a resource efficiency of 13.3m3 (or 11.1 tonnes) of waste per 100m2 of GIA
WASTE HIERACHY	The Waste hierarchy will be followed in design and construction.



Appendix A – Energy Calculations

Energy calculations and SAP results on following pages.

TER/DER

SAP Area	TER CO2	Lean CO2	Clean CO2	Green CO2
208.56	23.37	13.04	13.04	4.59

OVERALL EMISSION SCENARIOS

Area	TER CO2	Lean CO2	Clean CO2	Green CO2
208.56	4,874.05	2,719.62	2,719.62	957.29

Summary for Input Data

Property Reference	Upper Park	Issued on Date	29/07/2024
Assessment Reference	Part L	Prop Type Ref	
Property	3a, Upper Park Road, London, NW3 2UN		

SAP Rating	77 C	DER	23.37	TER	10.80
Environmental	74 C	% DER < TER			-116.39
CO_2 Emissions (t/year)	4.19	DFEE	75.15	TFEE	45.32
Compliance Check	See BREL	% DFEE < TFEE			-65.83
% DPER < TPER	-124.14	DPER	127.22	TPER	56.76

Assessor Details	Mr. Nicholas Bowen	Assessor ID	D719-0001
Client	Green Tiger, Ross Standaloft		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southeast
Property Tenture	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, End-Terrace
2.0 Number of Storeys	3
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	32.60 m	58.88 m²	2.50 m
Ground floor:	31.10 m	83.50 m²	3.10 m
1st Storey:	29.00 m	66.18 m²	3.50 m

8.0 Living Area 22.20 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Basement	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.18	9.00	81.50	71.00	0.00	None	10.50	Enter Gross Area
New walls	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	85.86	71.46	0.00	None	14.40	Enter Gross Area
Existing walls	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.30	9.00	85.86	69.76	0.00	None	16.10	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	47.20		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Basement	Plasterboard on timber frame	9.00	111.50
GF B	Dense block, plasterboard on dabs	75.00	61.60
GF T	Plasterboard on timber frame	9.00	108.08
UGF B	Dense block, plasterboard on dabs	75.00	46.20
UGF	Plasterboard on timber frame	9.00	30.00

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Existing	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	66.18	64.68	None	0.00	Enter Gross Area	1.50
New	External Flat Roof	Plasterboard, insulated flat roof	0.15	9.00	24.70	22.60	None	0.00	Enter Gross Area	2.10

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Base	Precast concrete planks floor, screed, carpeted	30.00	58.88
GF	Precast concrete planks floor, screed, carpeted	30.00	66.18

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Basement	Ground Floor - Solid	Basement	Slab on ground, screed over insulation	0.15	None	0.00	110.00	58.88
GF	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.25	None	0.00	110.00	24.62

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
GF		Plasterboard ceiling, carpeted chipboard floor	9.00	58.88
UGF		Plasterboard ceiling, carpeted chipboard floor	9.00	66.18

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Existing Windows	Manufacturer	Window	Single glazed			0.85			1.40
New windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Door	Manufacturer	Solid Door				0.00			1.00
Roof lights	Manufacturer	Roof Light	Double Low-E Soft 0.05			0.63		0.70	1.40
Existing RL	Manufacturer	Roof Light	Single glazed			0.85			1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front door	Door	New walls	South East	2.20	
Front new	New windows	New walls	South East	2.20	
Existing front	Existing Windows	Existing walls	South East	8.40	
Rear existing	Existing Windows	Existing walls	North West	7.70	
New rear	New windows	New walls	North West	5.80	
Base front	New windows	Basement	South East	5.25	
Base rear	New windows	Basement	North West	5.25	
Side new	New windows	New walls	South West	4.20	
New Rl	Roof lights	New	Horizontal	2.10	0
Existing RL	Existing RL	Existing	Horizontal	1.50	0

14.0 Conservatory: None

15.0 Draught Proofing: 100 %

16.0 Draught Lobby: No

17.0 Thermal Bridging: Default

Y-value: 0.20 W/m²K

18.0 Pressure Testing: No

Test Method: Blower Door

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present: No

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System: No

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting 1	81.00	10.00	810.00	20

