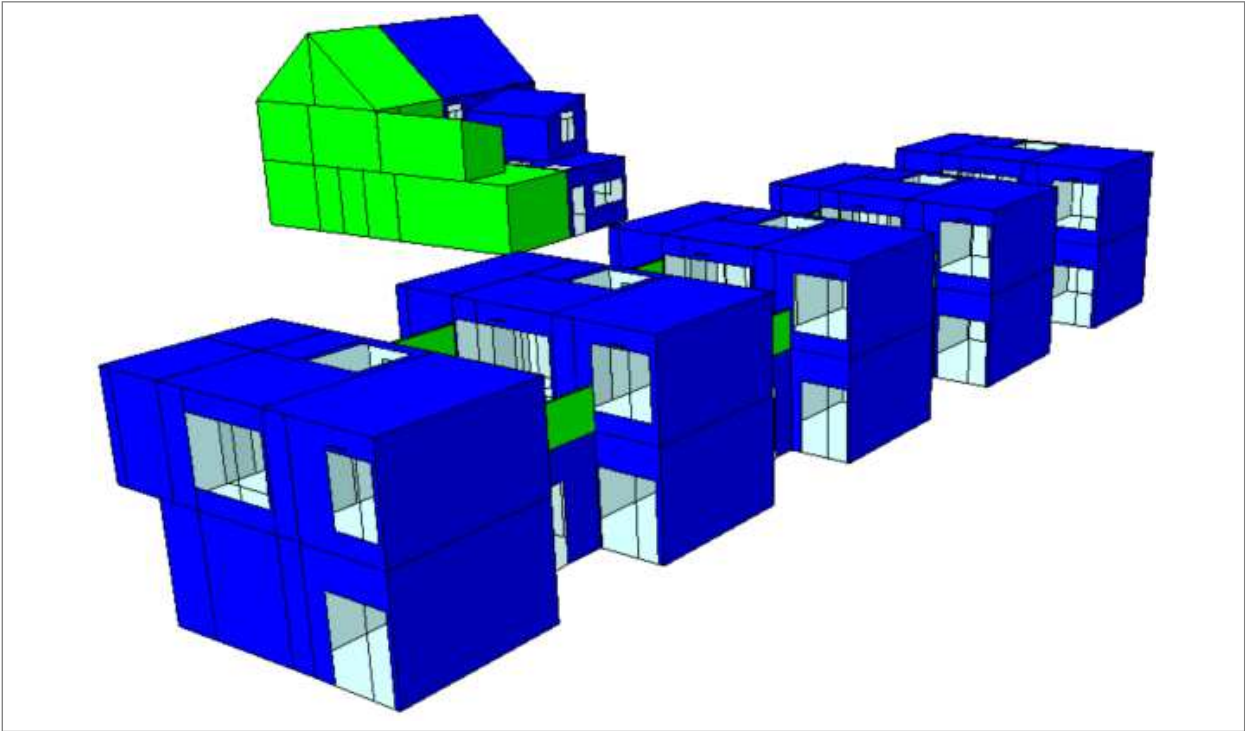




Technical Analysis – Energy Use Intensity Calculation Rev 1

18 Denmark Street
Tottenham
London
N17 0JL

01/02/2024

Document Status

Client: Atlas Property London

Site: 18 Denmark Street London N17 0JL

Proposals: The construction of 6 new terrace houses over two storeys.

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1 Executive Summary

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This report has been prepared in support of the planning application only for the construction of Denmark Mews, a development consisting of five contemporary house dwellings on the land between the rear gardens of Denmark Street and Chalgrove Road, Tottenham. Additionally, two refurbished/extended apartments at the site of 18 Denmark Street have been assessed.

This report assesses the Energy Use Intensity of four sample dwellings to provide an estimate of the operational demand for the various dwelling types on the proposed site. The plots assessed in this development are as follows:

- 1) Plot 3 – New 3 bed, 4 person mid-terrace dwelling
- 2) Plot 5 - New 2 bed, 3 person end of terrace dwelling
- 3) Plot 6 – New 1 bed, 1 person first floor apartment
- 4) Plot 7 – Refurbished/extended 1 bed, 2 person ground floor apartment

In order to assess against the LETI targets, we have modelled the Space Heat Demand, Operational Energy and Thermal Comfort of the development, below we have highlighted our findings.

