

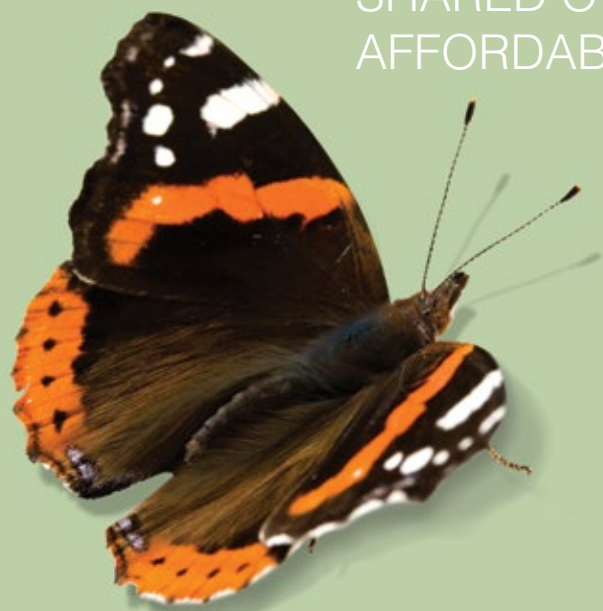


SULGRAVE GARDENS –
BRINGING PASSIVHAUS
INTO COMMON USE IN
AN URBAN CONTEXT.

PASSIVHAUS

ONE OF THE CAPITAL'S LARGEST
MIXED TENURE DEVELOPMENTS
TO USE A PASSIVHAUS APPROACH.

THIRTY STUNNING NEW HOMES,
WHICH WERE MADE AVAILABLE
TO INDIVIDUALS ON ALL
INCOMES – INCLUDING 8 FOR
OUTRIGHT PRIVATE SALE, 13 FOR
SHARED OWNERSHIP AND 9 FOR
AFFORDABLE RENT.



In 2011 Octavia developed the UK's first ever certified Passivhaus retrofit at a Victorian property in a beautiful conservation area of Holland Park, London, which provided important lessons for how to bring the approach to an inner city context.

Sulgrave Gardens, completed in 2013, represents a significant step forward in bringing Passivhaus into common use in the UK, in an affordable and deliverable format appropriate for higher density use in towns and cities. It proves that Passivhaus dwellings are a viable proposition in urban locations that might previously have been deemed unsuitable.

The motivation for Octavia was to make use of the most innovative methods of construction to make sustainable living available to those on all incomes, not just a luxury for those who can afford it.

These homes are not only anticipated to save residents a significant amount on fuel bills (up to 90% in the case of the certified units) but also to provide considerably improved air quality within.

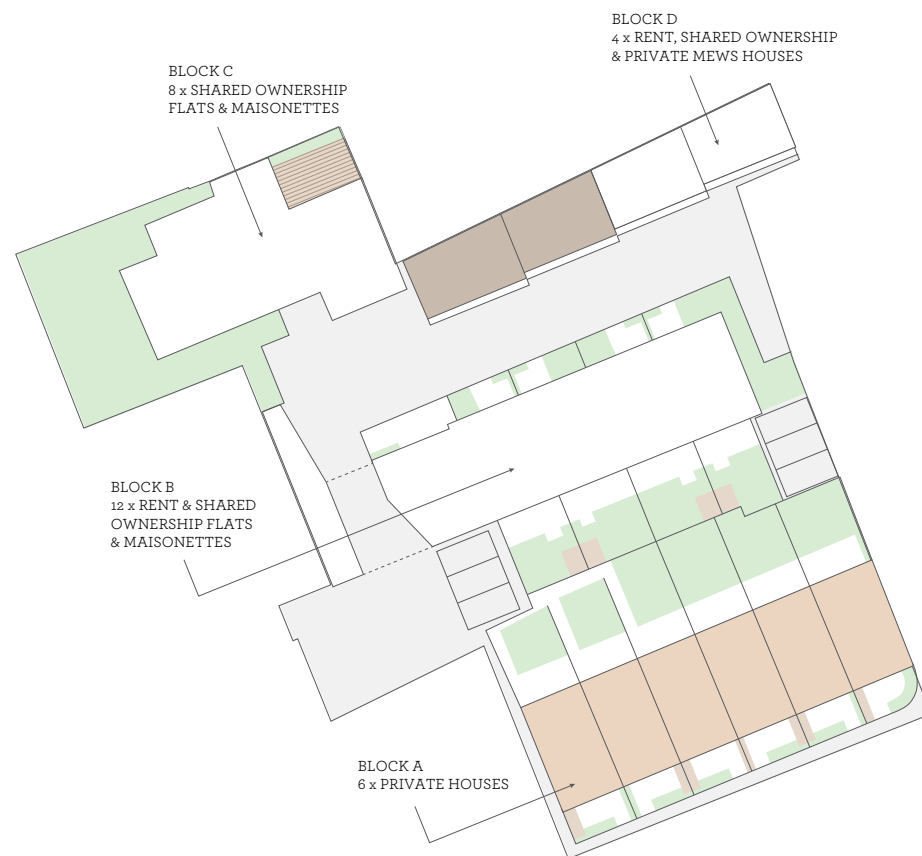
“Octavia seeks to continue the legacy of our founder, Octavia Hill, who pioneered good value, well-designed affordable housing. Setting the standard for sustainable living in the capital, *Sulgrave Gardens* is a testament to her vision of housing for a happy, healthy life.” Grahame Hindes, Chief Executive, Octavia.

