MIDDLETOWN HALL RETIREMENT VILLAGE –
THE WATERSIDE BUNGALOWS

DEVELOPER
Middleton Hall Development Ltd

ABOUT
Middleton Hall Retirement Village prides itself in being an innovative leader in services for older people. Winner of; LABC Best Development 2015, Best of Darlington Environmental Award 2014, and Finalist Pinders Healthcare Awards.

START DATE
March 2011

COMPLETION DATE
Phase 1 completed 2013
Phase 2 completed 2014

Profile supported by

OVERVIEW

Since our formation in 2008, the Zero Carbon Hub continues to work with Government and industry to identify risks, remove barriers to innovation and help demonstrate that energy efficient, healthy new homes can be delivered by the mainstream house building industry.

This series of building profiles gives examples of manufacturers, developers and clients who have embraced the challenge and are developing practical, commercially viable ways of delivering the next generation of homes in preparation for the nationwide introduction of Nearly Zero Energy Homes from 2020.

SUMMARY

The Waterside is thought to be the first zero carbon retirement development in the UK. Offering a range of 35 spacious, carbon-neutral, independent-living bungalows for over-55s, the new community sits within picturesque landscaped grounds of the award-winning Middleton Hall Retirement Village.

Dwellings are designed to the Fabric Energy Efficiency Standard (FEES) and to the Code for Sustainable Homes (CSH) Level 6. Bungalows are available in a range of Arts-and-Crafts inspired, low-maintenance designs.

SPECIAL FEATURES

Energy Saving Trust Enhanced Construction Detailing (2009) and MVHR (mechanically ventilated heat recovery systems) offers high levels of thermal insulation and air tightness benefits.

Primary heating: electric panel heaters using electricity generated by on-site PV arrays with surplus energy being fed back into the grid.
PROJECT STRATEGY

KEY DEVELOPMENT CHALLENGES

A key challenge within this development was to arrange the site within the existing field pattern while also creating a space that encouraged social interaction and community involvement.

Middleton Hall is also a Grade 2 listed building, this posed a significant challenge in creating an architectural style that keeps within the design specification required, but also allowed the implementation of contemporary designs and features that created a low energy development.

Challenges also occurred balancing privacy and security of residents on site.

DESIGN AND CONSTRUCTION/DELIVERY PROCESS

DESIGN & CONSTRUCTION

Design and construction within the development was driven by simple low maintenance solutions that would also meet requirements as set out by the Code for Sustainable Homes (CSH) Level 6 criteria.

Low maintenance solutions in this case included simple technologies with few moving parts that are easy to operate and require little maintenance from both residents and engineers (such as PV panels and independent low energy electric radiators that can easily be replaced).

DELIVERY PROCESS

To ensure that the development was constructed to the standards required, construction and site management was kept “in-house”, this ensured that the required level of skills and knowledge could be provided and the quality of the build process monitored throughout. Keeping management in house also allowed for the development of staff.

PRODUCTS AND SYSTEMS

FABRIC

- Enhanced construction details and high performance walls, roof and floor insulation.
- Argon-filled, triple-glazed windows ensure optimum thermal performance and at least 1.5-2% natural daylight to each habitable room.
- Cavity walling including 200mm full-fill cavity insulation and high performance concrete block inner leaf giving excellent insulation value and high compressive strength.
- Local material sourced in line with BRE ‘Green Guide’ wherever possible.

BUILDING SERVICES

- Primary heating is provided by electric panel heaters using electricity generated by on-site PV arrays with surplus energy feed back into the grid. Additional heating can be supplied in cooler months via log burning stoves; which are fuelled by wood harvested from on-site woodlands.
- Water is provided to dwellings via electric immersion heaters (solar thermal pre-heating in Phase 1) with a switching device to optimise PV output.
- Extensive external lighting including site circulation.
- Sustainable urban drainage system with landscape management and maintenance.

CONTROLS

- Energy display in each bungalow provides residents with energy consumption data allowing residents to monitor their use.
- Fully programmable electric heating and MVHR.
- In order to ensure smooth running of all services within homes a 24 hour care assistance is linked to Middleton Hall.
BUILDING PROFILE  MIDDLETON HALL RETIREMENT VILLAGE – THE WATERSIDE BUNGALOWS

PROJECT SOLUTIONS

Fabric Energy Efficiency

33.7 Kwh/m$^2$/yr (based on end terrace unit)

- **EXTERNAL WALL**: 0.13 w/m$^2$/K
- **PARTY WALL**: 0.00 w/m$^2$/K
- **COLD ROOF**: 0.11 w/m$^2$/K
- **WARM ROOF**: 0.11 w/m$^2$/K
- **GROUND FLOOR**: 0.1 w/m$^2$/K
- **WINDOWS**: 0.8 w/m$^2$/K (windows, rooflights and external door)
- **DORMER CHEEK**: 0.14 w/m$^2$/K
- **THERMAL BRIDGING Y VALUE**: 0.04 w/m$^2$/K (Enhanced Construction Details)

Carbon Emissions Predicted

-15.01 kg/CO$_2$/yr

**SPACE AND DOMESTIC HOT WATER (DHW)**

Primary space heating supplied by electric panel heaters powered by the circa 7 kWp installed PV array.

Secondary heating supplied by high-efficiency, renewable log-burning stove with back boiler and radiator for first floor. On-site woodlands fuel source.

4m$^2$ of solar hot water panels per property provide a top-up hot water supply to 250 litre storage cylinder. (Phase 1 only)

**AIRTIGHTNESS AND VENTILATION**

**AIRTIGHTNESS**

2 m$^3$/h/m$^2$(@50Pa)

Dwelling air permeability rating no more than 2 m$^3$/h/m$^2$(@50Pa).

Whole-house mechanical ventilation unit with heat recovery (MVHR) providing high heat exchange efficiency and a low running power (W/l/s).

**OVERHEATING STRATEGY**

Due to the potentially vulnerable nature of its occupants, Middleton Hall was designed with reduced solar and internal gains in mind. A focus was also placed on the thermal mass of building products used, as well as, the design, installation and commissioning of ventilation systems to ensure that residents would be comfortable in their homes during all seasons. Additional strategies such as ‘clip-on’ solar shading blinds were also made available to residents who reported discomfort in an effort to further reduce the effects of solar gains.
KEY LESSONS

DESIGN STAGE

Construction of a prototype gatehouse dwelling for staff purposes provided design and construction testing, enabling tweaking of construction detailing for buildability and a review of mechanical and electrical installations.

This process also allowed for the identification and development of required onsite skills and knowledge, helping to ensure that all future dwellings would perform as intended, providing residents with the level of comfort they expect.

CONSTRUCTION AND COMMISSIONING STAGE

While The Waterside was designed to meet Code for Sustainable Homes (CSH) Level 6, no formal assessment has taken place due to certain criteria being deemed inappropriate for a stand-alone retirement community. In place of a formal assessment procedure detailed SAP analysis has been used to demonstrate zero carbon achievement.