Assessment Findings:

- Space Heating Demand – Between 6.89 and 7.44 kWh/m²
- Energy Use Intensity – Between 58.64 and 66.31 kWh/m²

It is proposed that for each plot a 2.4kWp photovoltaic system is installed. These systems were found to contribute as much as 56.3kWh/m² (apartments) and 34.78kWh/m² (dwellings) towards the energy demands on the site respectively.

It is important to note that with any modelling exercise there are assumptions and approximations that have to be made. As far as possible, details of all assumptions and approximations are supplied within the report. These were predominantly informed by information provided by Hill Patru Architects.

Overview of Design Parameters	
Roof	0.12 (W/m ² K)
Floor	0.10 (W/m ² K)
Wall	0.15 (W/m ² K)
Windows and Roof lights	1.20 (W/m ² K) –Glazing G value 0.40
Internal Walls	0.0 (W/m ² K)
Heating	ASHP
Hot Water	ASHP (Water Consumption 100L PerPerson/PerDay)
Ventilation & Cooling	MRXBOX Hybrid Ventilation Unit – Trickle and Boosted rates as specified in this report
Lighting	100% LED (no auto controls)
Air Leakage	3.0 m ³ (h.m ²)
Overall PSI Value Thermal Bridging	0.04

2 Introduction

The site at 18 Denmark Street for the proposed dwellings and apartments located in Tottenham, North London.

The development consists of four new 3-bed terraced (plots 1-4) and one new 2-bed end of terrace dwellings (plot 5) completing the terrace.

Additionally, a refurbished ground (plot 6) and first (plot 7) floor apartments from an existing end of terrace dwelling complete the site. All of which can be seen below.



Table 01: Units Analysed at the proposed development

Unit Reference	Level	Description
Plot 1	Ground and First	3 bed, 4 person end of terrace
Plot 2	Ground and First	3 bed, 4 person mid-terrace
Plot 3	Ground and First	3 bed, 4 person mid-terrace
Plot 4	Ground and First	3 bed, 4 person mid-terrace
Plot 5	Ground and First	2 bed, 3 person end of terrace
Plot 6	Ground	1 bed, 2 person ground floor apartment
Plot 7	First	1 bed, 2 person first floor apartment