The street view of the 6 Town Houses. The external shutters are not only an iconic part of the design, they perform an important function by helping to control the amount of 'solar gain' the homes receive.



THE SITE

The site is composed of four separate blocks, two of which are built to meet Passivhaus certification and the remaining two, due to their shape, are designed to be as close to certification standards as possible.



PASSIVHAUS

PASSIVHAUS IS A BUILDING STANDARD THAT IS TRULY ENERGY EFFICIENT, COMFORTABLE, AFFORDABLE AND ECOLOGICAL, ALL AT THE SAME TIME.

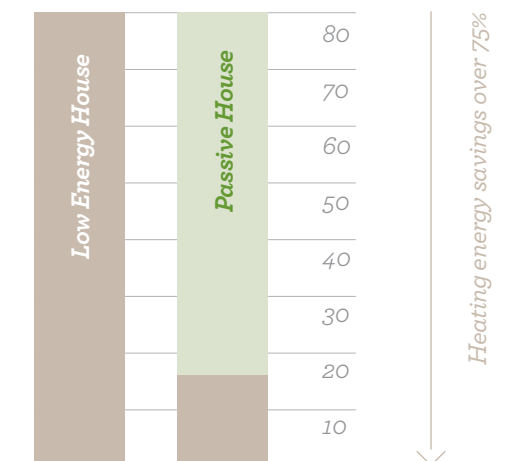
IT IS NOT A BRAND NAME, BUT A CONSTRUCTION CONCEPT THAT FOLLOWS A SET OF RIGOROUS AND CERTIFIABLE PRINCIPLES THAT HAVE STOOD THE TEST OF TIME AND PRACTICE.

- Passivhauses allow for energy savings of up to 90% compared with typical central European buildings and over 75% compared with average new constructions.
- They use energy sources inside the building such as body heat from the residents and solar gain from the windows, which requires very high levels of insulation and very low air leakage.
- Triple glazed windows and a building shell consisting of highly insulated exterior walls, roof and floor slab keep the desired warmth in the house during cold months, or out during the summer.
- A ventilation system consistently supplies fresh air providing superior quality air (with reduced levels of pollen or dust for example) without causing any unpleasant draughts. A highly efficient heat recovery unit allows for the heat contained in the exhaust air to be re-used.

All the major components of Sulgrave Gardens either meets or exceeds the performance requirements of Passivhaus.

The primary energy requirement to meet Passivhaus standards is 120 kWh/m²/ year. In two blocks at Sulgrave Gardens we exceeded these readings. Block A achieved 92 kWh/m²/year and block B was as low as 80 kWh/m²/year.

Heating energy kWh/m²/year



The vast energy savings in passivhauses are achieved by using especially energy efficient building components and a quality ventilation system: There is no cutting back on comfort; instead the level of comfort is considerably increased. (Passivhaus Institute, 2013)

PARTICULAR DESIGN FEATURES AT SULGRAVE GARDENS

AIR LEAKAGE BARRIERS AND MINIMISING THERMAL BRIDGING

Conventional houses lose significant amounts of heat through air leakage. The homes at Sulgrave Gardens are designed with a continuous air leakage barrier or membrane, and use special tapes at the joints of the building elements to maintain this barrier, which drastically reduces the air leakage. There is some truth in the assertion that a Passivhaus can pass current building regulations with an open window.

