NRG CONSULTING

2-4 Ennerdale Road

Energy Statement

November 2024

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1 Executive Summary

NRG Consulting have been commissioned to undertake an Energy Statement on a proposed development at **2-4 Ennerdale Road, Richmond, TW9 3PG.**

The description of development is:

"Demolition of existing two storey side extension and single storey extensions to facilitate the conversion of former care home (C2 use) to residential use together with the construction of a pair of semi-detached dwellings, with all works providing 7no. dwellings with associated access, parking and gardens."

This document illustrates a reduction in CO_2 emissions over Part L of the Building Regulations (2021) via:

Energy Efficiency – *Be Lean*

- U-Values have been set to maximise fabric efficiency and reduce energy demand.
- High-efficiency double glazed windows will be installed.
- LED Lighting with a minimum efficacy of 95 lm/w is proposed.

Decentralised Energy – *Be Clean*

A feasibility review of the schemes potential to connect to decentralised energy sources has been undertaken in-line with Policy SI 3 - Energy Infrastructure of the London Plan.

The result of this is that the scheme will have individual heating.

Renewable Energy – *Be Green*

The on-site provision of renewable energy has been prioritised and following a feasibility review, the following technology will be provided:

- Air Source Heat Pump

	CO_2 Emissions (Tonnes per Annum)	
	Residential (New Build)	Residential (Refurb)
Baseline: Part L 2021	3.1	8.7
Be Lean: Use Less Energy	3.4	
Be Clean: Supply Energy Efficiently	3.4	
Be Green: Use Renewable Energy	1.2	5.7
CO_2 Savings at *Be Green* over Part L 2021	60.17%	33.78%
Overall Site Reduction	45.9%	

Table: Carbon Emissions Table

2 Policy Framework

The proposed development is classified as a **minor** development.

2.1 National Planning Policy Framework (NPPF) (2023)

The NPPF was updated in December 2023 and contains the following text regarding *sustainable development.*

Achieving Sustainable Development *(Paragraphs 7 to 14):*

The purpose of the planning system is to contribute to the achievement of sustainable development. This includes three overarching objectives:

An economic objective: To help build a strong, responsive, and competitive economy.
A social objective: To support strong, vibrant, and healthy communities.
An environmental objective: To protect and enhance our natural, built, and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

Presumption in Favour of Sustainable Development *(Paragraph 11):*

Plans and decisions should apply a presumption in favour of sustainable development. This includes promoting a sustainable pattern of development that seeks to meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects.

2.2 Regional Policy – The London Plan (March 2021)

The London Plan sets out high-end goals for the whole of London based on the energy hierarchy. It also states that its overarching goal is for London to become a net zero-carbon city. This will require reduction of all greenhouse gases, of which carbon dioxide is the most prominent.

Local Boroughs should ensure that all developments maximise opportunities for on-site electricity and heat production and reduce carbon emissions in-line with the stages of the energy hierarchy. In-line with the Zero Carbon Policy, all CO_2 emissions should be offset via a mixture of on-site and off-site measures.

The policies within The London Plan relevant to this assessment are:

- Policy SI 2 Minimising greenhouse gas emissions
- Policy SI 3 Energy Infrastructure
- Policy SI 4 Managing heat risk

In line with the London Plan, major developments are expected to achieve net zero-carbon by following the energy hierarchy:

- **Be Lean**: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures
- **Be Clean**: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks
- **Be Green**: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
- **Be Seen:** monitor, verify and report on energy performance through the Mayor's post construction monitoring platform.

2.3 Regional Policy – GLA Energy Assessment Guidance (June 2022)

On 15th June 2022, with the implementation of Part L of the Building Regulations (2021) and SAP 10.2 a new GLA guidance note was released to supersede the April 2020 guidance.

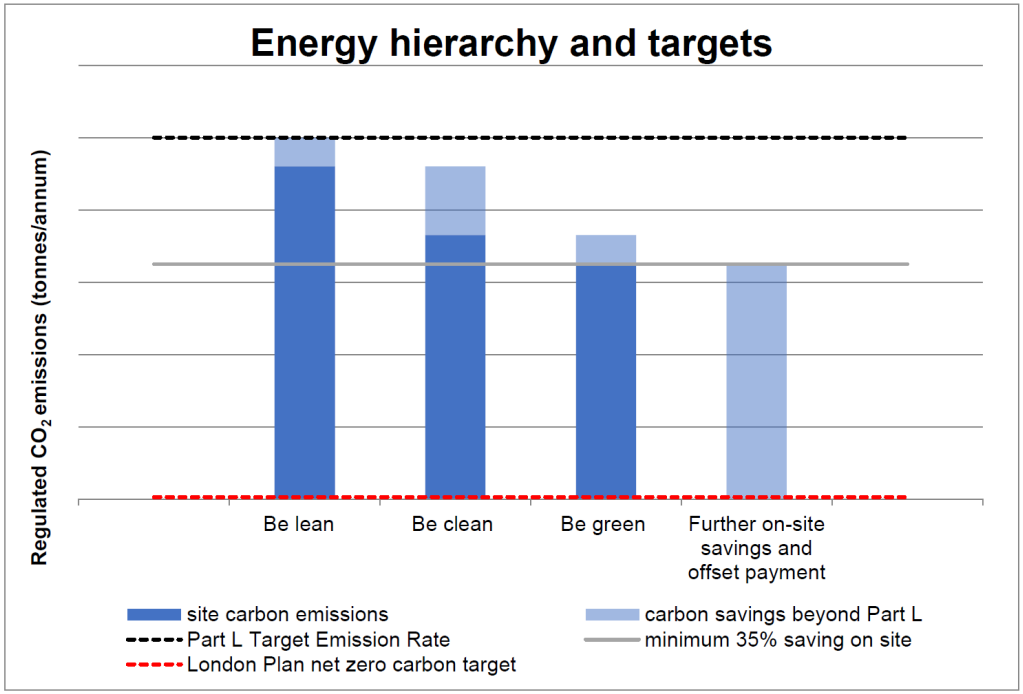
The main clarification within the June 2022 guidance was to confirm that the minimum expected carbon reduction on-site was to remain at 35% better than Part L 2021; the same target as the previous Building Regulation version.

A new benchmark target of 50% better than Part L 2021 was introduced for residential developments. The cover notes for the new version states:

The Mayor's net zero carbon target for major developments

The updated guidance confirms that all major developments in London must continue to meet the London Plan net zero carbon target by following the energy hierarchy (Policy SI 2), the heating hierarchy (Policy SI 3) and by maximising on-site carbon reductions. Planning applicants will be expected to demonstrate that at each stage of the energy hierarchy they have maximised opportunities for carbon reduction to achieve as close to zero as possible.

An on-site carbon reduction of at least 35 per cent beyond Part L 2021 of building regulations should be achieved. Once it has been demonstrated that carbon reductions have been maximised, any remaining emissions to zero should be offset by a contribution to the relevant borough's carbon offset fund.



2.4 Local Policy

London Borough of Richmond upon Thames - Local Plan (2018)

Policy LP22 is the relevant policy to this report and the full wording can be found on this page.

A summary of the expected provision within the borough can be found on the Councils website: Sustainable Construction Checklist - London Borough of Richmond upon Thames

Richmond Sustainable Construction Checklist

The Sustainable Construction Checklist Supplementary Planning Document (pdf, 493 KB) (June 2020 (pdf, 71 KB)) describes the key principles of sustainable design and construction which we expect all applicants to follow. The SPD reflects the Council's climate emergency declaration and the ambition to seek the highest standards of design and construction to improve the environmental performance of developments.

It forms a **mandatory** part of the planning application for the following classes of development:

- All residential development providing **1 or more new dwellings**, including conversions and extensions that create one or more new dwellings

The Checklist SPD consists of the following:

- Sustainable Construction Checklist SPD - Your scores will be calculated as you complete this checklist. You will need to submit the filled in checklist with your planning application. This should be submitted in **Excel format** to avoid losing any data.

- Sustainable Construction Checklist SPD Guidance Document (pdf, 493 KB)

Policy LP 22

Sustainable Design and Construction

A. Developments will be required to achieve the highest standards of sustainable design and construction to mitigate the likely effects of climate change. Applicants will be required to complete the following:

1. Development of 1 dwelling unit or more, or 100sqm or more of non-residential floor space (including extensions) will be required to complete the Sustainable Construction Checklist SPD. A completed Checklist has to be submitted as part of the planning application.
2. Development that results in a new residential dwelling, including conversions, change of use, and extensions that result in a new dwelling unit, will be required to incorporate water conservation measures to achieve maximum water consumption of 110 litres per person per day for homes (including an allowance of 5 litres or less per person per day for external water consumption).
3. New non-residential buildings over 100sqm will be required to meet BREEAM 'Excellent' standard.
4. Proposals for change of use to residential will be required to meet BREEAM Domestic Refurbishment 'Excellent' standard (where feasible).

Reducing Carbon Dioxide Emissions

B. Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions:

1. All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy.
2. All other new residential buildings should achieve a 35% reduction.
3. All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non-residential buildings should achieve zero carbon standards in line with London Plan policy.

Targets are expressed as a percentage improvement over the target emission rate (TER) based on Part L of the 2013 Building Regulations.

C. This should be achieved by following the Energy Hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

2.5 Part L of the Building Regulations (2021)

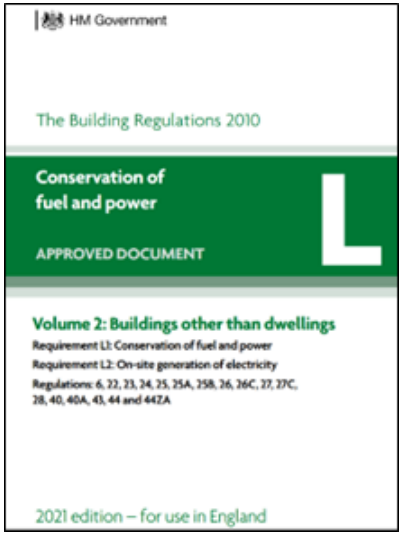
In July 2018 the then Department for Business Energy & Industrial Strategy (BEIS) published their proposed update to SAP 9.92 (Part L 2013), called SAP 10.

In June 2022, Part L 2021 of the Building Regulations came into force. As per the requirements, all new homes must produce 31% less CO_2 emissions than that of Part L 2013 in-order to achieve Building Regulation compliance.

One of the major change in the regulations was the change in carbon factor of electricity to represent the decarbonisation of the National Grid and the push towards net-zero carbon developments.

Part L 2021 also introduced three targets for Part L compliance:

- TER Target Emission Rate
- TPER Target Primary Energy Rate
- TFEE Target Fabric Energy Efficiency



2.6 The Future Homes and Buildings Standard

In October 2019, the then Ministry of Housing, Communities and Local Government (MHCLG) issued a consultation on changes to Part L. Dubbed *The Future Homes Standard*, it was an aspiration to ensure all new homes will have low carbon heating and "world-leading levels of energy efficiency" by 2025 and was intended to be the primary driver in achieving the net-zero carbon commitment made by the Government.

On 13th December 2023, consultation documents were issued by the Department for Levelling Up, Housing and Communities for *The Future Homes and Buildings Standard.* While still at a consultation age, this document details potential scenarios in how new build dwellings and buildings in the UK will become *net-zero ready.* The published proposals however

A separate consultation was published to discuss the withdrawal of the Standard Assessment Procedure (SAP) and replace it with a Home Energy Model (HEM).

Key points within the consultation document are:

- Removal of Gas Boilers from the Notional Dwelling Specification and;
- Fossil fuel-powered boilers in new buildings will be prohibited from 2025
- Further reduction in the carbon factor of electricity as the grid-decarbonises.
- Hybrid & hydrogen-ready boilers "will not meet the proposed standards"
- No major changes to M&E or Fabric requirements from Part L 2021.

Fuel	Part L 2013	Part L 2021	Part L 2025	Percentage Reduction
	(kg/CO_2/kWh)	(kg/CO_2/kWh)	(kg/CO_2/kWh)	
Electricity	0.519	0.136	0.086	73.8%

Table: *Change in Carbon Factor for Electricity from Part L 2013 to Part L 2025*

3 Energy Calculations – *Be Lean*

3.1 Energy Calculations

To estimate the CO_2 emissions for the site, SAP calculations have been carried out by an accredited OCDEA Domestic Energy Assessor using Design SAP 10's online platform.

The baseline CO_2 emissions covered by Part L are expressed as the Target Emission Rate (TER) and the proposed actual emissions are the Dwelling Emission Rate (DER). These use kilograms of CO_2 per square-metre per annum ($kg/CO_2/m^2$) as the unit. To calculate the overall proposed emissions, these figures are multiplied by the floor area of the dwellings and is presented in tonnes/annum. This is the figure within this report.

