

## Case Study 5

# HOW TO FUTURE-PROOF YOUR DULWICH HOME

### *Why Retrofitting Matters*

Dulwich housing stock includes Victorian terraces, Edwardian semis, 1930s homes, and post-war infill—many of which were built long before modern insulation standards. As a result, they often lose heat quickly and rely on carbon-intensive heating systems. Retrofitting these homes is one of the most effective ways to support local climate goals while reducing energy bills.

### *Our Mission*

The goal of this series of retro-fit case studies, is to empower Dulwich residents with clear, trustworthy information to help:

- Reduce household energy use
- Lower carbon emissions
- Improve comfort and indoor air quality
- Protect the character of local homes
- Make informed decisions about retrofit investments
- Navigate Scheme of Management and Local Authority planning rules



The rear extension soon after completion

## Case Study 5

# HOW TO FUTUREPROOF YOUR EDWARDIAN ESTATE HOME

*A sensitive conservation-led deep retrofit transforming a Edwardian house into a low-energy family home on a picturesque Dulwich street.*

### Energy saving impacts:

- *Deep retrofit achieving EnerPHit-level performance*
- *Lower bills with payback expected within 10–12 years*
- *Airtight construction, MVHR and high-performance glazing*



Rear elevation before the works commenced.

## BACKGROUND

This semi-detached Edwardian home forms part of an architecturally distinctive group. Built in red brick with roughcast render at first floor and a red clay tiled roof, it features a canted bay with a lean-to porch and half-timbered gable. The front elevation was conserved and a re-landscaped front garden improved biodiversity and enhanced streetscape character.

Before the retrofit, a rear single-storey glass and timber extension provided good light but was poorly insulated. The architects designed a new extension to replace it with a basement and lightwell opening the rear of the house up to the garden.

# SUSTAINABILITY OBJECTIVES

The project set out to achieve Enerphit-level performance, beyond Building Regulations standards, while creating a comfortable family home. Every design decision was guided by these objectives. Demolition was minimised and brickwork repaired, and insulation was maximised. Existing double-glazed windows were retained, and all new glazing was triple glazed including doors and skylights.

To achieve airtightness careful detailing was needed at the junction of existing roof and walls including a layer of 'parge coat' plaster to infill gaps. The layout of the ground floor kitchen and basement living room was planned for future adaptability and to promote family togetherness. The kitchen, bathroom and utility room fittings have plenty of storage and are made of robust, durable materials.



The rear single storey extension and lightwell to the new basement.

## TECHNICAL STRATEGY

A fabric-first approach was adopted prioritising insulation, high-performance glazing and advanced soundproofing. Considerable time was spent designing and analysing the soundproof thermal insulation applied to the party walls. For solid wall construction, over insulating can increase the risk of condensation and interstitial condensation risk analyses were carried out using Passivhaus Planning Package (PHPP) modelling. The result was a mixture of rigid foam board (PIR, polyisocyanurate) and breathable wood fibre insulation solutions.

An air source heat pump and photovoltaic panels have reduced the property's reliance on fossil fuels. Bricks salvaged from demolition were reused for the extension reinforcing the project's low-carbon and resource-efficient approach.



Photovoltaic solar panels on the flat roof of the rear addition. New rooflights were triple glazed.

## PROJECT ACHIEVEMENTS

The project demonstrates how a highly energy-efficient retrofit can be achieved for an older property. To manage condensation risk a Mechanical Ventilation with Heat Recovery (MVHR) system was installed. The inlet and outlet were located discretely within the side passage, and an internal riser was created centrally with ductwork being distributed to each room between the floor joists. The internal wall thickness was increased slightly for the riser but covings were replaced to match making the installation very discrete.

The specification and design process for the heat pump, finding the optimum size and location, took considerable time. A horizontal roof-mounted heat pump was considered but would have been visible and was not permitted by the Scheme of Management. Finding the right location while not impacting neighbouring properties was a challenge. The final position is screened by the side fence but was a distance from the house which reduced its overall efficiency. High-quality Armacell insulation was required to all the underground pipework to improve its performance.

