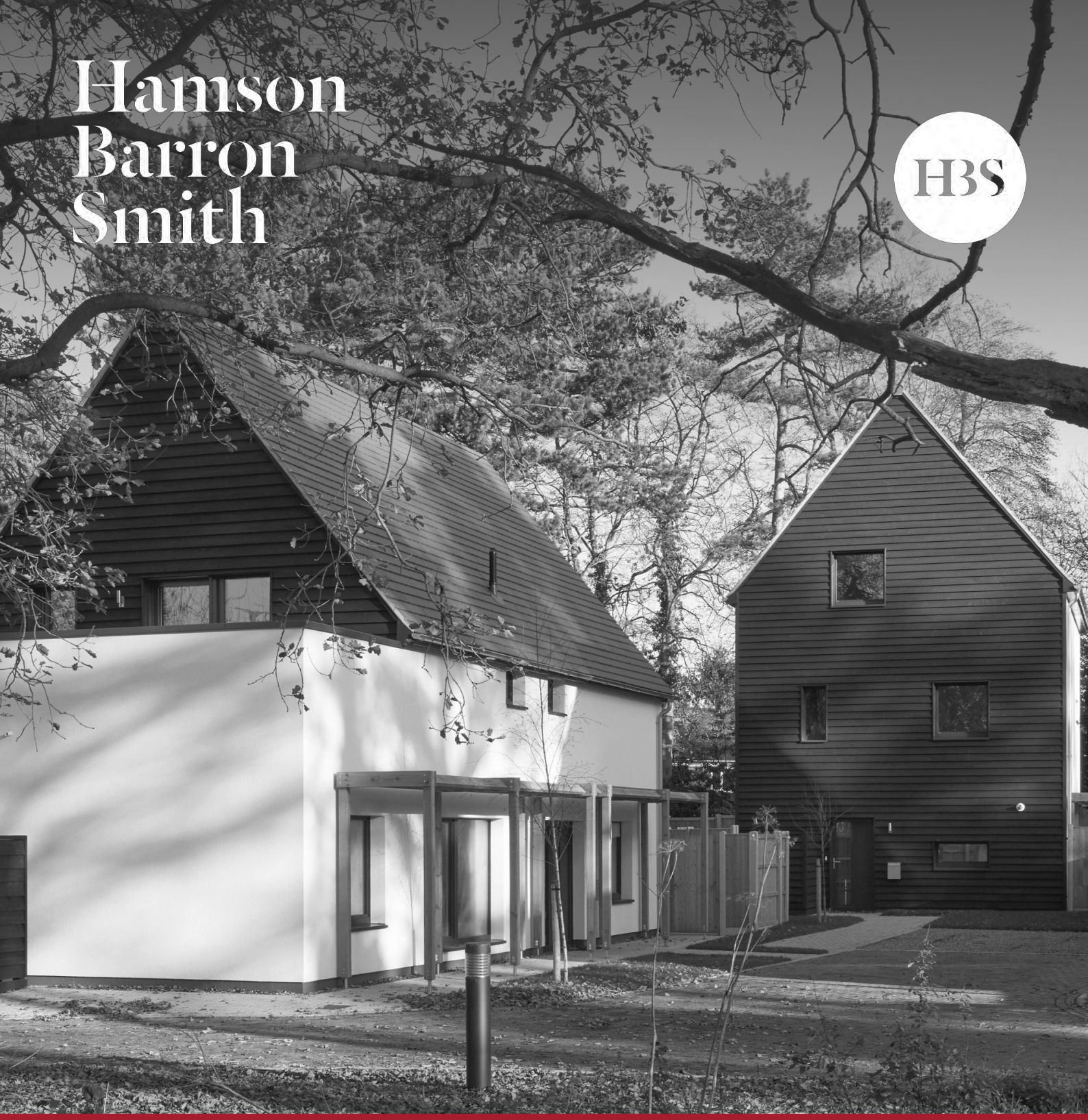
Hamson
Barron
Smith

HBS



CARROWBRECK MEADOW

Hamson
Barron
Smith

www.hamsonbarronsmith.com

LONDON	BRIGHTON	EXETER`	HAYWARDS HEATH	LEEDS	NORWICH
3 Maltings Place 169 Tower Bridge Rd London SE1 3JB +44 (0)207 940 3469	4 Hunns Mere Way Woodingdean Business Pk Brighton BN2 6AH +44 (0)1273 391100	Venture House, Capital Ct Sowton Industrial Estate Exeter EX2 7FW +44 (0)1392 351 000	Hayworthe House Market Place West Sussex RH16 1DB +44 (0)1444 449 400	3a, Evolution House Springwell Rd, Holbeck Leeds LS12 1AW +44 (0)1444 449 400	Townshend House 30 Crown Road Norwich NR1 3DT +44 (0)1603 227135

Carrowbreck Meadow is a development of 14 homes, the largest Passivhaus development in Greater Norwich. This landmark scheme sets new benchmarks for sustainable development, not only meeting the demanding requirements of full Passivhaus certification but also by providing 43% of the site as affordable homes, an over provision of around 13%.

