

## Case Study 2

# 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



Renovated Edwardian Estate house

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## Case Study 2

# HOW TO FUTUREPROOF YOUR EDWARDIAN ESTATE HOME

*A comprehensive retrofit of a large Edwardian house, designed for long-term durability and easy maintenance while creating a spacious, bright family home.*

### Energy saving impacts:

- *Whole-house retrofit designed for long-term*
- *Major reductions in heat loss and noise*
- *Discretely integrated low-energy measures*



Pre-renovation view

## BACKGROUND

Constructed in 1905, this wide-fronted semi-detached house sits within a tree-lined road in a local Dulwich conservation area. The grand red-brick front elevation features white-painted sash windows with leaded top lights and decorative white banding above and below. Yellow stock brick to the side and rear reflects typical speculative building of the period.

Although well preserved, the property had not been refurbished for many years, presenting an opportunity to adopt a whole-house approach. The project combined a new rear and basement extension with upgrades to insulation, draughtproofing, new heating and renewable systems, while maintaining the building's architectural integrity.

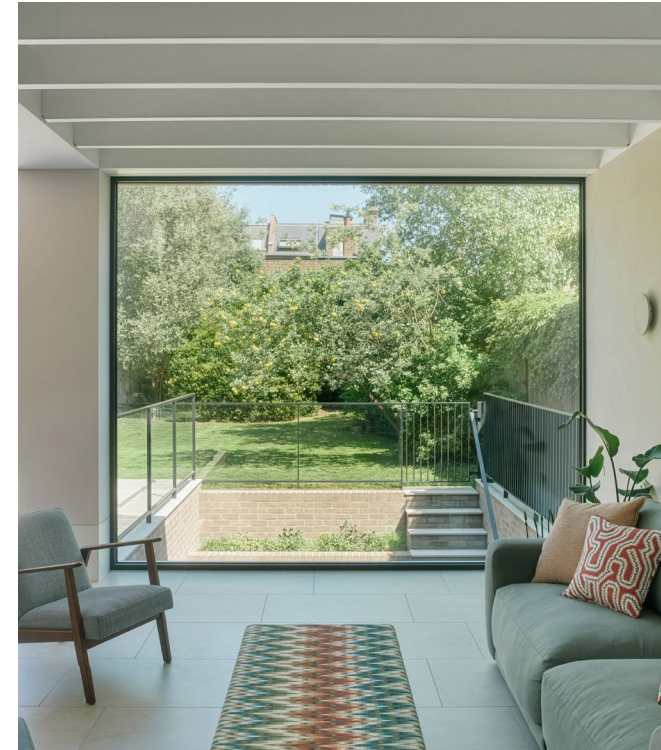
# SUSTAINABILITY OBJECTIVES

The house previously suffered from significant heat loss through large single-glazed windows, uninsulated solid brick walls and a draughty timber floor. The brief was to extend and refurbish the home for long-term occupation, ensuring efficiency and comfort for at least another 50 years.

Key measures included installing generous insulation, improving airtightness and moisture permeability (“breathability”) and maximising daylight. Priority was given to ‘low-energy performance in use’ over embodied carbon, recognising the enduring value of robust durable materials and detailing. A new basement was conceived as a once-in-a-generation investment, maximising the home’s potential while reducing the need for future major works.



*The air source heat pump (ASHP) sits discreetly along the side passage. Inside the basement, the system is supported by a hot water cylinder and an expansion vessel. The whole house is heated by low-temperature underfloor heating, which runs around 20°C cooler than a typical boiler, providing gentle, even warmth that works well with timber flooring.*



*View of the rear garden from the interior of the rear extension*

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# TECHNICAL STRATEGY

The technical brief emphasised simplicity, reliability, and longevity, using natural and durable materials throughout.

The existing brick façades were cleaned and repointed in flexible lime mortar, while cork and lime plaster with wood fibre insulation were applied internally to improve thermal performance and manage moisture. The building fabric was made airtight to reduce heat loss, supported by a mechanical ventilation and heat recovery system that recovers warmth from outgoing air (MVHR). Environmental systems were designed for ease of use, minimal maintenance, and low visual impact. An air source heat pump provides heating and hot water, supplemented by roof-mounted solar panels to reduce reliance on electricity from the national grid.