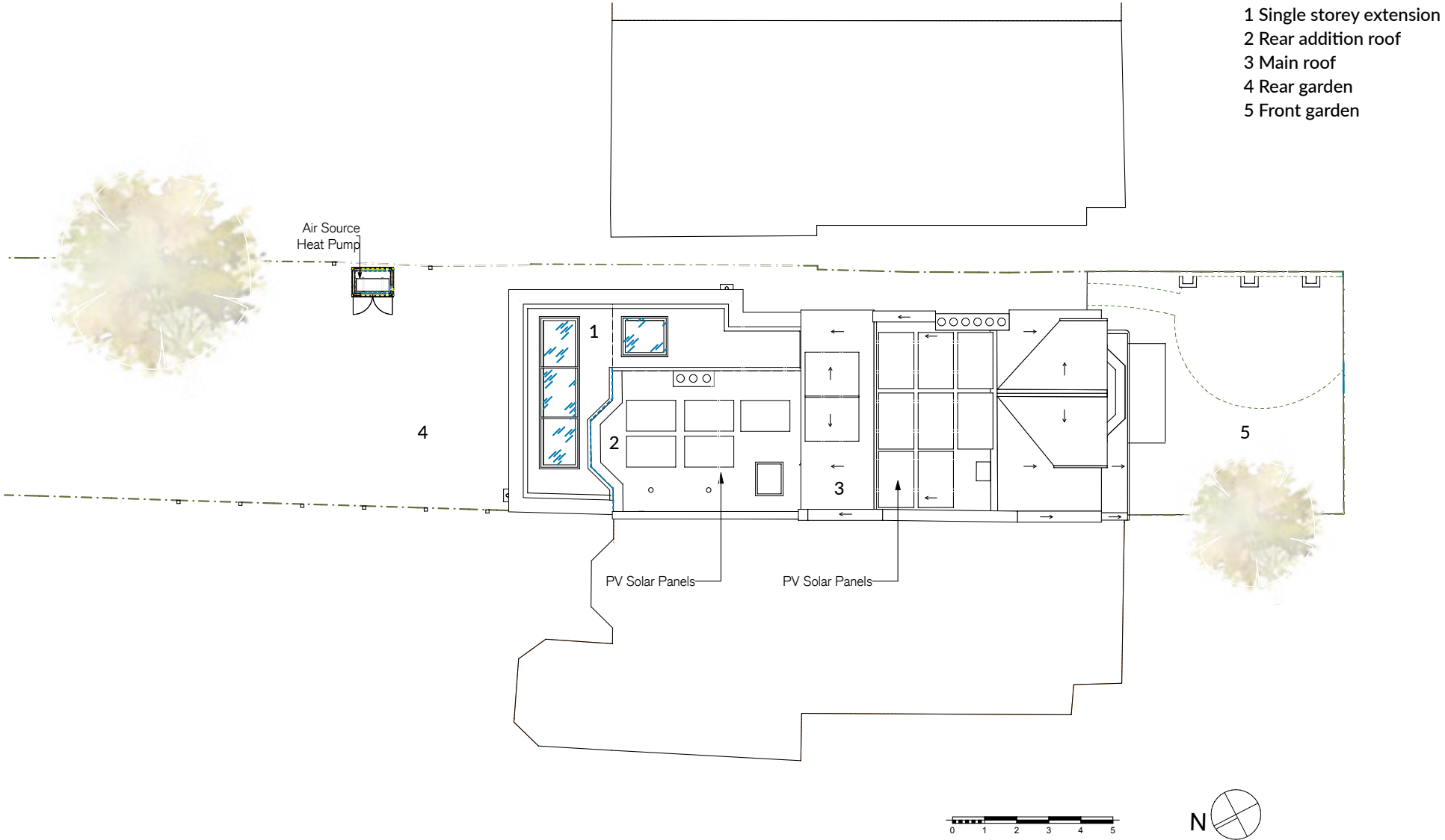
The flexible layout and environmental design support the family's daily routines and work-life balance. A Life Cycle Assessment undertaken at RIBA Stage 3 when the design had been developed, ensured embodied carbon targets were set and informed sustainable material selection in the following design stages. Post-occupancy evaluation confirmed excellent thermal comfort and acoustic performance, with the MVHR system maintaining consistently high air quality. The completed home meets Passive House Low Energy Building standards, with sustainability measures expected to pay back within 10–12 years.