This innovative development has been designed and delivered by certified passivhaus architects at Hamson Barron Smith (HBS) for Broadland Growth Ltd, a company set up by Broadland District Council and the NPS Group to provide:

- positive intervention in the marketplace driving up the quality of the housing product through design, space and material selection
- income generation to support local community needs and protection of front line services
- environmental excellence

The design response at Carrowbreck Meadow is a contemporary rendition of a well-established and local typology, a ‘Norfolk style’ – defined by a number of references to the historic barn vernacular seen throughout the county. A material pallet of white render, black stained timber cladding and either slate or plain red roof tiles also reflects the materials used in the adjacent Carrowbreck House.

The properties have been carefully grouped so the development sits comfortably in its woodland setting. The positioning and orientation of the homes maximises the access to solar gain in winter and prevents over heating in summer, with brise soleil and venetian blinds reoccurring across the design to provide solar shading.

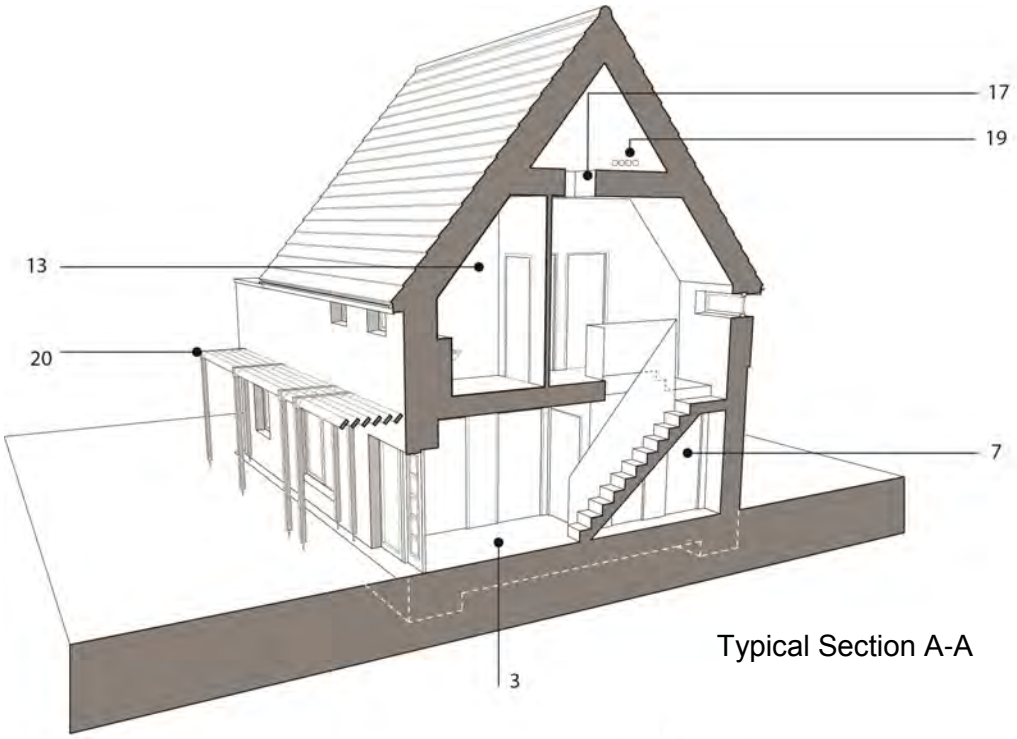
This development has delivered a unique selection of contemporary homes set within a mature woodland. These homes are at the leading edge of low energy design, joining a small elite group of super low energy Passivhaus projects across the UK and act as exemplars for future development in the area and beyond.

The provision of affordable housing for the local community which exceeds planning requirements and is truly tenure blind demonstrates the inclusive nature of the development which will help to achieve a sustainable, energy efficient and a mixed community.