SAPs cover regulated carbon emissions from:

- Heating (and Cooling)
- Hot Water
- Lighting
- Auxiliary (Pumps and Fans)

The scheme is a part new-build (2 houses) and part change-of-use (5 houses). Therefore, *Be Lean,* TFEE and TPER compliance is only required for the two new build semi-detached dwellings.

Due to the high levels of carbon reduction achieved, the scheme has been assessed for planning purposes as a new-build i.e. against a 35% reduction over the TER target.

3.2 Passive Design Measures

Passive measures utilised in the concept and development of the design include:

- High levels of insulation exceeding than the Part L 2021 notional values
- Through good design, air infiltration will be minimised.
- A high-performance glazing system to reduce heat demand and increase solar gains.

Element	Part L1 Limiting U-Vales	Proposed U-Values (W/m^2K)
Walls		
External Wall (New)	*0.26 W/m²K*	0.16 W/m²K
Existing Cavity Wall (Upgraded)	*0.55 W/m²K*	0.55 W/m²K
Floor		
Ground Floor (New)	*0.18 W/m²K*	0.10 W/m²K
Ground Floor (Upgraded)	*0.25 W/m²K*	0.25 W/m²K
Roof		
Flat Roof (New)	*0.16 W/m²K*	0.16 W/m²K
Roof insulation at Ceiling (New)	*0.16 W/m²K*	0.11 W/m²K
Sloping Roof (New)	*0.16 W/m²K*	0.13 W/m²K
Existing Roofs (All Types)	*0.16 W/m²K*	0.16 W/m²K
Openings		
Windows	*1.6 W/m²K*	1.4 W/m²K
Front Door	*1.6 W/m²K*	1.4 W/m²K
Air Permeability – Change-of-Use Plots		
7 $m^3/(hm^2)$ @50Pa		
Air Permeability - New Build		
3 $m^3/(hm^2)$ @50Pa		

Table: Proposed Fabric Specification

3.3 Active Design

The development will incorporate efficient building services to limit carbon emissions, including a zero-NO_x heating system, smart metering and the following measures to both new and existing upgraded plots:

Element	Proposed Details
Ventilation	**System 1 - Intermittent Extract Fans & Trickle Vents**
Heating	**Air Source Heat Pump**
Heating Controls	**Time and Temperature Zone Controls**
Heat Emitters	**Radiators**
Hot Water	**170ltr Cylinder**
Lighting	**LED**
Cooling	**No**

Table: Proposed Mechanical and Electrical Specification

3.4 Lighting

In-line with exceeding Part L minimum requirements, all residential light fittings should be Light Emitting Diodes (LEDs) with a luminous efficiency per circuit watt of at least 95 lumens/Watt.

3.5 Unregulated Emissions (Residential)

Unregulated energy use and their carbon emissions are from systems or processes that are harder to quantify than regulated emissions which are from fixed systems.

Unregulated energy is not counted within SAP for the purpose of Part L compliance. This is because the emissions from these items are variable and dependant on occupant behaviour and specification i.e. different levels of White Good provision and use and amount of small power equipment used.

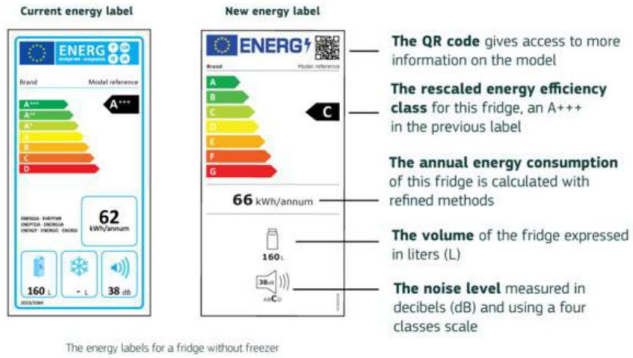
For the proposed residential units, unregulated emissions consist of:

- Equipment (Small Power devices)
- Cooking
- External Lighting
- Appliances

Appliances and white goods can use significant amounts of energy in a building. This energy use becomes relatively more important in low energy buildings where passive design and low-flow fittings have reduced demand from space heating and hot water. High efficiency appliances are recommended to limit total energy consumption and minimise overheating risk from waste energy given off as heat. In March 2021 the energy labelling ratings for appliances were updated, and are now rated simply A-G. What may have been an A+++ before might now be a B or even a C rating.

Proposed Development – Unregulated Emissions
1 tonnes of CO_2 per annum

Table: Unregulated Emissions



The energy labels for a fridge without freezer

3.6 Be Lean

London Plan Policy SI 2 energy efficiency targets are:

- Residential developments should achieve at least a 10 per cent improvement on Building Regulations from energy efficiency measures alone.

Be Lean calculations have been undertaken **for the two new-build semi-detached dwellings** and the heating has been modelled according to the GLA Guidance on Energy Statements. A copy of these calculations can be found in the appendices.

The scheme is short of the Be Lean target, however. The inclusion of WWHRS in the notional dwelling does not help along with PV. This scheme has proposed:

- U-Values as per the Part L 2021 notional dwelling
- High-efficiency double-glazing
- An Air Test of 3 $m^3/(hm^2)$ @50Pa

Therefore, every effort has been made to comply with the *Be Lean* target.

It should be noted that in the Etude Report *"Delivering Net Zero – An evidence study to support Planning Policies which deliver Net Zero Carbon developments (Rv. 4 – May 2023)"* commissioned by 18 London Boroughs for a review of achieving net-zero carbon that is states on Page 5:

No more 'Be Lean' requirement
The 'Be Lean' requirement was helpful under Part L 2013 but it is now challenging to achieve for non-domestic buildings and for domestic buildings, has little added value compared with the FEE requirement in Part L 2021.

Carbon Savings at *Be Lean*

	CO_2 Emissions (Tonnes per Annum)
	Residential
Baseline: Part L 2021	3.1
Be Lean: Use Less Energy	3.4

Table: Carbon Emissions Table – Be Lean (New Build only)

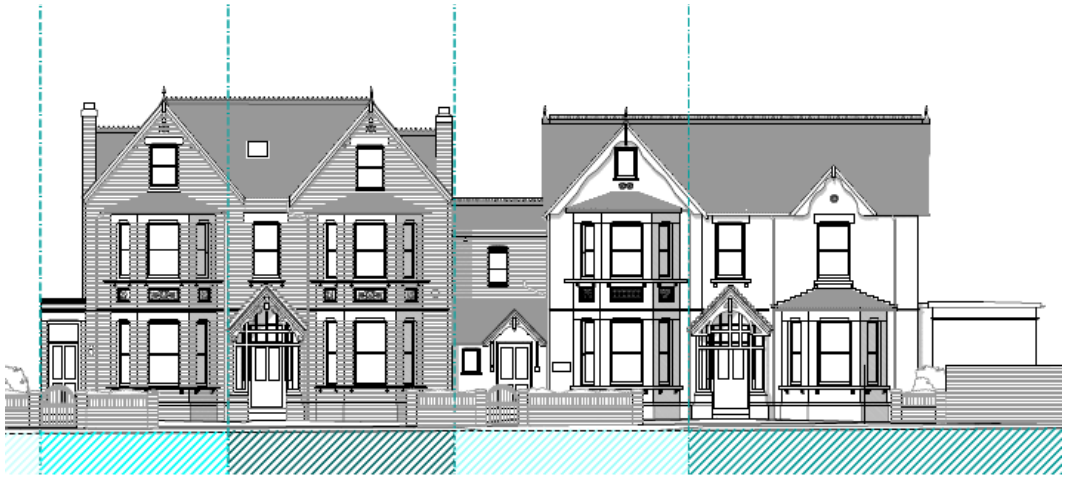


Figure: Proposed Street Elevations (part)

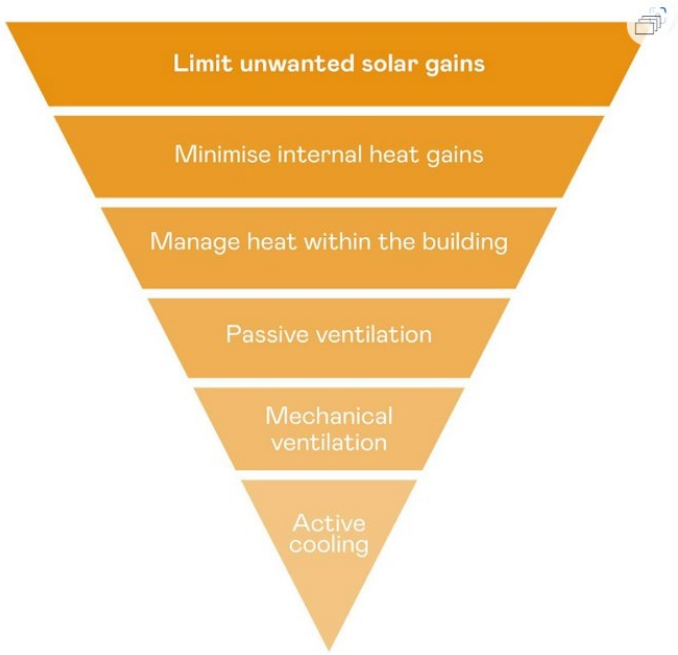
3.7 Overheating

This development will be compliant with Part O of the Building Regulations and a full dynamic overheating assessment will be undertaken at RIBA Stage 4 for the two new-build units.

The scheme has been designed to avoid overheating with the early stages of the cooling hierarchy prioritised and with the following being major factors in mitigating potential risk:

- Individual heating meaning a lack of communal heat distribution.
- Windows being able to be openable for overheating purposes.

On this page the cooling hierarchy is examined to highlight the measures introduced to mitigate the potential for overheating throughout the design process.



Cooling Hierarchy	Measures Undertaken
Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.	High albedo materials will be prioritised where possible.
	Insulation levels in-line with Part L 2021 have been proposed.
Minimise internal heat generation through energy efficient design:	Individual heating proposed so no communal heat distribution.
	LED lighting will reduce internal heat gains.
Manage the heat within the building through exposed internal thermal mass and high ceilings:	Thermal Mass will be maximised where possible throughout the scheme.
	The Floor to Ceiling Height complies with National Space Standards.
Provide Passive Ventilation	Openable Windows are proposed to all dwellings which will allow for nighttime purge ventilation if required.
	The dwellings benefits from the provision of cross-ventilation
Provide Mechanical Ventilation	Natural Ventilation is being provided.

4 Decentralised Energy – *Be Clean*

In the context of the London Plan, decentralised energy refers to low- and zero-carbon power and/or heat generated and delivered within London. This includes on-site heat networks and energy centres, through to large-scale district heat networks.

The London Heat Map displays connections to heat networks within London including both operational and future connections as well as displaying areas designated as Heat Network Priority Areas.

4.1 Connection to Existing Heating Networks (and Future Networks)

Following a review of the London Heat Map as well as a review of the Local Authority Website, the following details the closest existing or proposed heat network to the development (whichever is more appropriate).

Feature	Description/Unit
Nearest District Heat Network	Hounslow – Phase 3
Distance from Scheme	1.2km
Proposed Year of Operation	2031

Table*:* Closest Viable Heat Network Details

Based on the:

- Scheme location in context of the nearest proposed DHN
- Small size of development scheme
- Carbon reduction on-site that will increase further with National Grid decarbonisation

To clarify, the nearest DHN is on the side of the River Thames and Old Deer Park.

It is not proposed to connect, nor provide a future connection to an offsite network.