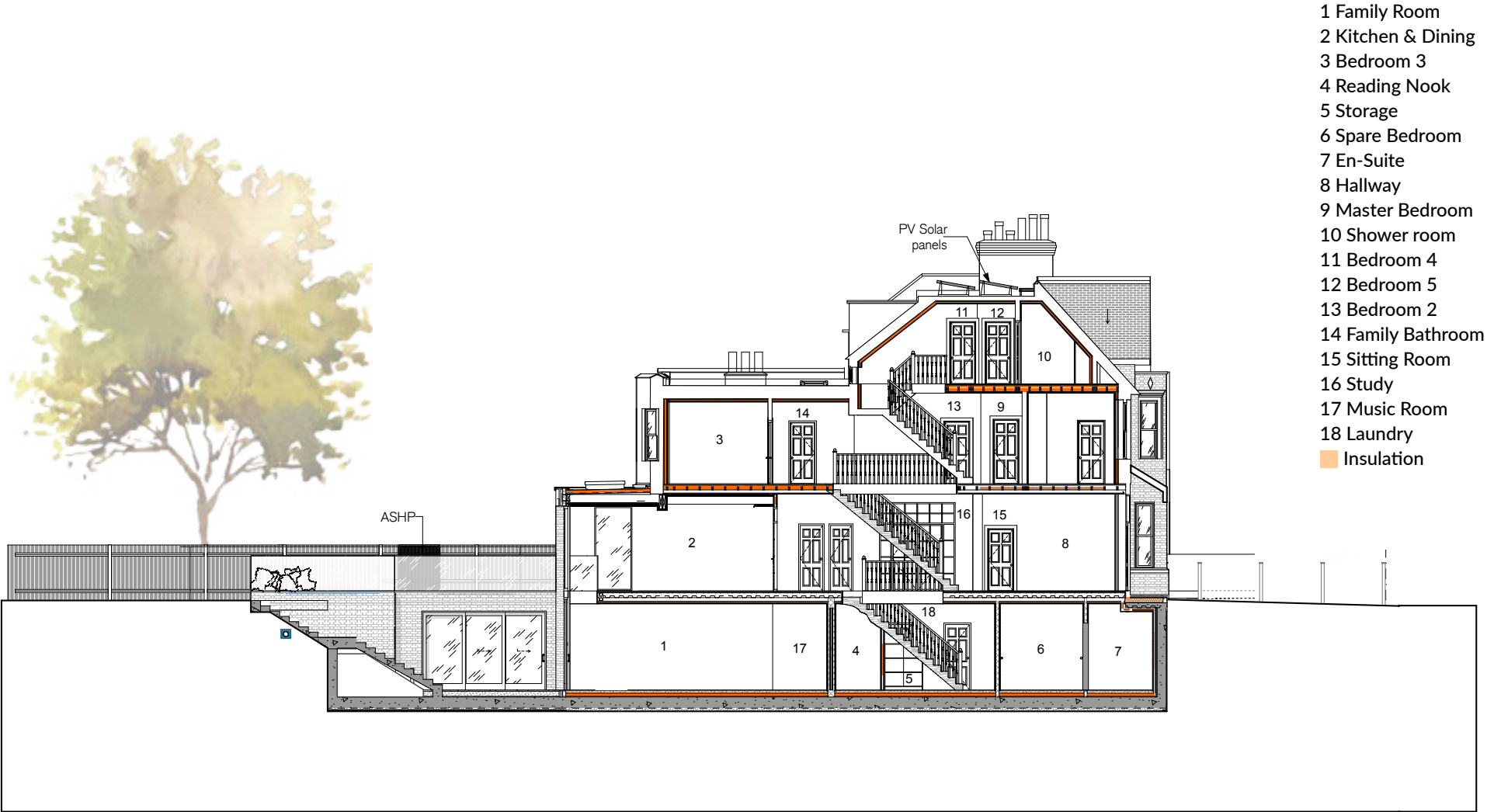
### More About: Mechanical Ventilation with Heat Recovery System (MVHR)

A mechanical ventilation with heat recovery (MVHR) system can play a crucial role in maintaining energy efficiency and indoor air quality. Duct routes need to be carefully planned to avoid conflicts with structure, insulation and finishes.

The system continuously extracts stale air from bathrooms and kitchens while supplying fresh, filtered air to living spaces, ensuring balanced air distribution throughout the home. A MVHR system recovers heat from exhaust air to pre-warm incoming air, reducing heating demand and maintaining consistent comfort levels year-round without compromising the building's historic fabric.