*Photovoltaic solar panels on the two-storey rear addition zinc roof. In this location they have no visual impact*



## More About: Lime and Cork Plaster

Lime and cork insulating plaster is a natural, breathable system suitable for internal use on solid-wall construction. Combining the vapour permeability of lime with the insulating properties of cork, it helps to regulate humidity, reduce heat loss, and maintain healthy moisture balance within the wall. Applied directly to masonry after removing existing plaster, it forms a seamless thermal layer that allows moisture to pass through safely, preventing condensation and damp. Lime is robust and flexible, accommodating minor movement without cracking, making it ideal for traditional and historic buildings. Available from manufacturers such as Diasen Diathonite, EcoCork, and Round Tower, these systems offer a sustainable alternative to synthetic insulation materials.

## PROJECT ACHIEVEMENTS

This project demonstrates how a traditional house can achieve substantial carbon reductions while providing generous, healthy and comfortable living spaces. The architects delivered full architectural design services and a whole house approach across all project stages, with the construction managed under a traditional building contract. Although the mechanical and electrical systems were delivered as a contractor-designed portion, their installation was guided by clear performance specifications set out by the architects, maintaining high standards of performance while respecting the character and construction of the original house.

The Scheme of Management guidelines were reviewed early and accommodated easily, thanks to the property's generous width and spacing. Neighbour engagement was integral from the outset. Using 3D computer models, the architects developed a design that stepped the extension down towards both boundaries to preserve privacy and daylight for adjacent homes. Lowering the ground floor to garden level created stepped interior spaces with generous ceiling heights while keeping the overall roof height low. The result is a series of light-filled rooms with a strong connection to the garden, enhanced by large, glazed openings that bring the landscape into the home. The homeowners now enjoy exceptional comfort and consistent internal temperatures year-round. The added benefit of improved insulation, airtightness, and double glazing has been the reduced noise from external sources, such as traffic and aircraft. With careful design, respectful conservation, and practical sustainability upgrades, the project shows how a period home can be improved for long-term comfort and efficiency without losing its architectural character.



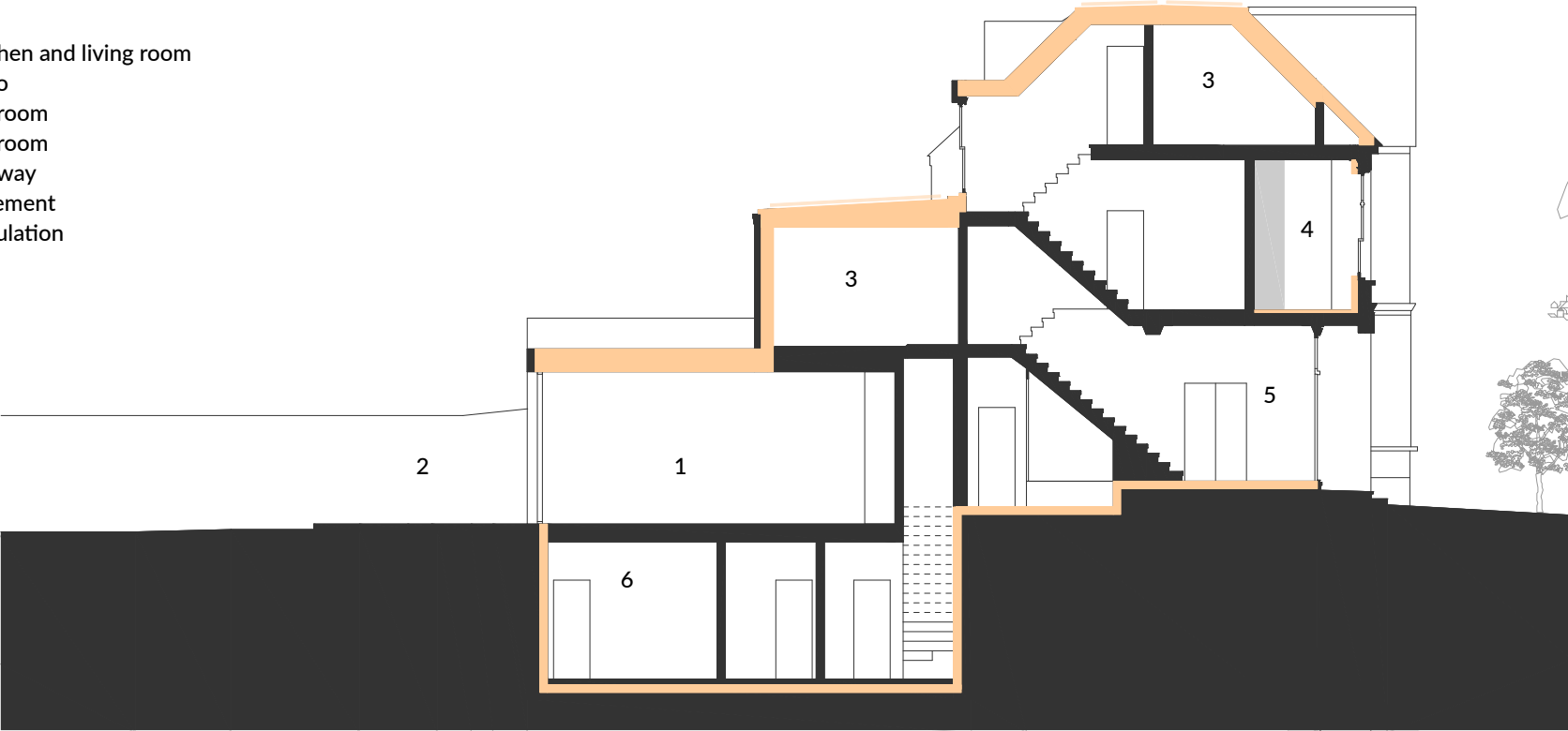
The front door and windows have been replaced to match. Double glazing and draughtproofing has reduced heat loss and noise.