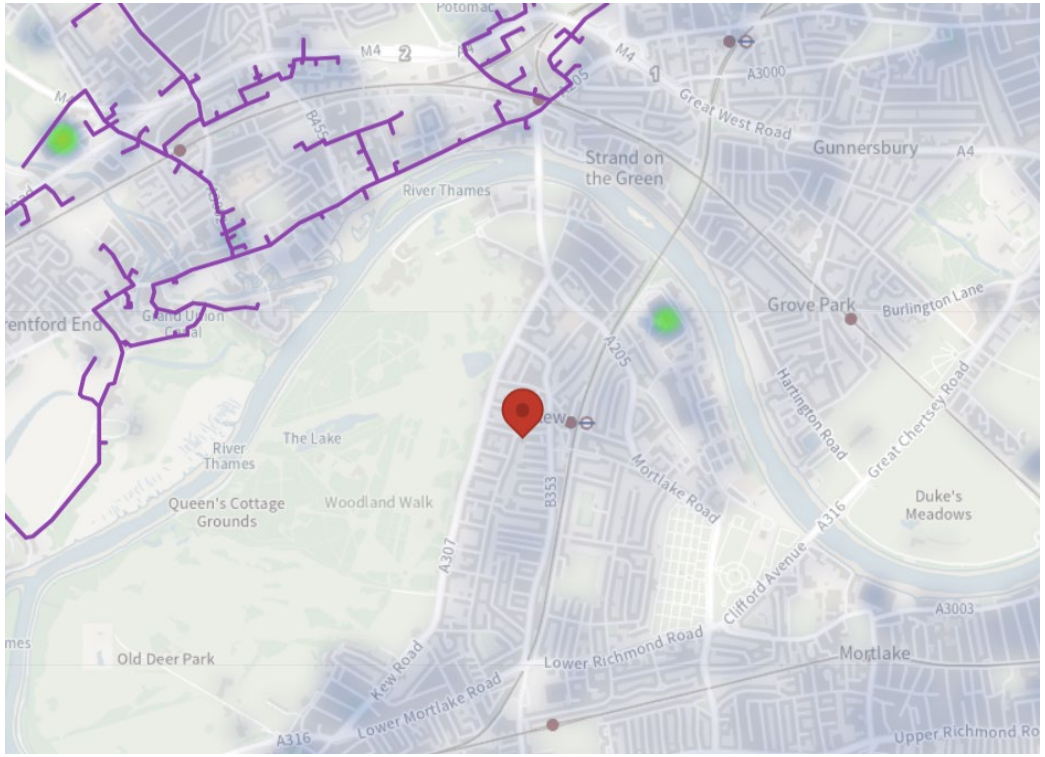


Figure: London Heat Map

5 Renewable Energy – *Be Green*

Renewable Energy is typically defined as:

"Energy derived from a source that is continually replenished, such as wind, wave, solar, hydroelectric and energy from plant material, but not fossil fuels or nuclear energy. Although not strictly renewable, geothermal energy is generally included."

As per Renewable Energy Directive (2018/2001/EU) aerothermal and hydrothermal technologies are also officially included within the definition.

Based on recent legislation including the *Clean Air Act* and *The Future Homes and Buildings Standards: 2023 consultation* as well as the location of the scheme, the following technologies have been discounted and are not discussed further:

- Wind Turbines
- Hydropower / Wave Technology
- Biogas / Biofuel / Biomass
- Hydrogen
- Hybrid Heat Pumps

The feasibility of remaining renewable and low carbon technologies has been undertaken based on the following parameters:

1. Practicality of installation of the technology
2. Energy demand profile for the project
3. Environmental impact & land use
4. Economic feasibility and overall payback (including available financial incentives)
5. Planning and regulatory issues i.e. conservation and heritage areas and aspects
6. Noise & aesthetic considerations

It should be noted that due to decarbonisation and the decrease in carbon factor for electricity, factors such as energy security and lowering running costs are deemed equal or more important to that of the offset of CO_2.

Non-Chosen Technologies
Solar Hot Water
Solar Hot Water can provide free hot water to a dwelling, mainly during the summer months thus it requires a high hot water demand to be at its most effective and offer a sufficient payback. However, when the dwelling is heated by a renewable source like an ASHP, this reduces the renewable energy generated due to an overlap in provision. To avoid high pipework heat losses, it is recommended that pipe runs are as small as possible so usually the technology is recommended for houses and top floor dwellings only. The system requires a dedicated hot water cylinder or a dual-cylinder. In apartments where space is at a premium, this additional equipment would take up valuable storage space. For this project, while not unviable, other technologies are preferred to achieve higher levels of carbon reduction within a quicker payback period.
PV Panels
The main benefit of PV has evolved in recent times from financial (Feed-In-Tariff era) to CO_2 offset (Part 2013) to currently providing a tangible saving on energy bills with a correctly sized and installed system. While system costs are higher in 2024 due to inflation and shipping costs, a domestic directly inverted system of 5kWp has a payback of around 7-10 years. The CO_2 offset of PV in Part L 2025 is projected to be 36.76% less than Part L 2021 therefore carbon savings for the technology are set to further diminish as the grid decarbonises. PV panel systems without battery systems face significant inefficiencies due to the seasonal mismatch between power generation and energy demand. These panels generate the most power during summer, when daylight is abundant, but this coincides with lower energy demand. In winter, when energy demand peaks, PV output is significantly reduced. The technology does benefits from having no noise implications, creates no additional land-use and when correctly specified has very limited aesthetic impact. For this scheme, other technologies are preferred due to the very low CO_2 savings that the technology offers in 2024.

Exhaust Air Heat Pumps and Hot Water Heat Pumps
Exhaust Air Heat Pumps (EAHP) are based on heat-pump technology and provide heating, hot water and ventilation in a large all-internal unit. However, these are suited to Passivhaus style developments or small apartments as the units have a very low heat output (<2kW) so if not, it does need to be supplemented with electric panel heaters. They also have noise considerations and ease-of-maintenance is unknown as a new technology in England. There are also limited manufacturers and availability in the UK market presently. Based on the proposed scheme having large houses with a demand beyond the optimum system size, EAHPs are not deemed the most feasible technology for the scheme. Hot Water Heat Pumps (HWHP) are essentially hot water cylinders integrated with a small heat pump to raise the efficiency of the system above the 1 of a standard electric cylinder. This provides domestic hot water at efficiencies above that of an ASHP (as the pump is dedicated for the Hot Water) when it comes to hot water generation. As they do not provide any contribution towards heating, they are best suited for projects where there is both limited external space and a higher hot water than heating demand. They are not best suited to larger houses or dwellings with multiple bathrooms due to the size of the cylinder (litres) and the output (kW) of the heat pump. Because of this, traditional Air Source Heat Pumps are preferred.
Ground Source Heat Pumps
Ground Source Heat Pumps (GSHP) differ from Air Source Heat Pumps in that they draw their heat from the ground rather than the air. This allows for both a more consistent temperature and higher efficiency given that in the winter months, the ground is warmer than the air. This allows the running costs of the system to be lower, although maintenance costs are higher. To install a GSHP, you either need to install a ground-loop (s*linky)* system or to have deep boreholes installed during the piling phase of the scheme. The introduction of boreholes comes at significant capital cost, especially for schemes where raft or strip foundations are proposed so unless a significant amount of land is available then this can make the capital cost prohibitive. Based on the proposals here, other technologies are preferred as piling is not anticipated.

Table: Renewable Energy Feasibility

Renewable Energy Tariffs

For new-build developments within England, there are no grants available for the installation of renewable technologies.

Previous schemes such as the Feed-In-Tarriff (FiT) and Renewable Heat Incentive (RHI) are now closed to new applications.

The only scheme available is the Smart Export Guarantee for PV systems, administered through utility companies where a small payment for exported energy is paid.

Feasibility Conclusion

Following a review of the available technologies, the following have been integrated into the scheme:

- Air Source Heat Pumps

5.1 Air Source Heat Pumps (Individual)

Air Source Heat Pumps (ASHPs) are designed to extract heat from the external air, a process that is effective even during colder conditions. Despite low temperatures, the air contains heat energy that can be utilised. Through a refrigerant system, ASHPs absorb this ambient heat at a lower temperature, use a compressor to increase its temperature, and subsequently transfer the elevated heat via a heat exchanger into the building's heating system. The functionality of ASHPs is based on refrigerant, which easily transitions between liquid and gaseous states. During the evaporation process, the refrigerant absorbs heat; when it is compressed and condensed back into a liquid, it releases heat.

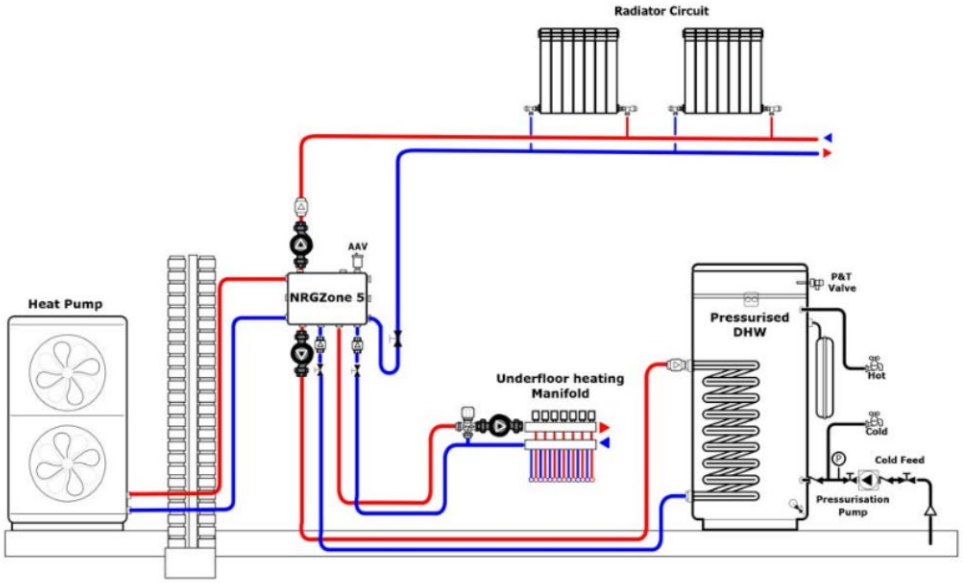
Scheme Proposals

At this early stage, an indicative Air Source Heat Pump has been modelled for the purpose of Part L compliance based on the estimated kW output and by using a common manufacturer that performs averagely in SAP. This is due to using a SAP default ASHP causes a disproportionately poor result within the software that would not be reflective of the final scheme.

A final make & model will be supplied during M&E design at RIBA Stage 3 / 4.

ASHP System Details	
Number of Heat Pumps	1 per property
Provides	Space Heating and Hot Water
Make and Model	Vaillant aroTHERM plus (for SAP modelling purposes)
SCOP	TBC depending on model but in excess of 3 (300%)
External Unit Location	Rear Garden

Table: Proposed ASHP Specification



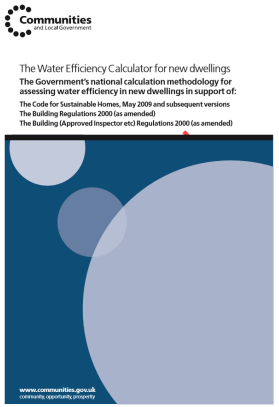
6 Water Efficiency

The Local Plan requires that all developments must incorporate water conservation to ensure a maximum internal water consumption rate of 110 litres/per person/per day (with an additional external water allowance of 5 litres).

This target is the same as the optional target included within Part G of the Building Regulations which encourages the efficient use of potable water. The specification proposed has been produced using the calculation methodology used to assess compliance against the water performance targets in Building Regulations 17.K and is based on the Government's *"The Water Efficiency Calculator for new dwellings – September 2009"* (withdrawn in June 2016).

The current guidance and calculation methodology can now be found within *Approved Document G - Sanitation, hot water safety and water efficiency* (2015 edition with 2016 amendments):
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf

The proposed specification for the scheme can be found on the right-hand side of the page. For the Dishwashers and Washing Machines, default consumption figures have been used.



Proposed Sanitaryware Specification		
Element	**Specification**	**Unit of Measurement**
WC	***6/3 dual flush***	*Litres per Flush*
Basin Taps	***5***	*Litres per Minute*
Kitchen Sink Taps	***9***	*Litres per Minute*
Shower	***8***	*Litres per Minute*
Bath	***155***	*Capacity to Overflow*
Washing Machine	***8.17***	*Litres per Kilo (Dry)*
Dishwasher	***1.25***	*Litres per Place Setting*
Allowance for External Use	5	*(Litres / Person / Day)*
Total Consumption (Litres / Person / Day)		**109.7**

Table: Proposed Water Consumption (litres/person/day)

7 Conclusion

An energy assessment has been undertaken on the proposed scheme in-line with the energy hierarchy of The London Plan. These calculations illustrate a reduction in CO_2 emissions over the baseline of Part L via:

Energy Efficiency Measures (*Be Lean*)

- Thermal insulation specified to achieve U-Values lower than the Part L 2021 notional.
- New double-glazing (including upgrading windows throughout the existing building)
- LED Lighting with high luminous efficacy will be provided to all fittings.
- Low Air Permeability targets have been sought.

Decentralised Energy (*Be Clean*)

Following a review of the scheme against planning policy, an on-site individual heating strategy is proposed with an Air Source Heat Pump.