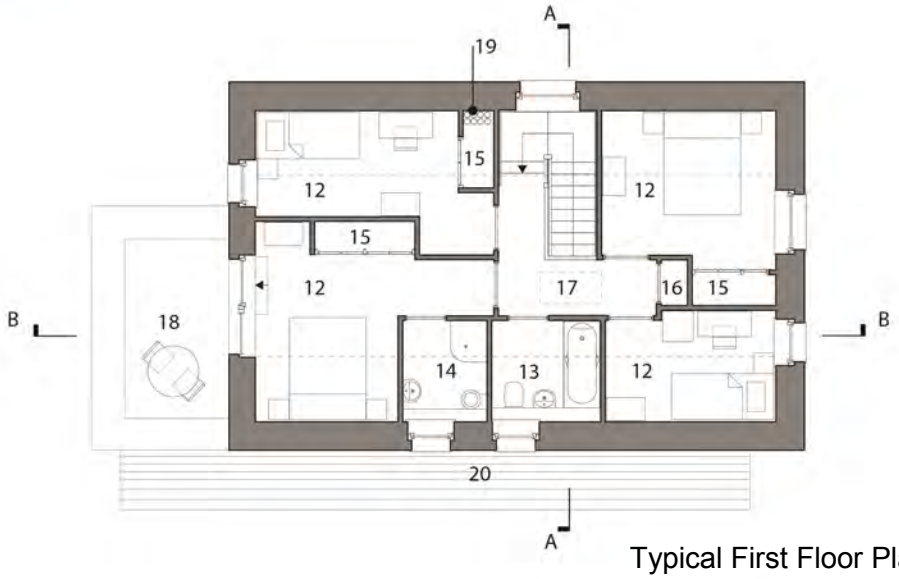
The development of the site for housing was not straight forward as it was located outside the defined settlement limit and heavily constrained by trees. The project had to be sensitively managed to overcome several planning challenges associated with trees, ground conditions, open space requirements, refuse/servicing, archaeology, highways and viability issues to ensure the scheme could be delivered within a very tight timescale and within the cost estimates.

The scheme is on target to return £1,200,000 to the public purse including land value, fees, equity and profit. This is over 30% of the Gross Development Value.

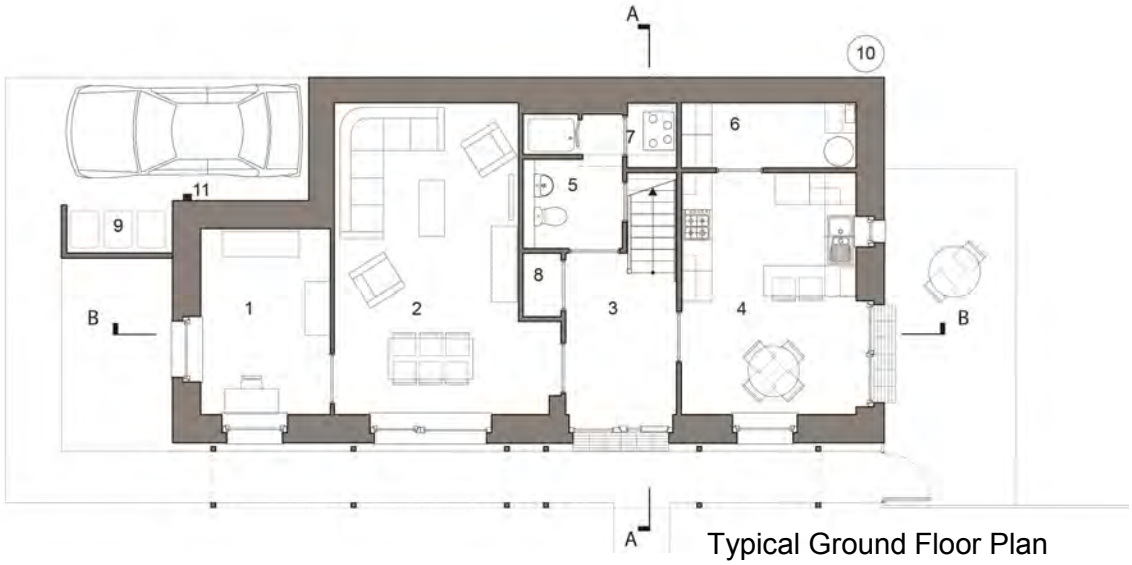
During the construction of the development, the contractor gave tours of the site so that methods of construction could be seen and understood by the wider community. HBS also opened up homes to share their expertise, as part of the International Passivhaus Days, 2016, in which over 300 schemes worldwide opened their doors. Carrowbreck was the only scheme in the East of England to do so.