 Assessed Plot

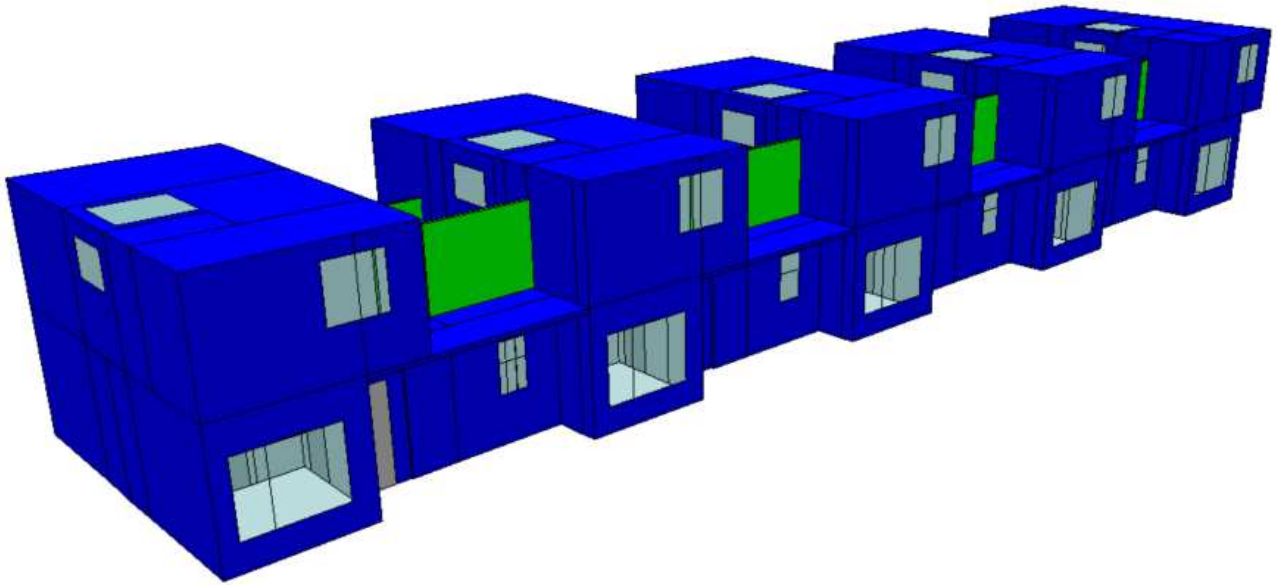


Figure 02.- IES models of plots 1-6 (left to right)

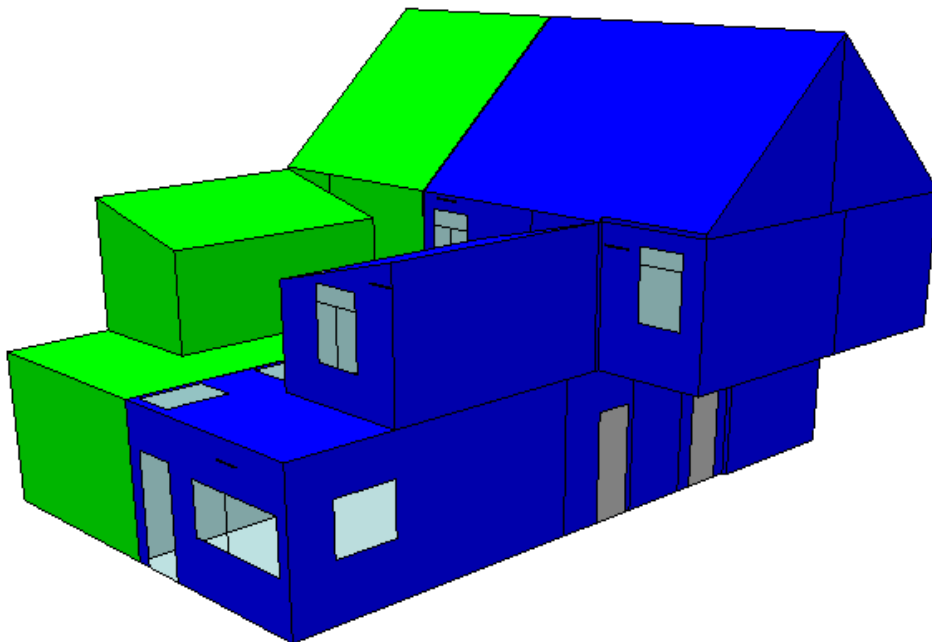


Figure 03.- IES models of plots 7-8 (bottom to top)

3 What is LETI?

The London Energy Transformation Initiative (LETI) was established in 2017 to support the transition of the capital's built environment to net zero carbon, providing guidance that can be applied to the rest of the United Kingdom (UK).

We are in a climate emergency, and urgently need to reduce carbon emissions. Here in the UK, 49% of annual carbon emissions are attributable to buildings. Over the next 40 years, the world is expected to build 230 billion square metres of new construction adding the equivalent of Paris to the planet every single week – so we must act now to meet the challenge of building net zero developments. LETI, along with others such as the World Green Building Council and Architecture 2030, believe that in order to meet our climate change targets all new buildings must operate at net zero carbon by 2030 and all buildings must operate at net zero carbon by 2050. This document provides practical solutions to set out a definitive journey, beyond climate emergency declarations, into a net zero future. To this end, the solution to meeting our climate change targets must be:

- Scalable: Energy consumption targets are set so that there is enough renewable energy to power all buildings in the UK.
- Achievable: A comprehensive modelling study has been undertaken, and in-use data from buildings have been analysed, so that the targets, while ambitious to achieve, are deemed achievable for most projects.
- Verifiable: Targets are measured in-use.
- Whole Life: Embodied carbon and operational carbon must both be considered.

