

# RICHMOND HILL PRIMARY, LEEDS - PASSIVHAUS SCHOOL



Operation and  
Maintenance

## A CASE STUDY



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Designed by Space Group and built by Interserve Construction, part of the international support services and construction Interserve group, the innovative sustainable construction of the school means it is designed to use up to 80 per cent less energy than conventionally designed and built equivalent facilities, reducing carbon emissions by 60 per cent, and all this crucially without the use of renewable energy.

The project won the Innovation Award at the Yorkshire & Humber Construction and Best Practice Awards 2012.

## **PROJECT DETAILS**

Client: Leeds City Council

Main contractor: Interserve Construction Ltd  
(leeds.office@interserve.com)

Designer: Space Group  
(newcastle@spacegroup.co.uk)

Other: Billingham George & Partners – Civil and Structural; Hoare Lea – Building Services

Project timescales: July 2011 to September 2012

Contract value: £8.7m

The high levels of air tightness and use of robust sustainable materials to achieve Passivhaus standards means the school is one of the most energy efficient in the UK, benefiting from lower energy costs and greater energy security in the future.

## **The school - technical and environmental solutions**

- Extensive design and construction planning, detailing and quality control were required to meet the demanding technical standards of Passivhaus:

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- The building was designed to make the best use of natural light to reduce energy demand. Energy savings are obtained via daylight linking of the classroom lighting, which automatically adjusts the brightness of lights closest to the windows. Lighting throughout the building is provided with passive infrared sensor detection. The external lighting is automatically controlled by photocells and time clock arrangements.
  - Significant research and product selection ensured that the electronic equipment used throughout the school was low emission and did not compromise the Passivhaus primary energy target.
  - In addition to dual flush toilets and sensor control taps, the water supply to the toilet areas is controlled from presence detectors so that water only flows when someone is in the room. The main water supply to the school is provided with audible alarm major leak detection systems.
  - Robust materials were selected to ensure longevity and all timber is from sustainable sources.
  - The unique insulation foundation solution to achieve Passivhaus standards at Richmond Hill was achieved using high strength FOAMGLAS® insulation, which consists of over 60% recycled glass, which itself is recyclable.
  - Structural insulated panels (SIPs) were chosen for Richmond Hill's walls and roof to achieve high thermal insulation. As a result, an impressive U value of 0.1W/m<sup>2</sup>k was achieved.
  - Triple glazed timber windows, certified by the Passivhaus Institute, were selected for use in the building. The windows facilitate extremely high standards of thermal insulation, whilst helping keep air leakage to a minimum. The windows have a U value of 1.0W/m<sup>2</sup>k.

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## Expected sustainability benefits

- Specific heat demand of less than 15kWh/m<sup>2</sup>/year, equivalent to just 2.8kg/CO<sub>2</sub>/m<sup>2</sup>/yr. Primary energy demand less than 120kWh/m<sup>2</sup>/year.
- Richmond Hill has an exceptionally low air tightness level of 0.25 ACH, less than half the level required to achieve Passivhaus certification.
- A building user manual has been produced and handed to the school's building operators. This acts as a user friendly reference guide on energy-efficient features and strategies in the building and how these can provide economic and environmental savings. Simpler M&E installations, i.e. no air-conditioning, mean easier operation and reduced maintenance costs.
- Annual energy bills up to 80% lower than traditionally constructed schools.
- Carbon emissions reduced by 60% without the use of renewable energy.
- All primary energy used within the school is monitored and logged by the building management system. Water and energy meters record usage by specific areas or system. This will enable the Richmond Hill Primary School to determine where the energy is being used and aid in developing future energy reduction strategies.
- The innovative design combines open spaces with natural lighting, creating various pleasant working environments. Constant fresh air is provided gently and is well-tempered by a ventilation system with heat recovery. As a result, unhealthy CO<sub>2</sub> peaks do not occur.

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## **Saving carbon through the construction process**

- Interserve placed 79% of orders within a 50 mile radius of the site, beating their KPI target of 50%. 56% of subcontractors travelled fewer than 20 miles to reach the site.
- Site water and power use were metered and recorded on a monthly basis, with targets set to reduce consumption.
- A site waste management plan was implemented, with 95% of construction waste diverted away from landfill.
- Off-site manufacturing of the SIPs and windows reduced waste and energy emissions.

## **Legacy**

- Interserve has also built Swillington Primary School to Passivhaus standards. These two projects have provided a legacy of a Passivhaus trained supply chain and also shown the benefits to Leeds City Council as a client.