Roof plan



- 1 Family Room
- 2 Kitchen & Dining
- 3 Bedroom 3
- 4 Reading Nook
- 5 Storage
- 6 Spare Bedroom
- 7 En-Suite
- 8 Hallway
- 9 Master Bedroom
- 10 Shower room
- 11 Bedroom 4
- 12 Bedroom 5
- 13 Bedroom 2
- 14 Family Bathroom
- 15 Sitting Room
- 16 Study
- 17 Music Room
- 18 Laundry
- Insulation

Cross Section



## LESSONS LEARNED

Procured through a traditional contract the scheme was competitively tendered to ensure quality and value. Close collaboration between the client, architect, structural engineer and the contractor was critical. A Party Wall Surveyor also advised and consultation with neighbours was essential. The project demonstrates how the Scheme of Management guidelines can positively influence sustainable design. Retaining a high level of landscaping to the front garden enhanced the streetscape, improved biodiversity, and will contribute to reducing urban temperatures.

The design is finished to a high standard, but some compromises were required in secondary spaces to manage the budget and prioritise energy performance and long-term value. Solar panels were installed on the flat roofs of the rear addition and main house, avoiding the visible pitched roof, which was more in keeping.

The project highlights how a qualified architect can help establish an environmental strategy, manage the budget, and achieve excellent design and environmental outcomes.



### More About: Timber Sash Windows

Traditional timber sash windows are a feature of many of Dulwich's historic homes. They are made from dense, durable timber and many have lasted for over a century with only modest repair and maintenance. Retaining these windows helps preserve embodied carbon and avoids the waste and cost of replacement. Upgrades such as discreet draught proofing, secondary glazing, and careful repair of timber sections can significantly improve thermal comfort without compromising heritage character. Timber also has the advantage of being a renewable and repairable material. With proper care including painting, re-cording, and maintaining putty and glazing, sash windows can outlast most modern replacements, providing both environmental and cultural value.

The image above is an example of a timber sash window that has been fitted with slender insulated glass to improve its thermal performance while retaining its historic appearance.

# SUMMARY OF RETROFIT IMPROVEMENTS

Element	Before	After	Existing U-Value (W/m <sup>2</sup> K)	Proposed U-Value (W/m <sup>2</sup> K)
Floors	Suspended timber ground floor	Insulated basement/ground slab build-up. Underfloor heating installed throughout.	2.2	0.153
Walls	Existing masonry walls with limited insulation	Insulated dry-lining added (82.5 mm Kingspan Kooltherm K118) with airtightness detailing	0.85	0.144
Windows	Single-glazed timber sash	Conservation-style high-performance slimline double-glazed units to match	5.3	1.4
Roof	Pitched tiled roof with limited insulation	Upgraded with insulation between and over-rafters	2.25	0.147
Mechanical and electrical upgrades	-	Photovoltaic panels and an Air Source Heat Pump. Low energy light fittings and appliances	-	-
Primary energy use	115 kWh/m <sup>2</sup> /year	Reduced to 110 kWh/m <sup>2</sup> /year	-	-
Heating demand	74 kWh/m <sup>2</sup> /year	Reduced to 61 kWh/m <sup>2</sup> /year	-	-
Airtightness	0.6 m <sup>3</sup> /m <sup>2</sup> h @50 Pa	Remained at 0.6 m <sup>3</sup> /m <sup>2</sup> h @50 Pa	-	-
Calculated CO <sub>2</sub> emissions	-	144.5 kg/m <sup>2</sup> /year below the 150 kg/m <sup>2</sup> /year target	-	-
Annual running costs	£2,800	Energy costs have almost halved despite price increases in rate caps	-	-

## TOP TIPS

- Allow additional time for basement projects. It is crucial to have a detailed set of drawings, an experienced Structural Engineer, Party Wall Surveyor and contractual team on the project.
- Align design, energy, and conservation objectives from the outset to avoid conflicts and maximise sustainability outcomes.
- Follow a fabric-first approach. Prioritise insulation, airtightness, and ventilation performance before considering renewable technologies.
- Plan for plant space. Allow adequate room and access for MVHR and heat pump installation, and consider efficiency impacts of placement.
- Engage stakeholders. Early dialogue with Residents Associations and neighbours helps build trust and ensures designs respect local character.
- Balance ambition and budget. Prioritise investment in long-term performance and adaptability.

## FURTHER GUIDANCE

RDA Architects  
[rdauk.com](http://rdauk.com)

For advice on insulation and practical energy saving advice see [energysavingtrust.org.uk](http://energysavingtrust.org.uk)

Air source heat pumps  
[vaillant.co.uk](http://vaillant.co.uk)

MVHR systems  
[envirovent.com](http://envirovent.com)