Typical Section A-A



Typical First Floor Plan

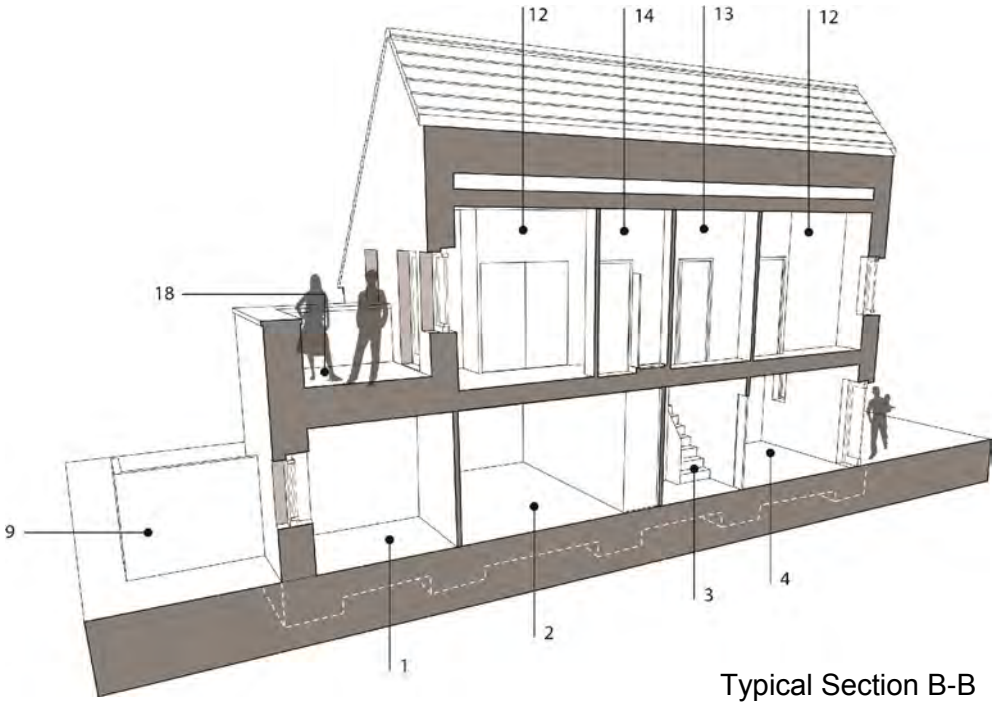


Typical Ground Floor Plan

KEY

(for plans and sections)

1 Study
2 Living/ dining
3 Hall
4 Kitchen/ breakfast room
5 WC/ shower
6 Utility
7 MVHR cupboard
8 Cloaks
9 Bin/ recycling store
10 Rainwater tank
11 Electric car charging point
12 Bedroom
13 Bathroom
14 Ensuite
15 Wardrobe
16 Cupboard
17 Loft Access
18 Terrace
19 MVHR ducts
20 Brise Soleil

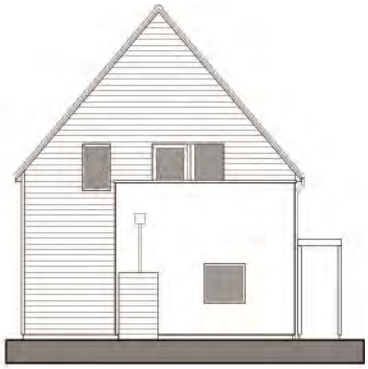


Typical Section B-B

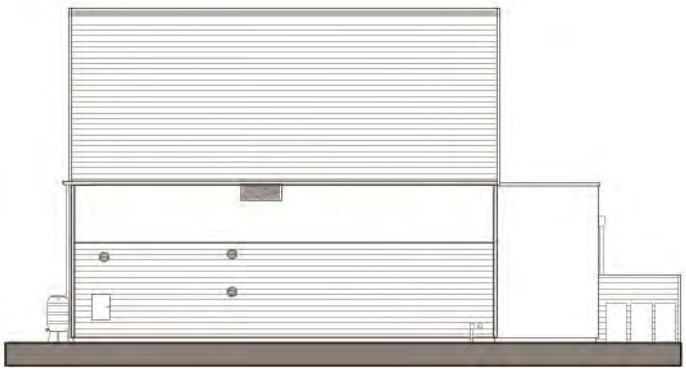
KEY
(for plans and sections)

1 Study
2 Living/ dining
3 Hall
4 Kitchen/ breakfast room
5 WC/ shower
6 Utility
7 MVHR cupboard
8 Cloaks
9 Bin/ recycling store
10 Rainwater tank
11 Electric car charging point
12 Bedroom
13 Bathroom
14 Ensuite
15 Wardrobe
16 Cupboard
17 Loft Access
18 Terrace
19 MVHR ducts
20 Brise Soleil