Renewable Technologies (*Be Green*)

A feasibility on renewable technologies has been undertaken and the following systems are proposed for the scheme:

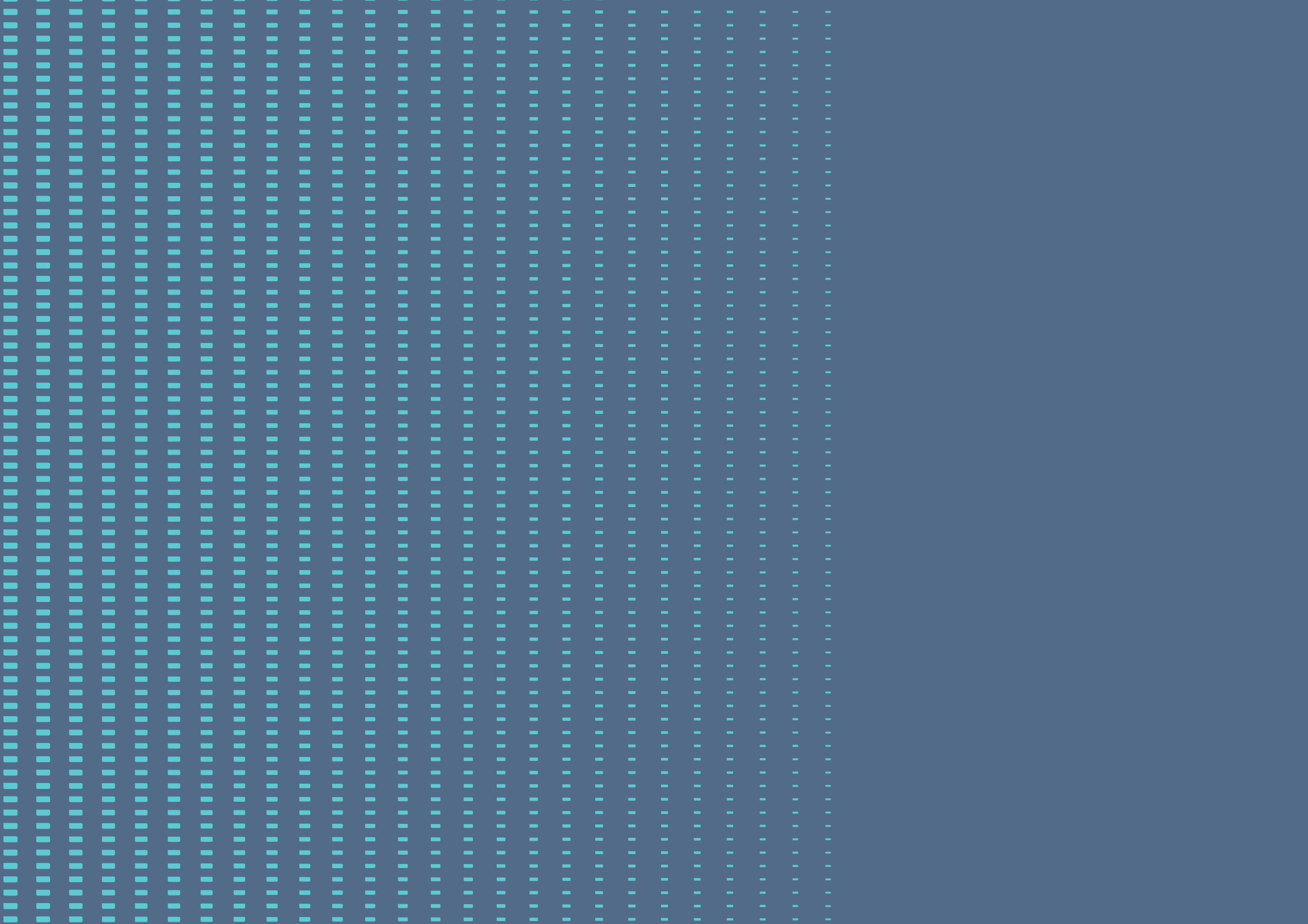
- Air Source Heat Pump

A copy of the Richmond Sustainability Checklist can be found in the Appendices.

As per the CO_2 emissions shown on this page, the proposed scheme is a highly-sustainable and low-carbon development that complies with and exceeds the requirements of the Local Authority and the GLA.

	CO_2 Emissions (Tonnes per Annum)	
	Residential (New Build)	Residential (Refurb)
Baseline: Part L 2021	3.1	8.7
Be Lean: Use Less Energy	3.4	
Be Clean: Supply Energy Efficiently	3.4	
Be Green: Use Renewable Energy	1.2	5.7
CO_2 Savings at *Be Green* over Part L 2021	60.17%	33.78%
Overall Site Reduction	45.9%	

Table: Carbon Emissions Table



Appendix 1

Project: Ennerdale Road (Conversions)					
Plots	Floor Area	Target Emissions (TER) *Part L Baseline*	Total TER	Dwelling Emissions Rate (DER) *Be Green*	Total DER *Be Green*
	m^2	$kg/CO_2/m^2/year$	$kg/CO_2/year$	$kg/CO_2/m^2/year$	$kg/CO_2/year$
House 2 (L1B)	220	8.91	1,960	5.90	1,298
Total Site Area Assessed (m^2):	220		1,960		1,298
		1m² TER	*8.91*	*1m² DER (BG)*	*5.90*
Total Site Area (m^2):	973		8,669		5,741

Results			Overall Results		
Baseline Emissions - Total Site	8,669	$kg/CO_2/year$	Final CO_2 Emissions at *Be Green*	5,741	$kg/CO_2/year$
Unregulated Energy - Total Site	1,600	$kg/CO_2/year$	CO_2 Savings at *Be Green*	33.78	%
			Total CO_2 reduction achieved	2,929	$kg/CO_2/year$

Project: Ennerdale Road (New Build)								
Plots	Floor Area	Target Emissions (TER) *Part L Baseline*	Total TER	Energy Generation Technologies within TER (Row 269)	Dwelling Emissions (DER) *Be Lean*	Total DER *Be Lean*	DER *Be Green*	Total DER *Be Green*
	m^2	$kg/CO_2/m^2/year$	$kg/CO_2/year$	$kg/CO_2/year$	$kg/CO_2/m^2/year$	$kg/CO_2/year$	$kg/CO_2/m^2/year$	$kg/CO_2/year$
Victoria (L1A)	177	9.39	1,662	-467	12.94	2,290	3.74	662
Total Site Area Assessed (m^2):	177		1,662	-467	*Be Lean* Emissions (minus EGT)	1,824		662
		$1m^2$ TER	9.39		*$1m^2$ DER (BL)*	10.30	*$1m^2$ DER (BG)*	3.74
Total Site Area (m^2):	332		3,117	-467	*Be Lean* Emissions (minus EGT)	3,421		1,242

Results		
Baseline Emissions - Total Site	3,117	$kg/CO_2/year$
Be Lean Emissions - Total Site	3,421	$kg/CO_2/year$
Be Lean Saving	-9.72	%
Unregulated Energy - Total Site	800	$kg/CO_2/year$

Overall Results		
Final CO_2 Emissions at *Be Green*	1,242	$kg/CO_2/year$
CO_2 Savings at *Be Green*	60.17	%
Total CO_2 reduction achieved	1,876	$kg/CO_2/year$

Results by Hierarchy Stage		
CO_2 Reduction at *Be Lean*	-303	$kg/CO_2/year$
CO_2 Reduction at *Be Green*	2,179	$kg/CO_2/year$

Appendix 2

Summary for Input Data

elmhurst energy

Property Reference	No 2	**Issued on Date**	24/10/2024
Assessment Reference	L1B proposed	**Prop Type Ref**	L1b existing
Property	No 2, 2.4 Ennerdale road, Richmond , TW9		

SAP Rating	69 C	**DER**	5.90	**TER**	8.91
Environmental	94 A	**% DER < TER**			33.78
CO_2 Emissions (t/year)	1.18	**DFEE**	74.85	**TFEE**	41.07
Compliance Check	See BREL	**% DFEE < TFEE**			-82.26
% DPER < TPER	-29.59	**DPER**	60.82	**TPER**	46.93

Assessor Details	Mr. Neil Rothon	**Assessor ID**	L759-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	House, End-Terrace	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	281.86	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	30.00 m	97.22 m²	3.40 m
1st Storey:	20.24 m	63.09 m²	2.93 m
2nd Storey:	22.90 m	63.09 m²	2.20 m

8.0 Living Area	45.56	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
Existing upgraded	Cavity Wall	Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure	0.55	150.00	176.92	144.00	0.00	None	32.92	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	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	98.30	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	375.29

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
over GF upgraded	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	34.13	34.13	None	0.00	Enter Gross Area	0.00
Sloping upgraded	External Slope Roof	Plasterboard, insulated slope	0.16	9.00	54.40	54.40	None	0.00	Enter Gross Area	0.00

Summary for Input Data

elmhurst energy

Flat ceiling upgraded	External Plane Roof	Plasterboard, insulated at ceiling level	0.16	9.00	21.22	21.22	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	63.09
Internal Ceiling 2	+1	Plasterboard ceiling, carpeted chipboard floor	63.09

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground F upgraded	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	97.22

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	63.09
Internal Floor 2		Plasterboard ceiling, carpeted chipboard floor	9.00	63.09

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
new door	Manufacturer	Solid Door				0.00			1.40
New Windows	Manufacturer	Window	Double Low-E Hard 0.2			0.72		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front door	new door	Existing upgraded	South	2.94	0
Front	New Windows	Existing upgraded	South	7.42	0
rear	New Windows	Existing upgraded	North	4.23	0
side	New Windows	Existing upgraded	East	13.53	0
bay se	New Windows	Existing upgraded	South East	2.40	0
bay sw	New Windows	Existing upgraded	South West	1.20	0
bay ne	New Windows	Existing upgraded	North East	1.20	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

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	6	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	7.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	95.00	5.00	475.00	20

Summary for Input Data

elmhurst energy

24.0 Main Heating 1	Database	
Description	ashp	
Percentage of Heat	100.00	%
Database Ref. No.	103778	
Fuel Type	Electricity	
SAP Code	0	
In Winter	284.45	
In Summer	172.45	
Model Name	aroTHERM 7kW	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating	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	Yes
Summer Immersion	No
Cold Water Source	From header tank
Bath Count	2
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
m	Vented hot water system + pump	12.00		No	
e1	Vented hot water system + pump	12.00		No	
e2	Vented hot water system + pump	12.00		No	

28.3 Waste Water Heat Recovery System

Summary for Input Data

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Insulation Thickness Type	80 mm	
Insulation Thickness	80	
Cylinder Volume	180.00	L
Loss	1.80	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	
31.0 Thermal Store	None	
34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Appendix 3

Summary for Input Data

elmhurst energy

Property Reference	Victoria	**Issued on Date**	24/10/2024
Assessment Reference	Be Lean	**Prop Type Ref**	L1A new build
Property	Victoria, 2.4 Ennerdale road, Richmond , TW9		

SAP Rating	86 B	**DER**	12.94	**TER**	9.39
Environmental	86 B	**% DER < TER**			-37.81
CO_2 Emissions (t/year)	2.25	**DFEE**	38.11	**TFEE**	40.63
Compliance Check	See BREL	**% DFEE < TFEE**			6.21
% DPER < TPER	-44.95	**DPER**	71.24	**TPER**	49.15

Assessor Details	Mr. Neil Rothon	**Assessor ID**	L759-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	House, Semi-Detached	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	196.35	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	23.75 m	73.00 m²	3.24 m
1st Storey:	24.53 m	67.00 m²	3.00 m
2nd Storey:	25.22 m	58.00 m²	2.20 m

8.0 Living Area	45.56	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
New wall	Cavity Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.16	110.00	174.76	135.32	0.00	None	39.44	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	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	85.61	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Plasterboard on timber frame	9.00	931.39

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
over GF	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	6.00	6.00	None	0.00	Enter Gross Area	0.00
new sloping	External Slope Roof	Plasterboard, insulated slope	0.13	9.00	47.84	47.84	None	0.00	Enter Gross Area	0.00

Summary for Input Data

elmhurst energy

Flat ceiling	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	31.27	31.27	None	0.00	Enter Gross Area	0.00	

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	67.00
Internal Ceiling 2	+1	Plasterboard ceiling, carpeted chipboard floor	58.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground new	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.10	None	0.00	75.00	73.00

