CONSTRUCTION

PROJECT TYPE: Residential
EXTERNAL FLOOR AREA: 84.6m² per house
NUMBER OF STOREYS: 2
ARCHITECT/DESIGNER: Jacob Wihan and Barbara Jones of Straw Works (previously of amazonails)
CLIENT: North Kesteven Council
CONTRACTOR: Taylor Pearson Construction with specialist subcontractor amazonails
PRODUCT CONSULTANT: Barbara Jones
CONSTRUCTION TYPE: Loadbearing straw bale
STANDARD: Code for Sustainable Homes Level 5
COST: £103,000 per house, excl. foundations and balcony
COMPLETION DATE: November 2009
SELF BUILD ELEMENT: N/A
SITE TRAINING: Straw bale building and lime plastering courses run by amazonails

North Kesteven Council Housing
Waddington, Lincolnshire
2009

This fabulous pair of semi-detached houses were designed in 2008 by Jakub Wihan and Barbara Jones of Straw Works (previously of amazonails) and built by amazonails in partnership with Taylor Pearson in 2009. They are the first of two pairs of council houses designed by the team, and need no framework, being made of loadbearing straw. As with all Straw Works’ designs, there is no cement in the build. The foundations are gravel trenches with a brick plinth wall laid with lime mortar, and foamglas blocks to the interior giving a U value of 0.17. Double glazed timber windows, FSC accredited timber throughout, and sheepswool insulation to the roof and ground floor, all add up to a house made entirely of natural materials, with no toxic off-gassing from modern products.

FABRIC PERFORMANCE

AIR TIGHTNESS: 2.62
WALLS U VALUE: 0.11
ROOF U VALUE: 0.17
SAP: 88

The NK houses have been fully tested for energy efficiency and were better on all counts than similar houses in the council’s stock that had been refurbished to a similar standard, see http://www.strawworks.co.uk/?s=energy+efficiency.

They achieved an airtightness of 2.62 air changes per hour without the need for any tapes or special measures other than Straw Works’ standard design details.

The vapour permeable wall and roof build up, together with Passive venting in the kitchen and bathroom, allows the buildings to ventilate. Moisture levels are controlled by the natural hygroscopic plasters without any need for trickle vents or mechanical ventilation systems.
LEARNING

PARTY WALL ACOUSTIC TEST
This design has a loadbearing straw party wall, and the acoustic test showed that although all the accompanying details for the floor, wall plate and roof connections were excellent, the plastered strawbale wall on its own failed in the lower registers. This led to a re-think and the addition of a 50mm stud wall in front of one side of the party wall, filled with sheepswool insulation and covered with plasterboard and skim enabled it to pass.

CONSTRUCTION METHOD
The method used to protect the building from the weather during the construction phase – placing the first floor and wall plate on top of scaffolding, then doing the same with the roof – is not recommended as it is an expensive solution. More recent methods are to build the floor and roof first on temporary posts and beams and then lower them after the straw is installed.

ATTITUDE: It was imperative that all team members had a positive ‘can do’ attitude towards the project and that the contractor chosen to carry out the work was fully on board with the job, as anxieties about the method can cause the building to fail or suffer long delays. In particular the site manager was able to understand and appreciate the way this type of construction differs from modern mainstream construction and was adaptable and open to new ways of working.

MATERIALS

These houses are made almost exclusively from natural materials. These include: straw, timber, lime, hemp fibre, sheepswool, wood fibre board, clay tiles and bricks. 85% of materials used are low in embodied energy.

Materials were chosen for thermal efficiency, to promote healthy indoor air quality and for their sustainability credentials as well as their accessibility to novice builders.

Plasters and renders were mixed on-site. Amazonails ran courses and applied the first coat of external lime. A sub contractor with experience of applying lime onto straw walls completed the exterior lime render. Taylor Pearson carried out the interior lime plaster. Time constraints meant rendering was applied outside the ‘safe’ period and repairs were needed to the resultant frost damage.

MONITORING

Moisture, temperature and relative humidity sensors are embedded in the walls of one of the houses. These are recording data concerning the moisture content of the walls ready for analysis.

Post occupancy research needs to be carried out to establish the true insulation value of the wall build up, as it is not accurately represented in computer modelling at present.

Excerpts from an interview with strawbale council house tenant Sharon, August 2014.
Full interview at: https://www.youtube.com/watch?v=q44_2zo4KUM

It was three years ago that we moved in and it’s been the best thing that’s happened to me in those three years. It’s such a lovely house; it’s warm; the heating costs are much lower ...

I’m actually in credit with the water because of the rainwater harvesting ...

It’s made us very eco-friendly, which we weren’t before!

The atmosphere is much better ... the light that comes in through those big windows makes you feel like you’re on holiday every morning ...

Straw Works Ltd: www.strawworks.co.uk
barbara@strawworks.co.uk
www.facebook.com/StrawWorksUK

North Kesteven Council Housing
Waddington, Lincolnshire
2009

Crop Based Products within Buildings ; Case Study :