At Sulgrave Gardens the air leakage barrier in the floor is mainly provided by the concrete slab at ground floor level with special attention given to the joint between the floor and walls or doors. The barrier in the **external walls** and the **ceiling** on the top floor consists of an airtight membrane. All of the external **doors and windows** are special products with very low air leakage in performance.

To meet Passivhaus standards, the air leakage rate should not exceed 0.6 air changes per hour. In block B of Sulgrave Gardens, we achieved as low as 0.37-0.40 air changes per hour.

Significant levels of insulation is not enough alone. Much heat can be lost around the edges of the insulation. For Passivhaus principles to work, complete elimination of these ‘thermal bridges’ is required. Sulgrave Gardens effectively achieves thermal bridge free construction.



WINDOWS

The windows are an integral part of the overall heating system. Made of high performing triple glazing and insulated frames, during winter they convert solar energy into heat - a process called ‘solar gain’. During the summer when the solar gain is not desired, occupants utilise the shades on the outside of the building to prevent the house overheating.

It is possible for windows to be opened if residents desire (often a misconception of Passivhaus), however it is not required for ventilation. At Sulgrave Gardens the windows are designed to open inwards so can still be open when the shutters are drawn across. The mechanical ventilation with heat recovery provides constant fresh filtered air.

SOLAR HEATING AND HOT WATER

The homes are kept at a constant temperature throughout both day and night all year round and normally this will be achieved without the need for much adjustment by the occupant. Given the infancy of the Passivhaus approach in the UK, a small amount of heating and some towel radiators have also been fitted to give reassurance but it is unlikely that this will ever be required.

Each of the 10 houses have been fitted with solar panels on the roofs, which provide hot water to a hot water cylinder or ‘thermal store’. A small gas boiler has also been fitted, in the event that the solar panels are not contributing enough heat, as well as to ensure the water temperature is hot enough to discourage bacterial growth.

MECHANICAL VENTILATION HEAT RECOVERY SYSTEM (MVHR)

This is a key component of the Passivhaus approach. The system provides fresh filtered air 24 hours a day, seven days a week by taking fresh filtered air from outside into the home, whilst also removing moist and stale air from the bathrooms, kitchen and WC. The unit ‘exchanges’ the heat in the stale air and uses it to pre-heat the incoming fresh air. This avoids losing heat through open windows and so the heating system uses less gas and energy to heat the home.

The units are designed and installed to be incredibly low cost to run, low maintenance (requiring only a biannual change of filter) and to make very little sound. They also contain a control panel to allow occupants to manage the level of ventilation as they require. For example if more people are in the house for a party or extra heat is generated through appliances, users can increase the level of ventilation.

CODE FOR SUSTAINABLE HOMES

Sulgrave Gardens achieves Code For Sustainable Homes level 4, which measures the energy use of new homes along with other environmental criteria. Both Passivhaus and the Code give an assurance to residents that their home meets a desirable energy and comfort standard but they are not directly comparable measurements. The savings made in a Passivhaus on fuel bills are exceptionally high.

LANDSCAPE, SECURITY AND PARKING

Almost all homes have their own private outdoor space and the scheme uses the Homezone concept of shared areas throughout. Parking is discretely located within the site with 14 spaces available, 3 of which dedicated to the wheelchair accessible homes and space for 38 bicycles is provided in a secure storage area in keeping with the green ethos of the development.





The former site required demolition of a 1960s block of flats.

Sulgrave Gardens proved to be one of the most challenging sites that the project team have encountered for a number of reasons.

THE SITE

As in many urban dwellings, we were faced with constraints that exist as part of the usual planning and local contextual considerations, and as an added complication, the site is sandwiched between two conservation areas. This coupled with the desire to build a mixed tenure scheme of such a scale as well as being guided by the Passivhaus principles, required new dimensions of innovation.