For this document net zero carbon means whole life carbon. Whole life carbon is formed of two key components:

- Operational Carbon: a new building with net zero operational carbon does not burn fossil fuels, is 100% powered by renewable energy, and achieves a level of energy performance in-use in line with our national climate change targets.
- Embodied Carbon: Best Practice targets for embodied carbon are met, and the building is made from re-used materials and can be disassembled at its end of life in accordance with the circular economy principle

The built environment industry, together with current regulations and practices, are seriously lagging behind the carbon trajectory required to protect life on planet earth. Everyone's future is at stake. As an industry we must be absolutely confident that all new buildings can operate at net zero carbon from 2030.

In order to achieve this, LETI believes that by 2025, 100 percent of new buildings must be designed to deliver net zero carbon, and the whole construction industry will need to be equipped with the knowledge and skills necessary. To set us on this trajectory, LETI believes that in 2020, 10 percent of all new buildings need to be designed to deliver net zero carbon.

4 Design Criteria

4.1 Fabric Performance

On the 18 Denmark Street development, we have used the following fabric U-values:

Design Measures to be Incorporated	
Element	U-Values and G Value (W/m ² K)
Roof	0.12
Floor	0.10
Wall	0.15
Windows (including curtain wall) and Roof lights	1.20
Internal Walls	0.00

4.2 Efficiency Measures

On the 18 Denmark Street development, we have used the following efficiency measures have been modelled:

Design Measures to be Incorporated	
Air tightness (m ³ / (h m ²) @ 50Pa)	3.00
Thermal Bridging	0.04
G-value	0.40

4.3 Heating and Hot Water

The heating and hot water are to be provided by an Air Source Heat Pump which follows the LETI guidance to ensure heating and hot water generation is fossil fuel free.

Heating and hot water

Implement the following measures:



Fuel

Ensure heating and hot water generation is fossil fuel free



Heating

Maximum 10 W/m² peak heat loss (including ventilation)



Hot water

Maximum dead leg of 1 litre for hot water pipework

'Green' Euro Water Label should be used for hot water outlets (e.g.: certified 6 L/min shower head – not using flow restrictors).

Design Measures to be Incorporated	
Fuel	All Electric
Heating	ASHP
Hot Water	ASHP
Shower	6L/min Green Euro Water Label

5 Internal Gains, Occupation, Hot Water Usage, Heating and Ventilation

5.1 Internal Gains, Occupation

Space	Occupancy	Occupied Hours (5 Days Week)	Sensible Heat Gain (W)	Lighting (W/m ²) 18:00-23:00	Plug in Equipment (W/per hour)
Living/Kitchen	2 People (1 and 2 Bedroom properties) 4 People for 3 Bed Properties	9:00-16:00	90	2	105 (1 and 2 Bed) 140 (3 Bed)
Bedroom 1	2 People	22:00-07:00	90	2	13.8
Bedroom 2	1 Person	22:00-07:00	90	2	6.8
Bedroom 3	1 Person	9:00-16:00	90	2	6.8
Bathroom	N/A	N/A	N/A	2	0
Hall/Landing/Stores	N/A	N/A	N/A	2	0

5.2 Plug in equipment

Space	Equipment	Usage 3 Bed
Kitchen / Living	Oven – 970W Hob – 725W Fridge Freezer – 32W Microwave – 900W Kettle – 110W Per Cycle TV – 60W Laptop – 100W W/Machine – 800W Per Cycle Extract Hood – 175W Router – 10W	30 mins 30 mins All day 2 cycle a day 3 cycles a day 4 hours 2 hours 0.5 cycle 45 mins All day
Bedroom 1	2 x Lamp – 7W 2 x Phone Charger – 10W 1 Hair Dryer 1200W 1 Straighteners 900W	1 Hour 8 Hours 10 Mins 10 Mins
Bedroom 2	Lamp – 7W Phone Charger – 10W TV – 60W	1 Hour 4 Hours 1 Hour
Bedroom 3	Lamp – 7W Phone Charger – 10W	1 Hour 4 Hours
Bathroom	N/A	N/A
Hall/Landing/Stores	N/A	N/A