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Ground floor plan

- 1 Kitchen and living room
- 2 Patio
- 3 Bedroom
- 4 Bedroom
- 5 Hallway
- 6 Basement
- Insulation



Cross Section

## LESSONS LEARNED

The construction of the extension and basement required careful planning. To simplify the work, the existing flat-roofed two-storey rear addition was temporarily removed and rebuilt using modern, lightweight timber construction. Reclad in matching stock brick, it kept its original appearance while offering much better insulation, thermal performance and moisture control. Inside, walls were finished with breathable lime-based cork plaster, helping the building manage moisture naturally. This required the use of breathable, low-VOC paints, which release far fewer chemicals into the air and support healthier indoor air quality.

The project involved 12 months of design and planning followed by 18 months on site. Scheme of Management restrictions, which prevent weekend working to protect neighbourhood tranquillity, extended the construction period.

Although a larger solar-panel array had been approved, detailed modelling showed that overshadowing from the main house would limit efficiency. The final layout was therefore adjusted to achieve the best technical performance and value for money.

## SUMMARY OF RETROFIT IMPROVEMENTS

Element	Before	After
Floors	No insulation	Insulated and draught-proofed suspended timber floors
Walls	No insulation	Solid brickwork was insulated internally using lime/cork plaster and wood fibre insulation. The insulation manufacturer provided WUFI calculations (specialist software 'Wärme und Feuchte', warmth and moisture).
Windows	Single-glazed sliding sash windows	Replaced with draught-proof double-glazed windows. New glazing to the rear extension is triple-glazed and thermally broken
Roof	Slate roof without insulation	Roof replaced with slates to match, using air-tight membranes, high specification insulation for sound and thermal performance and additional void ventilation.
Draught-proofing	None	Airtight membranes were fitted to create an airtight envelope while allowing breathability.
Renewables/heating system	Gas boiler	Air source heat pump with photovoltaic solar panels.
Lighting/appliances	Standard	LED light fittings and low energy appliances throughout
Recycled materials	-	Re-use of crushed existing bricks for hardcore subbase.
Flood alleviation	-	A flood alleviation reservoir is installed underneath the rear terrace, providing a large volume for storm water before it trickles into the local system.

## TOP TIPS

- Plan the retrofit as a whole-house strategy. Seek professional advice from an architect who can coordinate environmental upgrades and advise you on design and how you can get the most from your property.
- Use breathable materials. Choose natural plasters, mortars and insulation products that regulate moisture and prevent condensation in solid-wall buildings.
- Balance airtightness with ventilation. Mechanical ventilation with heat recovery (MVHR) helps maintain fresh air while retaining heat and can provide consistent temperatures efficiently.
- Engage early on with your neighbours to understand how your project might affect them.
- Computer 3d modelling can really help understand solar gain and shading during the design stages.
- Select robust, low-maintenance systems. Prioritise simplicity and durability over complexity; well-designed passive measures often outperform high-maintenance technology.
- Consider future access and maintenance of renewable technologies.

## FURTHER GUIDANCE

R2 Studio Architects  
[r2studio.co.uk](http://r2studio.co.uk)

Durable zinc roofing material see  
[vmzinc.com](http://vmzinc.com)

Always seek professional advice on solid wall insulation. To read more including details on airtight systems visit Ecological Building Systems website, [ecologicalbuildingsystems.com](http://ecologicalbuildingsystems.com)

Ty Mawr Lime,  
[lime.org.uk](http://lime.org.uk)

Round Tower  
[roundtowerlime.com/collections/insulating-plasters](http://roundtowerlime.com/collections/insulating-plasters)