Each of the four blocks required a specific design response so as to meet the challenges of the planning and architectural context, and the energy use and heat loss targets of Passivhaus. Two main construction methods were used, with SIPS (an insulated panel system) being used to provide the structural frame and external walls to the 10 houses. A concrete frame with SIPS external wall was used for the 20 flats and maisonettes. Taking into account the context and Passivhaus standards required, we achieved 18 homes built to the full Passivhaus standard with the remainder meeting the principles of Passivhaus design.

PASSIVHAUS IN THE UK

Passivhaus standards surpass that of present UK building regulations and so a more detailed and thorough approach is required from all parties involved. The infancy of this approach in the UK poses various hidden considerations alone. From sourcing and procurement limitations; new training for contractors in terms of understanding the importance of airtightness and calculating thermal bridges; through to rigorous quality control requirements; and limited niche expertise available for performance measuring.

MIXED TENURE

The concept of Passivhaus also added new facets to our marketing strategies. Whilst the concept of saving energy and money on fuel bills are probably universal desires for every individual we learnt that they are not key drivers for home owners or renting tenants. The needs of private home owners, shared owners and rented tenants all needed to be considered and accommodated so as to produce highly desirable and comfortable living environments whilst still achieving the goals of Passivhaus.

What is striking about these homes is that they do not look particularly different from standard homes as all the innovation lies in the construction method so occupants are not confronted with hi-tech gadgets. However, each home has been fitted with sustainable features where possible to encourage a more energy efficient way of life. Indoor water use is predicted to be reduced by 30% per person per day via water efficient appliances; easily accessible recycle points promote responsible waste disposal; and gardens are equipped with a water butt and outside drying line.

USER BEHAVIOURS AND MEASURING PERFORMANCE

The performance of these homes will depend on the behaviours of those who occupy them.

A DVD and additional home-manual was produced for all residents to ensure that they understood the principles of the design and were cautious of making lifestyle choices that were considerate of the Passivhaus build. For example using smaller fixings on internal walls so as not to perforate the insulation membranes; operating the shutters for solar gain in different weather conditions; and when and how to change ventilation filters.

The performance of each home will be monitored over an initial period of two years and will consider aspects such as humidity, CO₂ levels, temperatures, heating bills and user experiences and satisfaction, all of which will help to improve our planning for future schemes and provide lessons of how to improve energy performance across the rest of our portfolio.



STYLISH INTERIORS

27 of the 30 homes have their own private outdoor space in the form of private gardens, terraces or balconies.







PARTNERSHIPS

Sulgrave Gardens is the result of strong partnerships and valued expertise. Ambitious thinking combined with a collaborative and a flexible approach were vital to creating this pioneering scheme.

Architects Cartwright Pickard, Contrators Durkan and a host of others were vital to creating this stylish yet incredibly energy efficient housing.

We would like to thank:

- Cartwright Pickard Architects – Architects
- Durkan Limited – Construction partners
- MDA Consulting – Employers agent and cost consultants
- Atelier Ten – Mechanical and Electrical Engineers; Passivhaus Planning Package Advisors; and Code for Sustainable Homes assessors
- Warm - Particularly Peter Warm – Passivhaus assessor and advisor
- Campbell Reith – Structural engineers
- Grontmij – Landscape architects
- London borough of Hammersmith and Fulham
- Greater London Authority
- David Kneale Associates – Construction inspector

And many others.



A well-presented Homezone area has been created between blocks B and D to encourage sociability with little maintenance requirements.

OCTAVIA

Octavia was founded upon the principles that good quality housing and mixed communities matter. Established almost 150 years ago by Octavia Hill, the Victorian social reformer and co-founder of the National Trust, Octavia is now a prominent not-for-profit organisation that supports mixed communities by providing a range of low cost housing, development, community, and care services in central London.

Octavia has a strong track record for building award winning schemes with a focus on social and environmental sustainability.

Sulgrave Gardens is a truly mixed tenure scheme and a real success for the organisation. The private units sold before the development was complete and the demand for the shared ownership units reached a record high in our history.

Octavia are commercial for a purpose, all profit made from the sale of the private units is reinvested into the provision of more homes for London.

We are committed to providing quality homes that are attractive, affordable and comfortable, and to maintaining them in good condition through intensive management.

Find out more about Sulgrave Gardens including a documentary on our website.



octaviahousing.org.uk