24.0 Main Heating 1

SAP table

Description: boiler

Percentage of Heat: 100.00 %

Fuel Type: Mains gas

SAP Code: 104

In Winter: 79.00

In Summer: 75.00

Controls SAP Code: 2106

Delayed Start Stat: No

Summary for Input Data

Flue Type	Balanced
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	None
25.0 Main Heating 2	None
26.0 Heat Networks	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1
28.3 Waste Water Heat Recovery System	
29.0 Hot Water Cylinder	None
In Airing Cupboard	No
34.0 Small-scale Hydro	None

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Ratings after improvement Environmental Impact
		C 78	C 75
£3,500 - £5,500	£237	B 81	C 75
		0	0

Summary for Input Data

Property Reference	Upper Park	Issued on Date	30/07/2024
Assessment Reference	Lean	Prop Type Ref	
Property	3a, Upper Park Road, London, NW3 2UN		

SAP Rating	83 B	DER	13.04	TER	10.80
Environmental	86 B	% DER < TER			-20.74
CO_2 Emissions (t/year)	2.38	DFEE	57.41	TFEE	45.32
Compliance Check	See BREL	% DFEE < TFEE			-26.68
% DPER < TPER	-32.75	DPER	75.35	TPER	56.76

Assessor Details	Mr. Nicholas Bowen	Assessor ID	D719-0001
Client	Green Tiger, Ross Standaloft		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southeast
Property Tenture	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, End-Terrace
2.0 Number of Storeys	3
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	32.60 m	58.88 m²	2.50 m
Ground floor:	31.10 m	83.50 m²	3.10 m
1st Storey:	29.00 m	66.18 m²	3.50 m

8.0 Living Area 22.20 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Basement	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.15	9.00	81.50	71.00	0.00	None	10.50	Enter Gross Area
New walls	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.14	60.00	85.86	71.46	0.00	None	14.40	Enter Gross Area
Existing walls	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.30	9.00	85.86	69.76	0.00	None	16.10	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	47.20		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Basement	Plasterboard on timber frame	9.00	111.50
GF B	Dense block, plasterboard on dabs	75.00	61.60
GF T	Plasterboard on timber frame	9.00	108.08
UGF B	Dense block, plasterboard on dabs	75.00	46.20
UGF	Plasterboard on timber frame	9.00	30.00

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Existing	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	66.18	64.68	None	0.00	Enter Gross Area	1.50
New	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	24.70	22.60	None	0.00	Enter Gross Area	2.10

Summary for Input Data

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Base	Precast concrete planks floor, screed, carpeted	30.00	58.88
GF	Precast concrete planks floor, screed, carpeted	30.00	66.18

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Basement	Ground Floor - Solid	Basement	Slab on ground, screed over insulation	0.12	None	0.00	110.00	58.88
GF	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.25	None	0.00	110.00	24.62

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
GF		Plasterboard ceiling, carpeted chipboard floor	9.00	58.88
UGF		Plasterboard ceiling, carpeted chipboard floor	9.00	66.18

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Existing Windows	Manufacturer	Window	Single glazed			0.85			1.40
New windows	Manufacturer	Window	Triple Low-E Soft 0.05			0.57		0.70	0.85
Door	Manufacturer	Solid Door				0.00			1.00
Roof lights	Manufacturer	Roof Light	Triple Low-E Soft 0.05			0.57		0.70	0.85
Existing RL	Manufacturer	Roof Light	Single glazed			0.85			1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front door	Door	New walls	South East	2.20	
Front new	New windows	New walls	South East	2.20	
Existing front	Existing Windows	Existing walls	South East	8.40	
Rear existing	Existing Windows	Existing walls	North West	7.70	
New rear	New windows	New walls	North West	5.80	
Base front	New windows	Basement	South East	5.25	
Base rear	New windows	Basement	North West	5.25	
Side new	New windows	New walls	South West	4.20	
New Rl	Roof lights	New	Horizontal	2.10	0
Existing RL	Existing RL	Existing	Horizontal	1.50	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	2.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	6
Manufacturer SFP	0.99
Duct Type	Rigid
MVHR Efficiency	88.00
Wet Rooms	6
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	81.00	10.00	810.00	20

24.0 Main Heating 1	Database
Description	gas
Percentage of Heat	100.00 %
Database Ref. No.	17929
Fuel Type	Mains gas
In Winter	84.00
In Summer	87.30
Model Name	LOGIC COMBI
Manufacturer	Ideal Boilers
System Type	Combi boiler
Controls SAP Code	2110
Delayed Start Stat	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Enter value
Flow Temperature Value	55.00
Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	None