Typical South Elevation



Typical West Elevation



Typical North Elevation

Typical East Elevation

To meet the precision demanded by the Passivhaus standard, and the timescales of the clients brief, a number of innovations were utilised. Carrowbreck was one of the first UK projects to use 300mm precision-engineered Porotherm blocks; a fast, virtually dry construction. With its rapid daily output (30-40m2/man/day), this brought cost and timesaving benefits, while its thermal and acoustic efficiencies will bring further advantages for decades to come with a design life of over 150 years. The system used around 95% less water than traditional blockwork. The blocks achieve an A+ BRE Green Guide rating, with 30% of materials from alternative, recycled or secondary sources and are recyclable at end-of-life. With only around 2% waste provision for the blocks.

The blocks were combined with a brand new external wall insulation to the UK market, 'Baumit Open', the only expanded polystyrene insulation system to be truly permeable, allowing the walls to breath. Paired with lime plasters and MVHR it ensures perfect indoor humidity. The Baumit Open and lime plasters are from the 'healthy living' product ranges successfully tested at the ECO Institute in Cologne in accordance with the strict guidelines of the Sentinel House Institute, making a real contribution to the quality of indoor air. The external render is microscopically smooth, creating a self-cleaning surface important on this wooded site.

The roof design called for innovation to stay on programme and budget, a site-constructed solution was developed for the roof using Metsa Wood products who use 100% traceable wood from sustainable northern forests. Low carbon materials were incorporated wherever possible, for example the roof insulation was recycled newspaper (warmcell) and with the exception of the porotherm blocks – selected for their thermal performance and other benefits – the majority of materials were sourced through local suppliers. Travel and traffic associated with the development was also reduced by utilising locally-based subcontractors (approximately 75%) wherever possible to do so.

"Having developed the initial vision for Carrowbreck Meadow, Hamson Barron Smith continued to provide dedication, expertise and technical support to the R G Carter construction team throughout the project. The collaborative efforts of the HBS team played an important part in ensuring the quality of the final scheme, in terms of design, resident wellbeing, and achieving the stringent requirements of Passivhaus certification."

Grant Keys, Regional Director at R G Carter.

This project is innovative in its design, achieving full Passivhaus certification on a scale rarely seen in the UK. The homes achieve a thermal bridge and draught free building envelope, exceeding building regulations requirements for airtightness up to ten times over. And will use ≤15kWh/(m^2a) of heating energy in comparison to Part 'L' Compliant homes at ~100kWh/(m^2a).

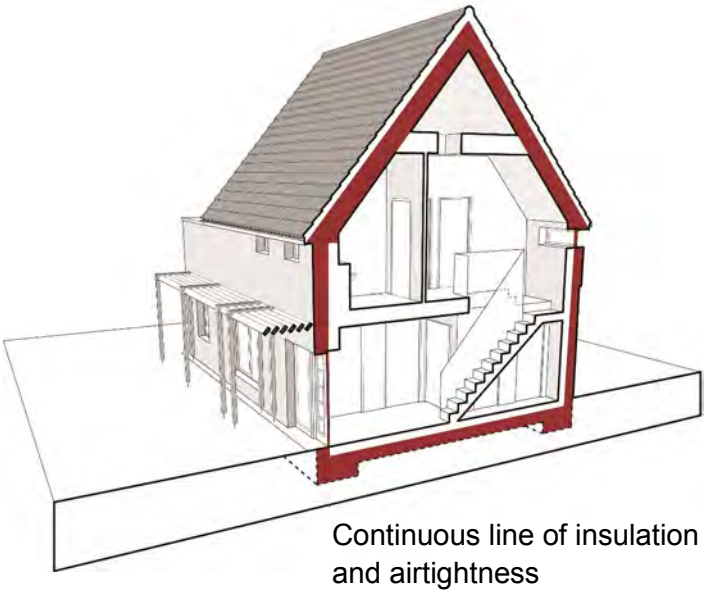
Fresh filtered air is provided to the homes, utilising a heat recovery system capable of achieving over 90% efficiencies, and an equivalent power requirement of 20p per day. All homes have electric car charging points, rainwater butts and connection points for PV. And are compliant with the recommendations of the National Housing Standards Review.

The development has been informed by the local community and has sought to involve the local community within the construction of the site through apprenticeship schemes and utilising staff from the joint partnership and resources from the Contractor and Town Council to provide a woodland path for the local community. Forming a green corridor between Norwich City and Drayton woods. An animal haven has been provided and a woodland management plan will be created involving local residents.