5.3 Heating and Ventilation

Space	Heating Set Point	Heating Times	Ventilation
Living/Kitchen	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Supply and extract – 13 l/s on continuously. Boosted to 30 l/s when cooling activated
Bedroom 1	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Supply 6/s on continuously Boosted to 20 l/s when cooling activated
Bedroom 2	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Supply 6l/s on continuously Boosted to 20 l/s when cooling activated
Bedroom 3	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Supply 6l/s on continuously Boosted to 20 l/s when cooling activated
Bathroom	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Extract 8l/s on continuously
Hall/Landing/Stores	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	N/A

5.4 Hot Water Usage

100L per person per day

Appliance	Flowrate / Capacity
Bath	200L to overflow
Shower	6L @ 3 Bar 'Green' Euro Water Label should be used for hot water outlets
WHB Taps	3L @ 3Bar
Kitchen Taps	5L @ 3Bar

6 EUI Results

To meet compliance with LETI standards the Energy Use Intensity (EUI) must be below 35 kWh/m²/year excluding renewable contributions and the space heating demand must be below 15kWh/m²/year. The results are detailed in the tables below:

5.1 Plot 3 – Mid-Terrace 3-bed, 4-person Dwelling

	Pumps and fans (MWh)	Service Water Heating (MWh)	Space Heating (MWh)	Other Process (MWh)	Interior Lighting (MWh)	Space Cooling (MWh)	Total	PV Generation (MWh)
Jan 01-31	0.04	0.13	0.24	0.16	0.02	0.00	0.59	-0.07
Feb 01-28	0.04	0.13	0.13	0.14	0.02	0.00	0.46	-0.07
Mar 01-31	0.04	0.12	0.06	0.16	0.02	0.00	0.41	-0.22
Apr 01-30	0.04	0.10	0.00	0.15	0.02	0.00	0.32	-0.27
May 01-31	0.05	0.10	0.00	0.16	0.02	0.07	0.40	-0.34
Jun 01-30	0.05	0.09	0.00	0.15	0.02	0.22	0.54	-0.34
Jul 01-31	0.06	0.08	0.00	0.16	0.02	0.32	0.65	-0.27
Aug 01-31	0.06	0.10	0.00	0.16	0.02	0.30	0.64	-0.29
Sep 01-30	0.05	0.10	0.00	0.15	0.02	0.13	0.45	-0.22
Oct 01-31	0.04	0.10	0.00	0.16	0.02	0.00	0.33	-0.17
Nov 01-30	0.04	0.12	0.05	0.15	0.02	0.00	0.39	-0.07
Dec 01-31	0.04	0.13	0.17	0.16	0.02	0.00	0.53	-0.05
Summed total	0.55	1.30	0.65	1.88	0.28	1.05	5.71	-2.40
kWh							5,710	-2,400
EUI (kWh/m ²)							64.75	-27.22
Space Heating Demand (kWh/m ²) (SAP)							7.40	-

5.2 Plot 5 – End of Terrace 2-bed, 3-person Dwelling

	Pumps and fans (MWh)	Service Water Heating (MWh)	Space Heating (MWh)	Other Process (MWh)	Interior Lighting (MWh)	Space Cooling (MWh)	Total	PV Generation (MWh)
Jan 01-31	0.02	0.11	0.19	0.10	0.02	0.00	0.44	-0.07
Feb 01-28	0.02	0.10	0.09	0.09	0.02	0.00	0.32	-0.07
Mar 01-31	0.02	0.10	0.05	0.10	0.02	0.00	0.29	-0.22
Apr 01-30	0.02	0.09	0.00	0.10	0.02	0.00	0.23	-0.27
May 01-31	0.03	0.08	0.00	0.10	0.02	0.08	0.31	-0.34
Jun 01-30	0.04	0.07	0.00	0.10	0.02	0.22	0.45	-0.34
Jul 01-31	0.04	0.07	0.00	0.10	0.02	0.33	0.56	-0.27
Aug 01-31	0.04	0.07	0.00	0.10	0.02	0.30	0.53	-0.29
Sep 01-30	0.03	0.08	0.00	0.10	0.02	0.12	0.35	-0.22
Oct 01-31	0.02	0.09	0.00	0.10	0.02	0.01	0.24	-0.17
Nov 01-30	0.02	0.10	0.03	0.10	0.02	0.00	0.27	-0.07
Dec 01-31	0.02	0.10	0.13	0.10	0.02	0.00	0.37	-0.05
Summed total	0.34	1.06	0.48	1.19	0.22	1.06	4.35	-2.40
kWh							4,350	-2,400
EUI (kWh/m ²)							63.12	-34.78
Space Heating Demand (kWh/m ²) (SAP)							6.89	-