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	67.00
Internal Floor 2		Plasterboard ceiling, carpeted chipboard floor	9.00	58.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
new door	Manufacturer	Solid Door				0.00			1.40
New Windows	Manufacturer	Window	Double Low-E Hard 0.2			0.72		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front door	new door	New wall	South	1.78	0
Front	New Windows	New wall	South	6.81	0
rear	New Windows	New wall	North	12.18	0
side	New Windows	New wall	East	13.53	0
bay se	New Windows	New wall	South East	2.56	0
bay sw	New Windows	New wall	South West	2.56	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging — Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	21.98	0.03	0.03	rcd	Yes
E3 Sill	Independently assessed	21.13	0.02	0.02	rcd	Yes
E4 Jamb	Independently assessed	57.10	0.02	0.02	rcd	Yes
E5 Ground floor (normal)	Gov Approved Scheme	23.75	0.06	0.06	rcd	No
E16 Corner (normal)	Gov Approved Scheme	18.75	0.04	0.04	rcd	No
E18 Party wall between dwellings	Gov Approved Scheme	6.25	0.05	0.05	rcd	No
E25 Staggered party wall between dwellings	Table K1 - Default	6.25	0.24	0.24	rcd	No
P1 Party wall - Ground floor	Gov Approved Scheme	12.37	0.05	0.05	rcd	No
P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	1.70	0.48	0.48	gf	No
E15 Flat roof with parapet	Table K1 - Default	6.95	0.30	0.30	df	No
E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	5.62	0.15	0.15	df	No
E6 Intermediate floor within a dwelling	Gov Approved Scheme	19.28	0.00	0.00	rcd	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	9.00	0.00	0.00	df	No
E11 Eaves (insulation at rafter level)	Gov Approved Scheme	17.02	0.02	0.02	rcd	No
P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	9.00	0.48	0.48	tf	No
R4 Ridge (vaulted ceiling)	Table K1 - Default	11.00	0.12	0.12	df	No
E13 Gable (insulation at rafter level)	Gov Approved Scheme	13.88	0.03	0.03	rcd	No

Y-value: 0.05 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present: No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	7
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting 1	95.00	5.00	475.00	20

24.0 Main Heating 1	Manufacturer	
Description	gas	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	102	
In Winter	89.50	
In Summer	89.50	
Model Name	tbc	
Manufacturer	tbc	
Controls SAP Code	2110	
Delayed Start Stat	No	
Burner Control	On/Off	
HETAS approved System	No	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
Boiler Interlock	No	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating	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

Summary for Input Data

Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From header tank
Bath Count	2
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
m	Vented hot water system + pump	12.00		No	
e1	Vented hot water system + pump	12.00		No	
e2	Vented hot water system + pump	12.00		No	

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	
Insulation Thickness Type	80 mm	
Insulation Thickness	80	
Cylinder Volume	180.00	L
Loss	1.20	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	
31.0 Thermal Store	None	
34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Appendix 4

Summary for Input Data

elmhurst energy

Property Reference	Victoria	**Issued on Date**	24/10/2024
Assessment Reference	Proposed Be Green	**Prop Type Ref**	L1A new build
Property	Victoria, 2.4 Ennerdale road, Richmond , TW9		

SAP Rating	81 B	**DER**	3.74	**TER**	9.39
Environmental	96 A	**% DER < TER**			60.17
CO_2 Emissions (t/year)	0.66	**DFEE**	38.11	**TFEE**	40.63
Compliance Check	See BREL	**% DFEE < TFEE**			6.21
% DPER < TPER	20.98	**DPER**	38.84	**TPER**	49.15

Assessor Details	Mr. Neil Rothon	**Assessor ID**	L759-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	House, Semi-Detached	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	196.35	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	23.75 m	73.00 m²	3.24 m
1st Storey:	24.53 m	67.00 m²	3.00 m
2nd Storey:	25.22 m	58.00 m²	2.20 m

8.0 Living Area	45.56	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
New wall	Cavity Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.16	110.00	174.76	135.32	0.00	None	39.44	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	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	85.61	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Plasterboard on timber frame	9.00	931.39

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
over GF	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	6.00	6.00	None	0.00	Enter Gross Area	0.00
new sloping	External Slope Roof	Plasterboard, insulated slope	0.13	9.00	47.84	47.84	None	0.00	Enter Gross Area	0.00

Summary for Input Data

elmhurst energy

Flat ceiling	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	31.27	31.27	None	0.00	Enter Gross Area	0.00	

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	67.00
Internal Ceiling 2	+1	Plasterboard ceiling, carpeted chipboard floor	58.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground new	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.10	None	0.00	75.00	73.00

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	67.00
Internal Floor 2		Plasterboard ceiling, carpeted chipboard floor	9.00	58.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
new door	Manufacturer	Solid Door				0.00			1.40
New Windows	Manufacturer	Window	Double Low-E Hard 0.2			0.72		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front door	new door	New wall	South	1.78	0
Front	New Windows	New wall	South	6.81	0
rear	New Windows	New wall	North	12.18	0
side	New Windows	New wall	East	13.53	0
bay se	New Windows	New wall	South East	2.56	0
bay sw	New Windows	New wall	South West	2.56	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging — Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	21.98	0.03	0.03	rcd	Yes
E3 Sill	Independently assessed	21.13	0.02	0.02	rcd	Yes
E4 Jamb	Independently assessed	57.10	0.02	0.02	rcd	Yes
E5 Ground floor (normal)	Gov Approved Scheme	23.75	0.06	0.06	rcd	No
E16 Corner (normal)	Gov Approved Scheme	18.75	0.04	0.04	rcd	No
E18 Party wall between dwellings	Gov Approved Scheme	6.25	0.05	0.05	rcd	No
E25 Staggered party wall between dwellings	Table K1 - Default	6.25	0.24	0.24	rcd	No
P1 Party wall - Ground floor	Gov Approved Scheme	12.37	0.05	0.05	rcd	No
P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	1.70	0.48	0.48	gf	No
E15 Flat roof with parapet	Table K1 - Default	6.95	0.30	0.30	df	No
E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	5.62	0.15	0.15	df	No
E6 Intermediate floor within a dwelling	Gov Approved Scheme	19.28	0.00	0.00	rcd	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	9.00	0.00	0.00	df	No
E11 Eaves (insulation at rafter level)	Gov Approved Scheme	17.02	0.02	0.02	rcd	No
P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	9.00	0.48	0.48	tf	No
R4 Ridge (vaulted ceiling)	Table K1 - Default	11.00	0.12	0.12	df	No
E13 Gable (insulation at rafter level)	Gov Approved Scheme	13.88	0.03	0.03	rcd	No

Y-value: 0.05 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present: No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	7
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting 1	95.00	5.00	475.00	20

24.0 Main Heating 1	Database	
Description	ashp	
Percentage of Heat	100.00	%
Database Ref. No.	103778	
Fuel Type	Electricity	
SAP Code	0	
In Winter	261.42	
In Summer	171.90	
Model Name	aroTHERM 7kW	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
Delayed Start Stat	No	
Burner Control	On/Off	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating	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	Yes

Summary for Input Data

Summer Immersion	No	
Cold Water Source	From header tank	
Bath Count	2	
Supplementary Immersion	No	
Immersion Only Heating Hot Water	No	

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
m	Vented hot water system + pump	12.00		No	
e1	Vented hot water system + pump	12.00		No	
e2	Vented hot water system + pump	12.00		No	

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	
Insulation Thickness Type	80 mm	
Insulation Thickness	80	
Cylinder Volume	180.00	L
Loss	1.20	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	
31.0 Thermal Store	None	
34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Appendix 5

Technical information

Be ready for the energy change

Vaillant Comfort for your home

Air-to-water heat pumps

A safe investment in the future

State-of-the-art heating technology with minimal environmental impact

Vaillant is continuously advancing the development of heat pump technology. The Vaillant research and development teams constantly strive to develop the most efficient and quiet heat pumps on the market, thoroughly testing them in our own testing centres for durability and performance. For example, we have climate and hail chambers where we can test for robustness and reliability in extreme conditions. Vaillant also manufactures only in Europe, so we can guarantee you and your customers receive the high quality expected from a Vaillant appliance.

Vaillant offers a great new model in our portfolio of air-to-water heat pumps with the introduction of the aroTHERM plus. This award-winning heat pump is the first in our range to use natural refrigerant R290. This refrigerant, commonly used in many household appliances, has a very low Global Warming Potential (GWP) that offers many advantages over refrigerants traditionally used in heat pumps.

The new aroTHERM plus heat pump has technical features for improved efficiency, as well as higher flow temperatures, so it's perfect for new and existing heating systems (including hybrid). It's also impressively quiet in operation and has been accredited by Quiet Mark*.

*Models 3.5, 5, 7 and 12kW

Always the right choice

Reliability and performance of the highest standards ensure peace of mind for your customers. It's so quiet, they won't even know it's on.

High performance

The aroTHERM plus heat pump has been designed to deliver the very best performance with low running costs, making it suitable for radiators as well as underfloor heating. With a flow temperature of up to 75°C, the aroTHERM plus can deliver more usable hot water with high hot water comfort levels and removes the need for direct electric immersion to sterilise the water, protecting from legionella.

Higher energy-efficiency

With a SCOP of up to 5.03, the aroTHERM plus is extremely energy efficient, enabling high energy savings against certain fossil fuels.
The aroTHERM plus can also be combined with photovoltaic systems and integrated into smart power grids (SG-ready), so your customers can enjoy the benefits of variable electricity tariffs.

Super quiet

With sound power as low as 54 dB for easier planning and siting, the aroTHERM plus is suitable for use in densely built-up terraced housing estates.

Natural refrigerant

Already fulfilling the next NZEB requirements, the aroTHERM plus uses monobloc technology with a hermetically sealed refrigerant circuit using the natural refrigerant, R290, to deliver the one of the lowest GWP of 3.

Why R290?
R290 is a natural refrigerant with a very low GWP* of three. This offers the following advantages:

- future-proof, as not affected by the F-Gas Regulation
- higher flow temperature of up to 75°C
- higher hot water comfort and protection against legionella without electric auxiliary heating
- wider performance envelope with operating temperature ranging between -25°C and +46°C
- Already fulfilling the next NZEB requirements, the aroTHERM plus uses monobloc technology with a hermetically sealed refrigerant circuit using natural refrigerant R290 to deliver the one of the lowest GWP of 3
- Reduced refrigerant charge compared to R410a and R32

Natural refrigerants are already used in many areas of our daily lives, e.g. in refrigerators and heat pump tumble-driers

Natural refrigerant GWP 3

Model calculation
R290 (aroTHERM plus)
0.6 kg R290 x 3 GWP **= 1.8 kg CO_2**

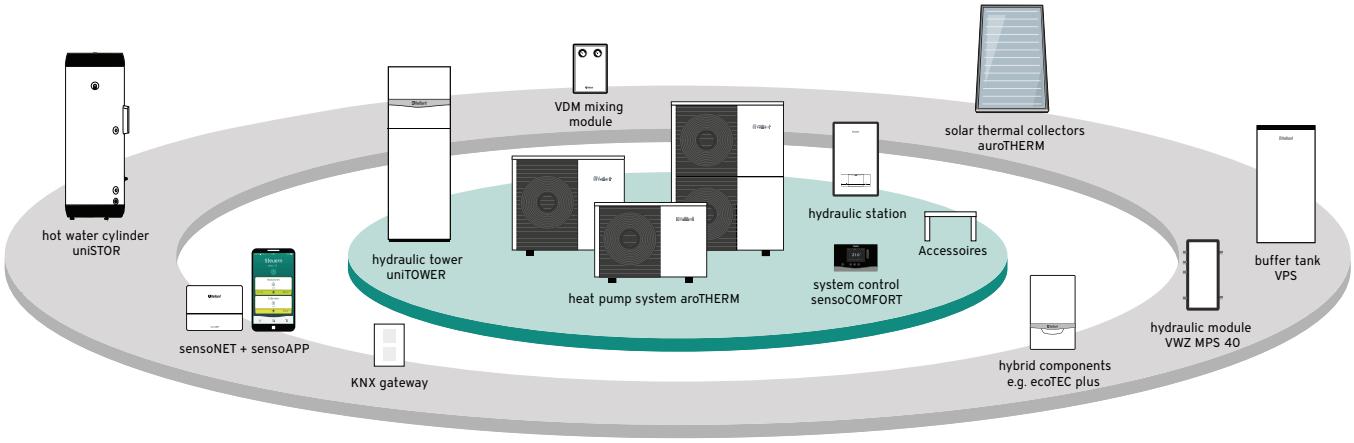
15 km journey by car

*Comparison of refrigerant GWP values:

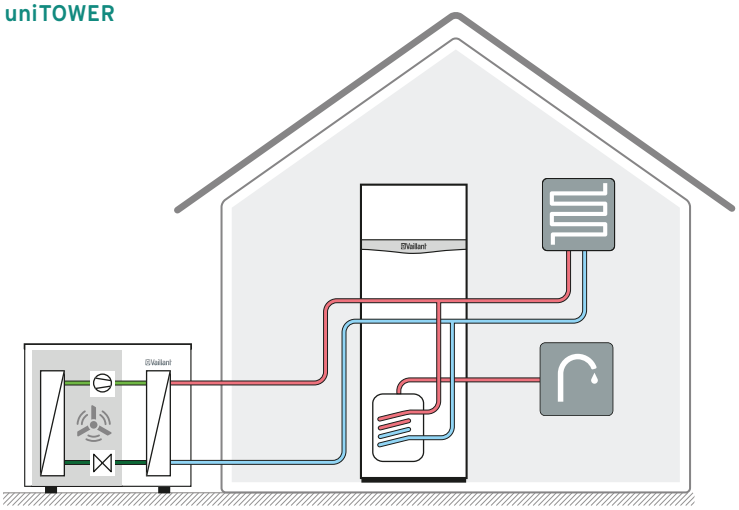
CO_2	1
R290	3
R32	675
R410a	2,088

Introducing the perfect partner

Your customers have widely differing wishes and needs. We offer the system components that enable you to fulfil them all – whether they wish to integrate photovoltaics, a solar-thermal system or smart home technology. All conveniently manageable with a single controller – the new sensoCOMFORT. This enables you to quickly commission the system and lets your customers change daily settings at the flick of a wrist.