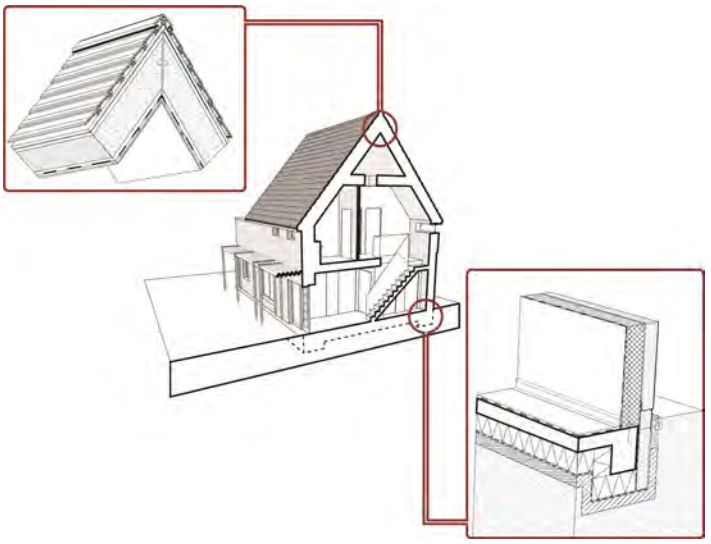
The development provides a new footpath to the nearest bus stop to improve accessibility to Norwich for this and future development sites. And is the first to be served by a waste management contractor in Broadland on a permeable shared surfaced access road, further supporting sustainable transport choices by prioritising pedestrians and cyclists.

Although no longer a regulatory requirement, the R G Carter project management team produced a Site Waste Management Plan for the project to reduce, reuse and recycle wherever possible.

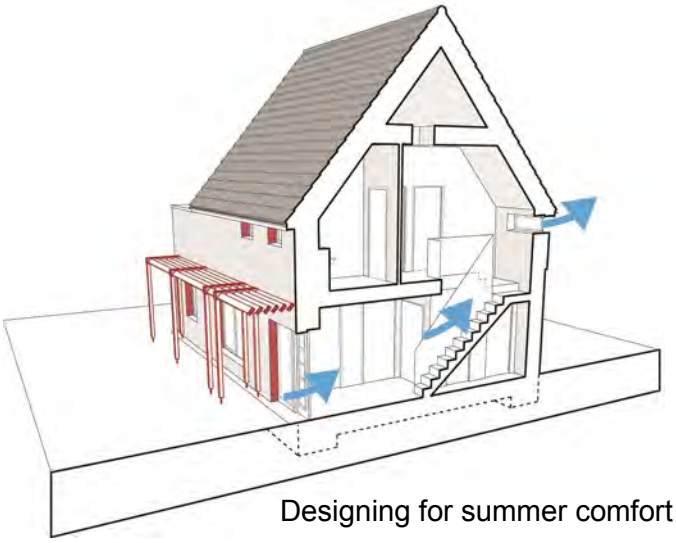
The construction supported economic activity, providing jobs in the construction industry and supply chain. The local contractor, R G Catrer, used a partner to deliver certified Passivhaus tradesperson training to their staff, with the entire project management team completing a 4-day Certified Passivhaus Tradesperson course. These skills and knowledge were employed directly on the project and provide a skill bank to allow the contractor to deliver more energy efficient homes in the future. In addition, 11 local apprentices were employed in a range of trades to further their education and in particular the skills required to build Passivhaus dwellings.