5.3 Plot 6 – Ground Floor 1-bed, 1-person Apartment

	Pumps and fans (MWh)	Service Water Heating (MWh)	Space Heating (MWh)	Other Process (MWh)	Interior Lighting (MWh)	Space Cooling (MWh)	Total	PV Generation (MWh)
Jan 01-31	0.02	0.04	0.11	0.06	0.01	0.00	0.25	-0.07
Feb 01-28	0.02	0.04	0.06	0.06	0.01	0.00	0.18	-0.07
Mar 01-31	0.02	0.04	0.03	0.06	0.01	0.00	0.16	-0.22
Apr 01-30	0.02	0.03	0.00	0.06	0.01	0.00	0.13	-0.27
May 01-31	0.02	0.03	0.00	0.06	0.01	0.06	0.18	-0.34
Jun 01-30	0.02	0.03	0.00	0.06	0.01	0.12	0.24	-0.34
Jul 01-31	0.03	0.03	0.00	0.06	0.01	0.25	0.38	-0.27
Aug 01-31	0.02	0.03	0.00	0.06	0.01	0.17	0.30	-0.29
Sep 01-30	0.02	0.03	0.00	0.06	0.01	0.06	0.19	-0.22
Oct 01-31	0.02	0.03	0.00	0.06	0.01	0.00	0.13	-0.17
Nov 01-30	0.02	0.04	0.03	0.06	0.01	0.00	0.16	-0.07
Dec 01-31	0.02	0.04	0.08	0.06	0.01	0.00	0.21	-0.05
Summed total	0.24	0.41	0.30	0.75	0.14	0.66	2.50	-2.40
kWh							5,500	-2,400
EUI (kWh/m ²)							58.64	-56.29
Space Heating Demand (kWh/m ²) (SAP)							7.02	-

5.4 Plot 7 – 1st 1-bed, 2-person Apartment

	Pumps and fans (MWh)	Service Water Heating (MWh)	Space Heating (MWh)	Other Process (MWh)	Interior Lighting (MWh)	Space Cooling (MWh)	Total	PV Generation (MWh)
Jan 01-31	0.01	0.09	0.14	0.10	0.01	0.00	0.35	-0.07
Feb 01-28	0.00	0.08	0.08	0.09	0.01	0.00	0.27	-0.07
Mar 01-31	0.01	0.08	0.05	0.10	0.01	0.00	0.25	-0.22
Apr 01-30	0.01	0.07	0.00	0.10	0.01	0.00	0.19	-0.27
May 01-31	0.01	0.06	0.00	0.10	0.01	0.08	0.27	-0.34
Jun 01-30	0.02	0.05	0.00	0.10	0.01	0.23	0.41	-0.34
Jul 01-31	0.02	0.05	0.00	0.10	0.01	0.28	0.48	-0.27
Aug 01-31	0.02	0.05	0.00	0.10	0.01	0.25	0.44	-0.29
Sep 01-30	0.01	0.06	0.00	0.10	0.01	0.09	0.28	-0.22
Oct 01-31	0.01	0.07	0.00	0.10	0.01	0.00	0.19	-0.17
Nov 01-30	0.01	0.08	0.03	0.10	0.01	0.00	0.23	-0.07
Dec 01-31	0.01	0.08	0.10	0.10	0.01	0.00	0.30	-0.05
Summed total	0.13	0.82	0.41	1.19	0.17	0.93	3.65	-2.40
kWh							3,650	-2,400
EUI (kWh/m ²)							66.31	-43.54
Space Heating Demand (kWh/m ²) (SAP)							7.44	-