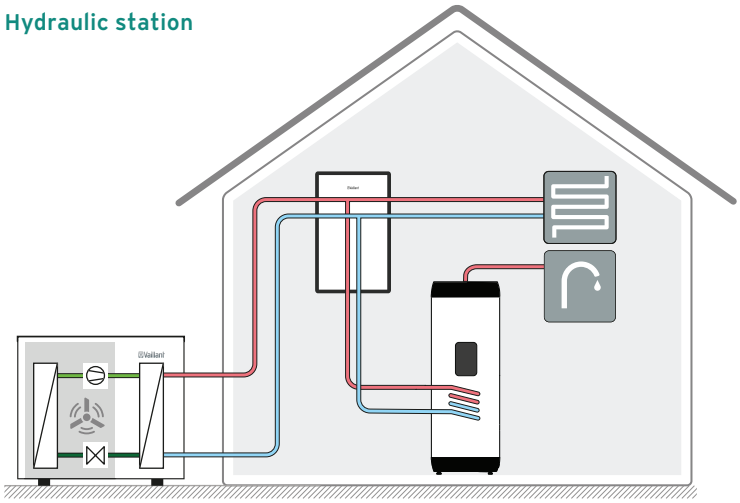


uniTOWER



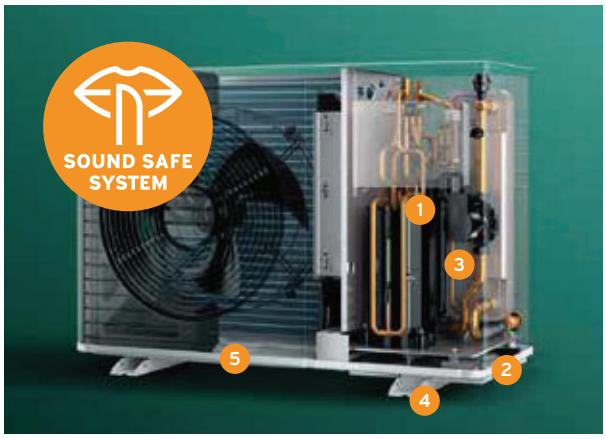
The uniTOWER is an integrated 190 litre cylinder with hydraulic components which can easily provide sufficient hot water for the needs of a family of five, including the use of rain showers. Thanks to its space-saving dimensions, the system is the perfect choice for new buildings. Installed indoors, the uniTOWER is about the size of a fridge freezer and saves valuable space in the room where it's installed.

Hydraulic station



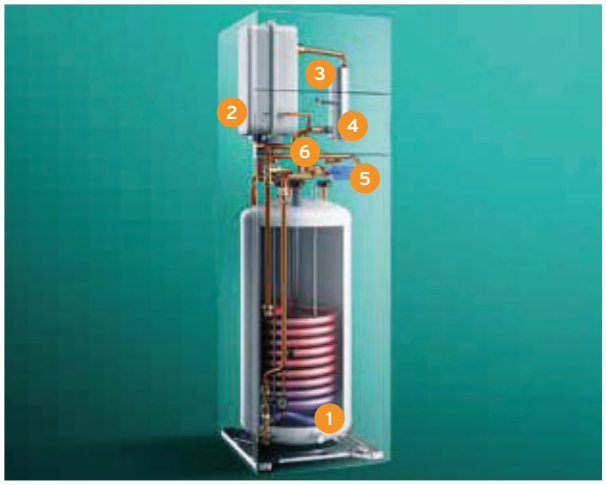
In the case of higher hot water demand, the aroTHERM plus can be used together with a wall-mounted hydraulic station and a wide range of accessories, including the uniSTOR heat pump cylinders and buffer tanks.

Features and benefits



aroTHERM plus

1. Hermetically sealed – no refrigerant certification required
2. Floating floor design absorbs vibration and reduces noise
3. Vortex sensor for accurate performance analysis
4. Weatherproof material and paint make it an ideal choice for coastal areas
5. Integrated tray and trace heater to ensure clear condensation run



uniTOWER

1. 190-litre storage cylinder capacity, corresponds to up to 380-litres of usable hot water output
2. Hydraulic components already integrated, e.g. 15-litre expansion vessel
3. System accessory options, ready for integration, e.g. heating zone packs, 18-litre buffer or system separation plate heat exchanger
4. Modulating electric auxiliary heater with up to 6 kW
5. 3-way diverter valve
6. Electric wiring interface

Hydraulic module

1. Hydraulic components already integrated, including 10-litre expansion vessel
2. Modulating electric auxiliary heater with up to 6 kW
3. 3-way diverter valve
4. Continued use of existing hot water storage cylinders
5. Electric wiring interface

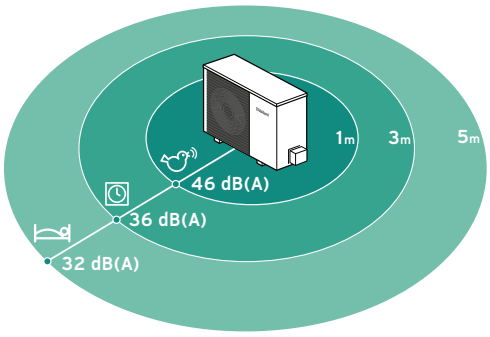
Heat pump interface

- Suitable for standard set-up and hybrid systems
- Heating system components can be placed to suit property layout
- Compatible with all Vaillant heat pump accessories including back-up heater, heat exchanger module and uniSTOR heat pump cylinders

SCOP and heating output

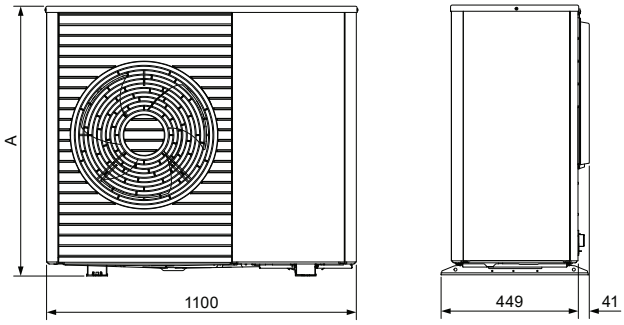
aroTHERM output		35°C flow		40°C flow		45°C flow		50°C flow		55°C flow	
		Output	SCOP	Output	SCOP	Output	SCOP	Output	SCOP	Output	SCOP
3.5kW	-5°C	4.2	4.41	4.1	4.03	4	3.65	3.9	3.37	3.8	3.10
	-3°C	4.6		4.4		4.3		4.2		4	
	0°C	4.7		4.7		4.6		4.5		4.4	
	2°C	4.9		4.9		4.9		4.7		4.6	
5kW	-5°C	6.3	4.48	6	4.13	5.6	3.77	5.5	3.41	5.4	3.06
	-3°C	6.8		6.4		6.1		5.9		5.8	
	0°C	6.9		6.7		6.6		6.4		6.2	
	2°C	7.1		7		6.9		6.7		6.5	
7kW	-5°C	8.2	4.36	8.1	4.13	8	3.91	7.5	3.65	7	3.39
	-3°C	8.8		8.6		8.4		7.9		7.4	
	0°C	9.5		9.3		9.1		8.6		8.1	
	2°C	10		9.8		9.6		9		8.5	
10kW	-5°C	9.9	5.03	9.7	4.58	9.4	4.13	9.1	3.85	8.8	3.58
	-3°C	10.7		10.3		10		9.6		9.2	
	0°C	11.9		11.6		11.3		10.7		10.2	
	2°C	12.8		12.5		12.1		11.5		10.9	
12kW	-5°C	13.1	4.88	12.8	4.55	12.5	4.21	11.7	3.92	10.8	3.63
	-3°C	13.9		13.4		12.9		12.1		11.2	
	0°C	15.2		14.6		14.1		13.2		12.3	
	2°C	16		15.5		14.9		13.9		13	

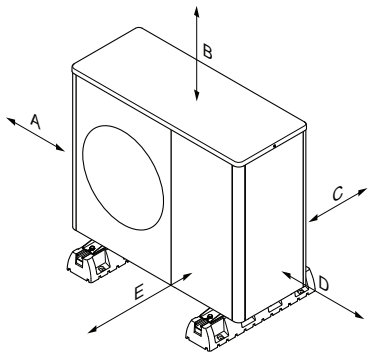
Sound power



Model	Sound Power Level A7/W55	Sound Pressure Level		
		1m distance	3m distance	5m distance
aroTHERM plus 3.5kW	54 dB	46 dB(A)	36 dB(A)	32 dB(A)
aroTHERM plus 5kW	54 dB	46 dB(A)	36 dB(A)	32 dB(A)
aroTHERM plus 7kW	55 dB	47 dB(A)	37 dB(A)	33 dB(A)
aroTHERM plus 10kW	60 dB	52 dB(A)	42 dB(A)	38 dB(A)
aroTHERM plus 12kW	60 dB	52 dB(A)	42 dB(A)	38 dB(A)

Dimensions and clearances



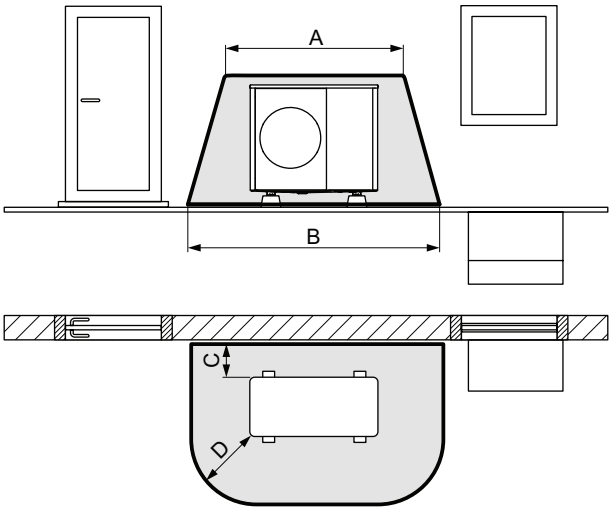


aroTHERM plus	Unit	Dimension A
3.5kW	mm	765
5kW	mm	765
7kW	mm	965
10kW	mm	1565
12kW	mm	1565

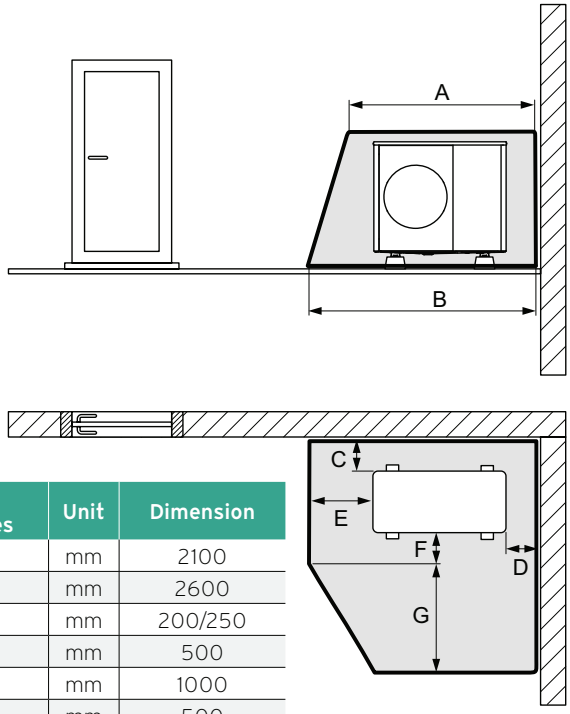
Minimum clearance	Unit	Heating mode	Heating and cooling mode
A	mm	100	100
B	mm	1000	1000
C	mm	200	250
D	mm	500	500
E	mm	600	600