25.0 Main Heating 2	None

26.0 Heat Networks	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1
Immersion Only Heating Hot Water	No

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
In Airing Cupboard	No

34.0 Small-scale Hydro	None

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			B 83	B 87
	£3,500 - £5,500	£252	B 86	B 87
			0	0

Summary for Input Data

Property Reference	Upper Park	Issued on Date	29/07/2024
Assessment Reference	Proposed	Prop Type Ref	
Property	3a, Upper Park Road, London, NW3 2UN		

SAP Rating	76 C	DER	4.59	TER	10.63
Environmental	95 A	% DER < TER			56.82
CO_2 Emissions (t/year)	0.88	DFEE	57.41	TFEE	45.32
Compliance Check	See BREL	% DFEE < TFEE			-26.68
% DPER < TPER	13.73	DPER	48.21	TPER	55.88

Assessor Details	Mr. Nicholas Bowen	Assessor ID	D719-0001
Client	Green Tiger, Ross Standaloft		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southeast
Property Tenture	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, End-Terrace
2.0 Number of Storeys	3
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	32.60 m	58.88 m²	2.50 m
Ground floor:	31.10 m	83.50 m²	3.10 m
1st Storey:	29.00 m	66.18 m²	3.50 m

8.0 Living Area 22.20 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Basement	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.15	9.00	81.50	71.00	0.00	None	10.50	Enter Gross Area
New walls	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.14	60.00	85.86	71.46	0.00	None	14.40	Enter Gross Area
Existing walls	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.30	9.00	85.86	69.76	0.00	None	16.10	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	47.20		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Basement	Plasterboard on timber frame	9.00	111.50
GF B	Dense block, plasterboard on dabs	75.00	61.60
GF T	Plasterboard on timber frame	9.00	108.08
UGF B	Dense block, plasterboard on dabs	75.00	46.20
UGF	Plasterboard on timber frame	9.00	30.00

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Existing	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	66.18	64.68	None	0.00	Enter Gross Area	1.50
New	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	24.70	22.60	None	0.00	Enter Gross Area	2.10

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Base	Precast concrete planks floor, screed, carpeted	30.00	58.88
GF	Precast concrete planks floor, screed, carpeted	30.00	66.18

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Basement	Ground Floor - Solid	Basement	Slab on ground, screed over insulation	0.12	None	0.00	110.00	58.88
GF	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.25	None	0.00	110.00	24.62

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
GF		Plasterboard ceiling, carpeted chipboard floor	9.00	58.88
UGF		Plasterboard ceiling, carpeted chipboard floor	9.00	66.18

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Existing Windows	Manufacturer	Window	Single glazed			0.85			1.40
New windows	Manufacturer	Window	Triple Low-E Soft 0.05			0.57		0.70	0.85
Door	Manufacturer	Solid Door				0.00			1.00
Roof lights	Manufacturer	Roof Light	Triple Low-E Soft 0.05			0.57		0.70	0.85
Existing RL	Manufacturer	Roof Light	Single glazed			0.85			1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front door	Door	New walls	South East	2.20	
Front new	New windows	New walls	South East	2.20	
Existing front	Existing Windows	Existing walls	South East	8.40	
Rear existing	Existing Windows	Existing walls	North West	7.70	
New rear	New windows	New walls	North West	5.80	
Base front	New windows	Basement	South East	5.25	
Base rear	New windows	Basement	North West	5.25	
Side new	New windows	New walls	South West	4.20	
New Rl	Roof lights	New	Horizontal	2.10	0
Existing RL	Existing RL	Existing	Horizontal	1.50	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	2.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	6
Manufacturer SFP	0.99
Duct Type	Rigid
MVHR Efficiency	88.00
Wet Rooms	6
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

Summary for Input Data

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	81.00	10.00	810.00	20

24.0 Main Heating 1	Database	
Description	ashp	
Percentage of Heat	100.00	%
Database Ref. No.	100061	
Fuel Type	Electricity	
In Winter	341.54	
In Summer	119.34	
Model Name	ECODAN 8.5kW	
Manufacturer	Mitsubishi Electric Europe B.V.	
System Type	Heat Pump	
Controls SAP Code	2207	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
28.0 Water Heating		
Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
28.3 Waste Water Heat Recovery System		
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.90	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	
31.0 Thermal Store	None	
34.0 Small-scale Hydro	None	

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

Recommendations

Summary for Input Data

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
	£4,000 - £6,000	£139	C 78	A 95
	£3,500 - £5,500	£275	B 81	A 96
			0	0