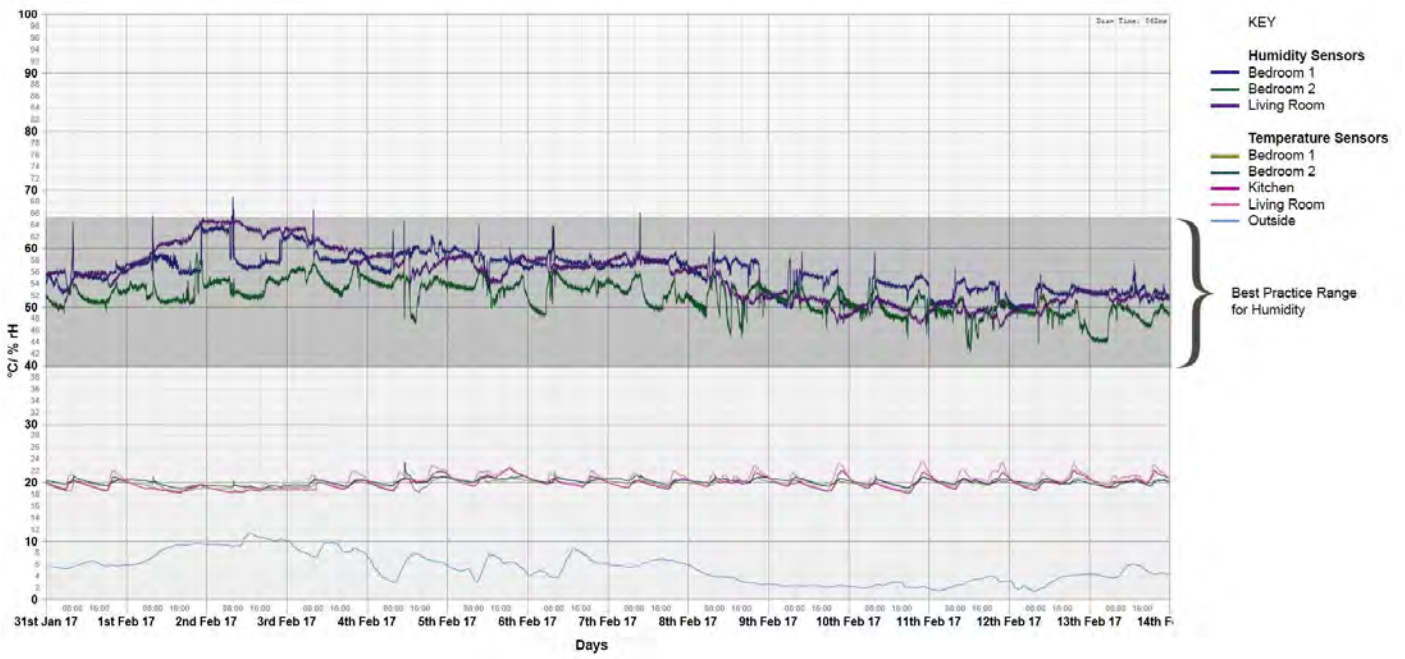
Continuous line of insulation and airtightness



Thermal Bridge Free



Designing for summer comfort



Temperature Humidity (rH) Graph

Typical heating season two week period (01/02/17-14/02/17)

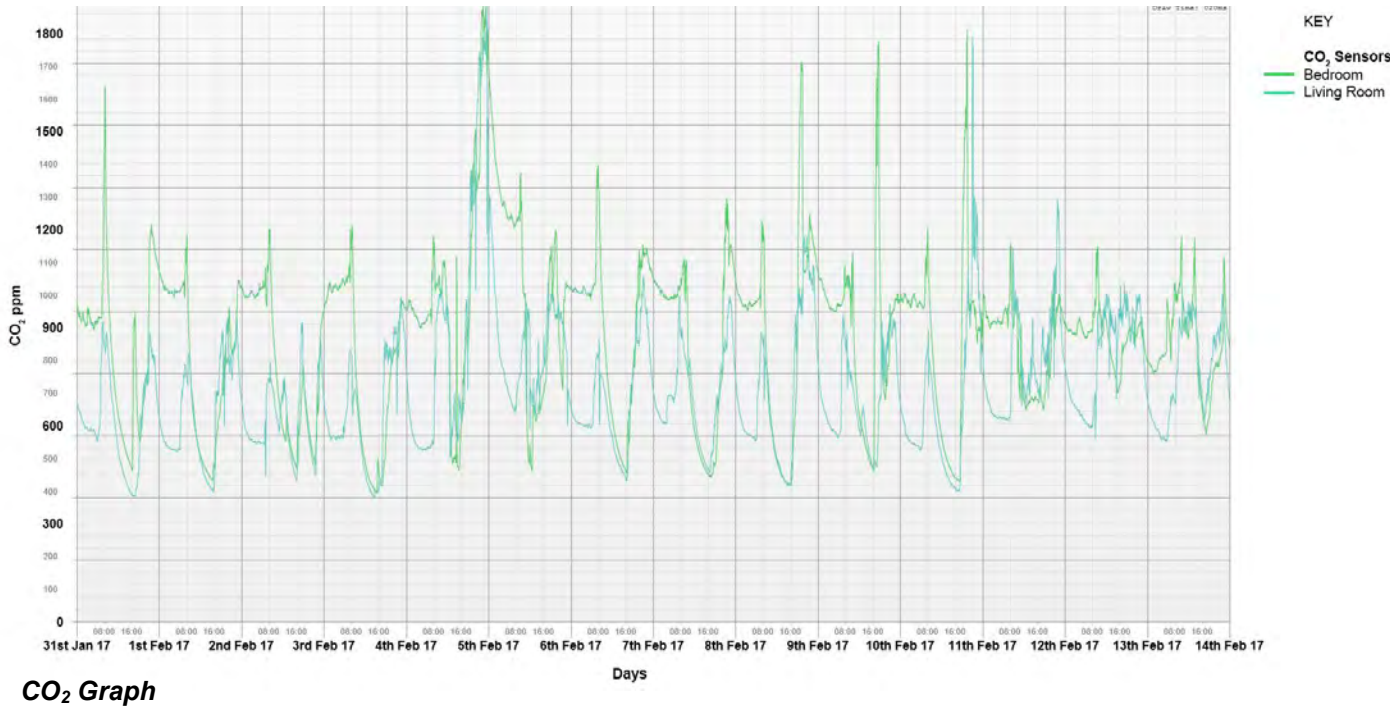
-outside temperatures range from 2-11°C, while internal temperatures maintain an almost constant 20 -21°C in the bedrooms, living room and kitchen