R290 clearances

Clearances required for any drains, light wells or other openings



Minimum clearances	Unit	Dimension
A	mm	2100
B	mm	3100
C	mm	200/250
D	mm	1000

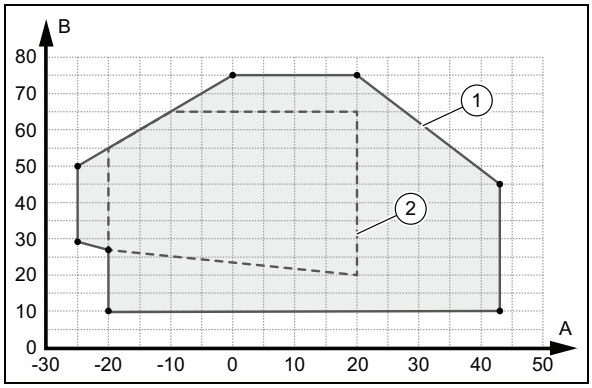


Minimum clearances	Unit	Dimension
A	mm	2100
B	mm	2600
C	mm	200/250
D	mm	500
E	mm	1000
F	mm	500
G	mm	1800

Application limits

heating mode

In heating mode, the product works at outdoor temperatures of -25 °C to 46 °C



A Outdoor temperature

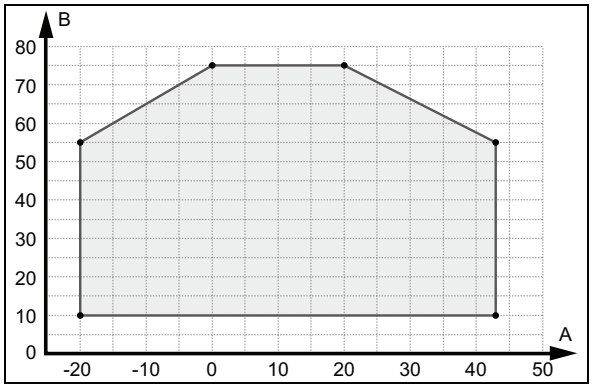
B Heating water temperature

1 Application limits, heating mode

2 Area of application, in accordance with EN 14511

DHW mode

For domestic hot water generation, the product works at outdoor temperatures of -20 °C to 46 °C.



A Outdoor temperature

B Heating water temperature

Technical specifications

aroTHERM plus	Unit	3.5kW VWL 35 / 6	5kW VWL 55 / 6	7kW VWL 75 / 6	10kW VWL 105 / 6	12kW VWL 125 / 6
General						
Width	mm	1,100				
Height	mm	765		965	1,565	
Depth	mm	450				
Weight, ready for operation	kg	114		128	194	
Connection, heating circuit		G 1 1/4"				
Rated voltage	V	230 V (+10%/- 15%), 50 Hz, 1~/N/PE				
Rated current, maximum	A	14.3		15.0	23.3	
Fuse size		16			25	
Fuse type	A	C/D				
RCD type		A				
eBUS (2-core communication cable)	mm2	0.75				
Maximum length eBUS cable (communication cable)	m	50				
IP rating		IP 15 B				
Fan, power consumption	W	40			50	
Fan quantity		1			2	
Fan, air flow , maximum	m^3 /h	2,300			5,100	
Heating pump, power consumption	W	2 - 50			3 - 87	
Heating circuit						
Heating water temperature, minimum/maximum	° C	20 - 75				
Basic length of the heating water pipe, maximum, between the outdoor unit and indoor unit	m	20				
Operating pressure, minimum	bar	0.50				
Operating pressure, maximum	bar	3.00				
Volume flow, minimum	l/h	400		540	995	
Volume flow, maximum	l/h	860		1,205	2,065	
Water volume, in the outdoor unit	l	1.5		2.0	2.5	
Water volume, in the heating circuit, minimum, thawing mode, activated/deactivated back-up heater	l	15 / 40		20 / 55	45 / 150	
Remaining feed pressure, hydraulic	kPa (mbar)	56.0 (560.0)		44.0 (440.0)	55.0 (550.0)	

aroTHERM plus	Unit	3.5kW VWL 35 / 6	5kW VWL 55 / 6	7kW VWL 75 / 6	10kW VWL 105 / 6	12kW VWL 125 / 6
Refrigerant circuit						
Fluid type		R290				
Fluid fill quantity	kg	0.6		0.9	1.3	
Refrigerant, Global Warming Potential (GWP)		3				
CO_2 equivalent	t	0.0018		0.0027	0.0039	
Permissable operating pressure	bar	31.5				
Compressor type		Rotary piston			Scroll compressor	
Compressor oil type		Specific polyalkylene glycol (PAG				
Compressor, control		Electronic				

Noise emissions, heating mode						
Sound power, EN 12102, EN 14511 LWA, A7/W35	dB(A)	51		53	58	
Sound power, EN 12102, EN 14511 LWA, A7/W45	dB(A)	53			58	
Sound power, EN 12102, EN 14511 LWA, A7/W55	dB(A)	54		55	60	

Efficiency		
Energy efficiency class 35°C	(A+++ to F)	A+++
Energy efficiency class 55°C	(A+++ to F)	A++
Combination with uniTOWER		
Energy efficiency class	(A+++ to F)	A++
Energy efficiency class for hot water supply	(A+ to F)	A

uniTOWER	Unit	VIH QW 190 / 6
Total storage cylinder capacity	l	188
Temperature hot water (max. – with auxiliary heating)	°C	55 - 75
Dimensions, unpacked (height/width/depth)	mm	1880 x 599 x 693
Weight, unpacked	kg	175
Auxiliary electric heater	kW	6kW (230V/50Hz) / 9kW (400V/50Hz)

Hydraulic station	Unit	VWZ MEH 97
Dimensions, unpacked (height/width/depth)	mm	720 x 440 x 350
Weight, unpacked	kg	15
Power electric backup heater	kW	6 kW (230V/50Hz) / 9 kW (400V/50Hz)

Description	Article number
aroTHERM plus with heat pump interface	
aroTHERM plus 3.5kW - VWL 35 / 6	0010037211
aroTHERM plus 5kW - VWL 55 / 6	0010037212
aroTHERM plus 7kW - VWL 75 / 6	0010037213
aroTHERM plus 10kW - VWL 105 / 6	0010037214
aroTHERM plus 12kW - VWL 125 / 6	0010037215
aroTHERM plus with hydraulic module	
aroTHERM plus 3.5kW - VWL 35 / 6	0010037206
aroTHERM plus 5kW - VWL 55 / 6	0010037207
aroTHERM plus 7kW - VWL 75 / 6	0010037208
aroTHERM plus 10kW - VWL 105 / 6	0010037209
aroTHERM plus 12kW - VWL 125 / 6	0010037210
aroTHERM plus with uniTOWER	
aroTHERM plus 3.5kW - VWL 35 / 6	0010037201
aroTHERM plus 5kW - VWL 55 / 6	0010037202
aroTHERM plus 7kW - VWL 75 / 6	0010037203
aroTHERM plus 10kW - VWL 105 / 6	0010037204
aroTHERM plus 12kW - VWL 125 / 6	0010037205

Compatible with

uniSTOR

sensoCOMFORT

VRC 700

Accessories	Article number
aroTHERM connection kit for ground install	0010027971
aroTHERM connection kit for ground install extension	0010027972
aroTHERM connection kit for wall install	0010027974
aroTHERM straight pipe connection kit	0010027976
750mm flexihose for air-to-water heat pump (pair)	0020165288
Snow Spacer	0010027984
Wall bracket for insulated wall	0020250224
Wall bracket for non-insulated wall	0020250225
Anti-vibration feet large	0020250226
Anti-vibration rubber feet small	0020252091
Coding resistor active cooling	0020269259
Discharge vessel	0020145563
aroTHERM 45 litre buffer	0010038365
aroTHERM heat exchanger module	0020222285
aroTHERM inline 6kW back-up heater	0020222286
VR 10 temperature sensor	306787
WH40 low-loss header (flow rates up to 3,000 litres per hour)	306720
WH95 low-loss header (flow rates up to 8,000 litres per hour)	306721
VR 32/B eBUS coupler (includes housing)	0020235465
VR 32 eBUS coupler	0020139895
Ball filter valve 28mm	0010038133
uniTOWER accessories	
uniTOWER decoupling module (small) for 3.5 - 7kW model	0010027982
uniTOWER decoupling module (large) for 10 and 12kW model	0010027973
uniTOWER 1" adapter connection kit	0020269275
18l Buffer cylinder for uniTOWER	0020269273
uniTOWER multi-zone kit - 1 direct zone	0020170507
uniTOWER extension set - 2 direct zones	0020170509
uniTOWER extension set - 1 mixed zone	0020170508
Circulation set without pump	0020170502
Circulation set with pump	0020170503
2l brine expansion vessel	0010030975

Description	Pack contents	Article number
VRC 700		
VRC 700 wired, weather compensating programmable room thermostat	-	0020236291
VRC 700f wireless, weather compensating, programmable room thermostat	-	0020259829
One wired heating zone and hot water system	VRC 700, VR 70	0020236292
One wireless heating zone and hot water system	VRC 700f, VR 70	0020259830
One wired heating zone and solar thermal hot water system	VRC 700, VR 70, VR 11	0020236295
One wireless heating zone and solar thermal hot water system	VRC 700f, VR 70, VR 11	0020259833
Two wired heating zones and hot water system	VRC 700, VR 70, VR 91	0020236293
Two wireless heating zones and hot water system	VRC 700f, VR 70, VR 91f	0020259831
Two wired heating zones and solar thermal hot water system	VRC 700, VR 70, VR 11, VR 91	0020259834
Two wireless heating zones and solar thermal hot water system	VRC 700f, VR 70, VR 11, VR 91f	0020259835
Three wired heating zones and hot water system	VRC 700, VR 71, two VR 91	0020236294
Three wireless heating zones and hot water system	VRC 700f, VR 71, two VR 91f	0020259832
VR 70 wiring centre for up to two zones	-	0020184844
VR 71 wiring centre for up to three zones	-	0020184847
VR 91 wired, additional room thermostat	-	0020171334
VR 91f wireless, additional room thermostat	-	0020231566
VR 40 two-in-seven multifunction module	-	0020017744
VR 11 solar collector NTC	-	306788
VR 10 immersion or contact sensor bare ends	-	306787
VR 32 eBUS coupler	-	0020139895
sensoCOMFORT		
sensoCOMFORT wired weather compensating programmable room thermostat	-	0010036819
sensoCOMFORT RF wireless weather compensating programmable room thermostat	-	0010036820
One wired heating zone and hot water system	sensoCOMFORT, VR 71	0010036821
One wireless heating zone and hot water system	sensoCOMFORT RF, VR 71	0010036826
Two wired heating zones and hot water system	sensoCOMFORT, VR 71, VR 92	0010036822
Two wireless heating zones and hot water system	sensoCOMFORT RF, VR 71, VR 92f	0010036827
Three wired heating zones and hot water system	sensoCOMFORT, VR 71, 2x VR 92	0010036823
Three wireless heating zones and hot water system	sensoCOMFORT RF, VR 71 and 2x VR 92f	0010036828
Four wired heating zones and hot water system	sensoCOMFORT, VR 71, VR 70, 3x VR 92	0010036824
Five wired heating zones and hot water system	sensoCOMFORT, VR 71, VR 70, 4x VR 92	0010036825
VR 10 immersion or contact sensor bare ends	-	306787
VR 32 eBUS coupler	-	0020139895
VR 70 wiring centre	-	0020184844
VR 71 wiring centre	-	0020184847
VR 92 wired additional room thermostat	-	0020260925
VR 92f wireless additional room thermostat	-	0020260940
sensoNET internet gateway	-	0020260963
VR 40 two-in-seven multifunctional module	-	0020017744
VR 32/B eBUS coupler (includes housing)	-	0020235465

Our experience is your guarantee

For over 140 years, Vaillant has been among the technology leaders when it comes to innovative heating solutions, with specific expertise in the area of heat pumps for more than 40 years. Our proprietary solutions - many of which are patented - have made this technology reliable, efficient and suitable for everyday life. More than 200,000 heat pumps installed around the world prove this in use each day. Benefit from our experience:

- Products developed in Germany and manufactured exclusively in the EU
- 100% test for each heat pump on the production line
- Toughest weather conditions simulated at our own test centres, in cold chambers with temperatures down to –25°C
- Vaillant heat pumps are among the quietest on the market
- High level of safety due to use of playground standards
- Quality management as per EN ISO 9001 and EN ISO 14001

Climatic chambers simulate all possible operating conditions

Optimisation of components in the acoustic lab

Renewable service and technical enquiries
For technical assistance:
Telephone: 0330 100 3540
Email: aftersales@vaillant.co.uk

General enquiries
If you have a general enquiry our friendly reception staff will happily point you in the right direction:
Telephone: 0345 602 2922

Training enquiries
Vaillant provides many different training courses. For more information:
Telephone: 0345 601 8885
Email: training@vaillant.co.uk

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Heating Hot water Renewables

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VALTB2BSATHERM0420

Appendix 6

LBRUT Sustainable Construction Checklist - June 2020

Official

This document forms part of the Sustainable Construction Checklist SPD. This document **must** be filled out as part of the planning application for the following developments: all residential development providing **one or more new residential units (including conversions leading to one or more new units)** , and all other forms of development providing **100sqm or more of non-residential floor space**. Developments including new non-residential development of less than 100sqm floor space, extensions less than 100sqm, and other conversions are strongly encouraged to comply with this checklist. Where further information is requested, please either fill in the relevant section, or refer to the document where this information may be found in detail, e.g. Flood Risk Assessment or similar. **Further guidance** on completing the Checklist may be found in the Justification and Guidance section of this SPD.

Property Name (if relevant): Ennerdale Road

Application No. (if known):

Address (include. postcode): 2-4 Ennerdale Road , Twickenham, TW9 3PG

Completed by: Neil Rothon

For Non-Residential
Size of development (m2)

For Residential
Number of dwellings: 7

1 MINIMUM COMPLIANCE (RESIDENTIAL AND NON-RESIDENTIAL)

Energy Assessment

Has an energy assessment been submitted that demonstrates the expected energy and carbon dioxide emissions saving from energy efficiency and renewable energy measures, including the feasibility of CHP/CCHP and community heating systems? If yes, please select TRUE. **TRUE**

Carbon Dioxide emissions reduction

What is the on site carbon dioxide emissions reduction against a Building Regulations Part L (2013) baseline: 45.9 %

Policy LP 22 B. and Draft London Plan Policy 9.2.5 require a 35% onsite reduction in CO_2 emissions beyond Building Regulations 2013.

What is the percentage reduction from efficiency measures alone: 45.9 %

Policy LP 22 C. and Draft London Plan Policy 9.2.6 require a 10% onsite reduction in CO2 emissions beyond Building Regulations 2013 from efficiency measures for residential and 15% for non-residential.

Percentage of **total** site CO2 emissions saved through renewable energy installation? 45.9 %

What is the total remaining carbon to be offset: 6.44 Tonne

Policy LP 22 B. and Draft London Plan Policy 9.2.4 require Major developments to achieve Zero Carbon after offsetting.

Are remaining emissions going to be offset through offset fund payment in accordance with current guidelines issued for the cost per tonne of CO2? **FALSE**

What is the total predicted cost of offset? 0 £

The London Plan sets this as £95/tonne per year over 30 years, this should be updated based on As Build calculations.

1A MINIMUM POLICY COMPLIANCE (NON-RESIDENTIAL AND DOMESTIC REFURBISHMENT)

Please check the Guidance Section of this SPD for the policy requirements

Environmental Rating of development:

Non-Residential new-build (100sqm or more)
BREEAM Level: **Please Select** — Have you attached a pre-assessment to support this?
Excellent required under Policy LP22 A 3

Extensions and conversions for residential dwellings
BREEAM Domestic Refurbishment: **Excellent** — Have you attached a pre-assessment to support this?
Excellent required under Policy LP22 A 4

Extensions and conversions for non-residential buildings
BREEAM Level: **Please Select** — Have you attached a pre-assessment to support this?
Excellent required under Policy LP 22

Score awarded for Environmental Rating:
BREEAM: Good = *0* , Very Good = 4, Excellent = *8,* Outstanding = *16*

Subtotal 8

1B MINIMUM POLICY COMPLIANCE (RESIDENTIAL)

Water Usage — ***Score***

Internal water usage after gray/rainwater systems limited to 105 litres person per day. (Excluding an allowance 5 litres per person per day for external water consumption). Calculations using the water efficiency calculator for new dwellings have been submitted. *1*

110l/p/d Required for new dwellings under Policy LP22 A 2 105l/p/d required under Draft London Plan Policy SI

Subtotal 1

2. ENERGY USE AND POLLUTION

2.1 Need for Cooling — ***Score***

a. How does the development incorporate cooling measures? Tick all that apply:

	Score
Energy efficient design incorporating specific heat demand to less than or equal to 15 kWh/sqm	*6*
Reduce heat entering a building through providing/improving insulation and living roofs and walls	*2*
Reduce heat entering a building through shading	*3*
Exposed thermal mass and high ceilings	*4*
Passive ventilation	*3*
Mechanical ventilation with heat recovery	*1*
Active cooling systems, i.e. Air Conditioning Unit	*0*

See Draft London Plan SI4

2.2 Heat Generation

b. How have the heating and cooling systems, with preference to the heating system hierarchy, been selected (defined in London Plan policy **SI3)** Tick all heating and cooling systems that will be used in the development: — ***Score***

	Score
Connection to existing heating or cooling networks powered by renewable energy	*6*
Connection to existing heating or cooling networks powered by gas or electricity	*5*
Site wide CHP network powered by renewable energy	*4*
Site wide CHP network powered by gas	*3*
Communal heating and cooling powered by renewable energy	*2*
Communal heating and cooling powered by gas or electricity	*1*
Individual heating and cooling	*0*

See Draft London Plan SI3

2.3 Pollution: Air, Noise and Light

a. Does the development plan to implement reduction strategies for dust emissions from construction sites? *2*

b. Does the development plan to include a biomass boiler?
If yes, please refer to the biomass guidelines for the Borough of Richmond, please see guidance for supplementary information. If the proposed boiler is of a qualifying size, you may need to complete the information request form found on the Richmond website.

c. Has an air quality impact assessment been provided
If yes, has 'Emissions Neutral' been achieved *1*
If yes, have occupants of new development been protected from existing pollution *1*
If no to any of the above are there any sensitive receptors as defined in Policy LP 10 present? *-1*

see Policy LP 10

d. Please tick only one option below

Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site?	3
Has the development taken care to not create any new noise generation/transmission issues in its intended operation?	1

see Policy LP 10

e. Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity? 3
see Policy LP 10

f. Have you attached a Lighting Pollution Report? -

Subtotal 9

Please give any additional relevant comments to the Energy Use and Pollution Section below

3. TRANSPORT

3.1 Provision for the safe efficient and sustainable movement of people and goods

a. Does your development provide opportunities for occupants to use innovative travel technologies?

Please explain:

Score

b. Does your development provide for 100% active provision for electric vehicle charging point(s) and have you successfully demonstrated that it would be able to operate satisfactorily in the future expectation of all vehicles being electrically powered? 2

c. **For major developments ONLY**: Has a Transport Assessment been produced for your development based on TfL's Best Practice Guidance?
If you have provided a Transport Assessment as part of your planning application, please tick here and move to Section 3 of this Checklist. 5
See policy LP44

d. **For smaller developments ONLY**: Have you provided a Transport Statement? 5

e. Does your development provide cycle storage? (Standard space requirements are set out in the Council's Parking Standards - Local Plan Appendix 3) 2
If so, for how many bicycles? **2**
Is this shown on the site plans?
See Local Plan Appendix 3

f. Will the development create or improve links with local and wider transport networks? If yes, please provide details. 2

Subtotal 2

Please give any additional relevant comments to the Transport Section below

4 BIODIVERSITY

4.1 Minimising the threat to biodiversity from new buildings, lighting, hard surfacing and people

a. Does your development involve the loss of an ecological feature or habitat, including a loss of garden or other green space? (Indicate if yes) -2
If so, please state how much in sqm? sqm

b. Does your development involve the removal of any tree(s)? (Indicate if yes)
If so, has a tree report been provided in support of your application? (Indicate if yes)

c. Does your development plan to add (and not remove) any tree(s) on site? (Indicate if yes)

d. Please indicate which features and/or habitats that your development will incorporate to improve on site biodiversity:

Pond, reedbed or extensive native planting	6	Area provided:		sqm
An extensive green roof	5	Area provided:		sqm
An intensive green roof	4	Area provided:		sqm
Garden space	4	Area provided:	50	sqm
Additional native and/or wildlife friendly planting to peripheral areas	3	Area provided:	0	sqm
Additional planting to peripheral areas	2	Area provided:		sqm
A living wall	2	Area provided:		sqm
Bat boxes	0.5			
Bird boxes	0.5			
Swift boxes	0.5			
Other	0.5			

e. Does your development use at least 70% of available roof plate as green/brown roof 1
Policy LP 17 requires 70%

Subtotal 4

Please give any additional relevant comments to the Biodiversity Section below

Hedgehog Box as "Other"

5 FLOODING AND DRAINAGE

5.1 Mitigating the risks of flooding and other impacts of climate change in the borough

a. Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) -2
Have you submitted a Flood Risk Assessment? (Indicate if yes)

b. Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick all that apply)

Store rainwater for later use	5
Use of infiltration techniques such as porous surfacing materials to allow drainage on-site	3
Attenuate rainwater in ponds or open water features	4
Store rainwater in tanks for gradual release to a watercourse	3
Discharge rainwater directly to watercourse	2
Discharge rainwater to surface water drain	1
Discharge rainwater to combined sewer	0

Have you submitted a Drainage Statement (Indicate if yes)
See Policy LP 21 and Draft London Plan SL 13

c. Please give the change in area of permeable surfacing which will result from your development proposal: sqm
Please provide details of the permeable surfacing below *please represent a loss in permeable area as a negative number*

Subtotal 0

Please give any additional relevant comments to the Flooding and Drainage Section below

6 IMPROVING RESOURCE EFFICIENCY

6.1 Reduce waste generated and amount disposed of by landfill though increasing level of re-use and recycling

a. Will demolition be required on your site prior to construction? *[Points will only be awarded if 10% or greater of demolition waste is reused/recycled]* *1*

If so, what percentage of demolition waste will be reused in the new development? 0 %

What percentage of demolition waste will be recycled? 50 %

b. Does your site have any contaminated land? *1*

Have you submitted an assessment of the site contamination? *2*

Are plans in place to remediate the contamination? *2*

Have you submitted a remediation plan? *1*

Are plans in place to include composting on site? *1*

c. Will a waste management plan and facilities be in place in line with Policy LP24 Yes

6.2 Reducing levels of water waste

a. Will the following measures of water conservation be incorporated into the development? (Please tick all that apply):

Fitting of water efficient taps, shower heads etc *1*

Use of water efficient A or B rated appliances *1*

Rainwater harvesting for internal use *4*

Greywater systems *4*

Fit a water meter *1*

Subtotal 3

Please give any additional relevant comments to the Improving Resource Efficiency Section below

7 ACCESSIBILITY

7.1 Ensure flexible adaptable and long-term use of structures

a. **If the development is residential,** will it meet the requirements of the nationally described space standard for internal space and layout? *1*

If the standards are not met, in the space below, please provide details of the functionality of the internal space and layout

AND

b. **If the development is residential**, will it meet Building Regulation Requirement M4 (2) 'accessible and adaptable dwellings'? *2*

If this is not met, in the space below, please provide details of any accessibility measures included in the development.

For major residential developments, are 10% or more of the units in the development to Building Regulation Requirement M4 (3) 'wheelchair user dwellings'? *1*

OR

c. **If the development is non-residential,** does it comply with requirements included in Richmond's Local Plan LP1, LP28.B, LP30 & LP45 *2*

Please provide details of the accessibility measures specified in the Local Plan that will be included in the development

Subtotal 3

Please give any additional relevant comments to the Design Standards and Accessibility Section below

LBRUT Sustainable Construction Checklist- Scoring Matrix for *New Construction* **(Non-Residential and domestic refurb)** ***TOTAL*** 30

Score	Rating	Significance
84 or more	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
75-83	*A*	Makes a major contribution towards achieving sustainable development in Richmond
56-74	*B*	Helps to significantly improve the Borough's stock of sustainable developments
40-55	*C*	Minimal effort to increase sustainability beyond general compliance
39 or less	*FAIL*	Does not comply with SPD Policy

LBRUT Sustainable Construction Checklist- Scoring Matrix for New Construction **Residential new-build**

Score	Rating	Significance
85 or more	A++	Project strives to achieve highest standard in energy efficient sustainable development
68-84	*A+*	Project strives to achieve higher standard in energy efficient sustainable development
59-67	*A*	Makes a major contribution towards achieving sustainable development in Richmond
39-58	*B*	Helps to significantly improve the Borough's stock of sustainable developments
24-38	*C*	Minimal effort to increase sustainability beyond general compliance
23 or less	*FAIL*	Does not comply with SPD Policy

Authorisation:

I herewith declare that I have filled in this form to the best of my knowledge

Signature _____ **Date** _____