-humidity is generally within 45-56%, well within the best practice range of 40-65%.

The Passivhaus standard is based on good building physics and is internationally recognised as a leading low energy build standard, successfully implemented worldwide. By focusing on increased building fabric efficiency there is a reduced need for bolt-on enhancements, which so often under perform in the long term. Monitoring of Passivhaus buildings has shown that these perform extremely well, in many cases exceeding predictions.

Passivhaus Homes create comfortable healthy dwellings which are affordable to run, eliminating fuel poverty, and which future proof these homes for the demands of our changing climate. As a consequence, user satisfaction in these buildings is exceptionally high. HBS is providing Soft Landings, tracking the energy and comfort performance of these homes with an advanced web-based monitoring system, ensuring not only their optimum performance but the continual refinement and improvement of the buildings we deliver.

This project marks a step change in the delivery of Passivhaus homes in the UK, as the standard moves from one-off projects for private clients to increasingly larger developments. This has been made possible through the upskilling of design and construction professionals and by recognition from the construction industry and wider public of the added value these exceptionally healthy and efficient homes deliver.



CO_2 Graph

Typical heating season two week period (01/02/17-14/02/17)

$C0_2$ Graph from one of the homes showing the MVHR is maintaining a healthy indoor environment for the occupants when assessed against ASHRAE and CIBSE guidance. $C0_2$ levels rarely exceed 900ppm in the living room and average less than 700ppm. In the bedroom the $C0_2$ only peaks over 1200ppm for less than one hour per day and averages well below 1000ppm.

Testimonials:

Client

"Achieving environmental excellence in everything we do is one of our key ambitions and I'm proud of this development. The homes will meet exceptionally high standards of energy efficiency making them much cheaper to run than the average house as well as good for the environment.

"Selling some of them on a shared equity basis will also help local people looking to get on the housing ladder. We intend this to be the start of development that Broadland Growth will undertake to provide top quality housing in Broadland."

Chairman of Broadland Growth Limited and Broadland District Council Leader, Andrew Proctor

Planning Officer

"It's a successful example of how a collaborative approach can deliver innovative housing in an attractive woodland setting which brings about social, economic and environmental benefits for occupiers and the local community."

Matthew Rooke–Area Planning Manager and Officer dealing with application

Residents

"We chose Carrowbreck Meadow as it was set in a lovely woodland environment and built to Passivhaus standards. It's aesthetically pleasing, modern, and a very spacious family home."

New resident

"The air quality in the house is in general amazing… we all now have amazingly wonderful sleeps at night which we believe is due to the air quality. The consistent temperature of this house is perfect."

Shared equity purchaser

"We both absolutely love the house and the surrounding area set in the woodland. We're sure our daughter (now 11 weeks old already!) will love growing up here."

Shared equity purchaser

"Yesterday I received my first gas bill -for the period 4 October to 26 November, total charges are £14.88!… So far -very happy with the cost of heating."

New resident

Carrowbreck Meadow has delivered an important benchmark for future developments by demonstrating best practice in the design, layout and construction of affordable units within housing developments.

The proposal also demonstrates that in a period where affordable housing requirements are being challenged due to the introduction of the Community Infrastructure Levy and viability issues, the Council can deliver its own high quality housing developments which exceed affordable housing requirements and deliver sustainable buildings while still delivering profit.

The project has featured in:
RIBA Journal, February 2017
AJ Specification, March 2017
Building Magazine, March 2017
The Terrier, Spring 2017 edition
Passive House Plus, due out June 2017

And was presented at the International Passivhaus Conference in Vienna, 2017

The project won an RIBA Eastern Region Design Award in May 2017.


HBS