



Redhill Primary School

location:
Worcester

An exemplar of sustainable design for a primary school, promoting the principle of 'living within environmental limits'. Designed by Worcestershire County Council Property Services.

The new building for this Worcester school replaces a 1960s building that was in very poor condition and had first floor rooms that were inaccessible to people with disabilities. The new build was funded using resources from the county council that had been allocated by central government to improve its schools.

The school moved into temporary accommodation on the site while construction was taking place. The school was originally one and a half-form entry, but this has reduced to one-form entry with a nursery. An extra classroom has been provided to accommodate the additional children on roll until the total reduces to the new size. It will then become a multi-purpose studio.



The building was designed by Worcestershire County Council's property services department. Construction started in January 2006 and the school transferred into the new building in April 2007.

Worcester County Council has a strong sustainability policy, and promotes the principle of 'living within environmental limits'. Red Hill Primary School supported this policy and became an exemplar of sustainable design for a primary school.

Introduction

The school site is wedge shaped and bounded on the north and east by a busy main road and a railway line. Tall, mature trees grow along most of the site boundary, making this an attractive site. Pedestrian access is from the main road to the north west of the site and vehicle access is from a small estate road in the south west corner. Although the site has a lot of character and creates a superb setting for the building, the amount of developable land is quite limited. The building has therefore been placed on the lowest, central part of the site.

The building is single storey, and in the shape of a banana with one central corridor. The main entrance leads into the corridor at one end of the curve facing north and the seven classrooms and nursery are grouped in pairs along the south side of the corridor. All the other accommodation is arranged along the north side of the curve facing north. The cross

section of the building is similar along the length of the building, although there is a small internal courtyard close to the entrance.

The hall and other non-classroom areas are housed in a tall block with a shallow curved roof, and the corridor and classrooms have a lean-to roof against this taller block. Clerestory lighting along the corridor provides generous daylighting. The classrooms are arranged in pairs with a group room in between them. There is a flexible shared space adjacent to the classroom entrances. Toilets, cloakrooms, some storage and further meeting/ mentoring rooms are also located along this strip adjacent to the corridor.

The larger spaces are all grouped together so that they can be separated for use by the community outside school hours. There is a separate entrance into the building for this community use.

Design process

The design project started with visits by the headteacher and a small group of stakeholders to a number of local schools. From these visits the school composed a wish list including a central street, outdoor spaces for each of the classrooms, a separate entrance for foundation-stage classes and adequate storage.



The county council was keen that the building should contribute to the sustainability agenda for Worcestershire. The architect put considerable effort into testing the design throughout its development stages using the UK Climate Impacts Programme (UKCIP) adaptation wizard. This made it possible to assess the impacts of climate change on the proposals, the design and construction phases and through the design life of the building.

The building had to be located on the lowest part of the site even though this area is potentially prone to flooding. This risk has been addressed by creating a sustainable urban drainage scheme (SUDS), using swales, ponds and underground box storage. The SUDS is used as an educational tool to support environmental studies and other curriculum subjects. This was designed by the landscape consultant, who has particular expertise in this area. A rainwater harvesting scheme storing up to 20,000 litres of water beneath the playground is used for flushing toilets. An overflow from this discharges water into a channel adjacent to the playground so that pupils can see when the tank is full. A sedum roof is also used to reduce run-off. Large overhangs on the roof and canopies protect level thresholds (required for disabled access) from heavy rain.

The risk of mould growth during predicted milder and more humid winters has also been considered. There are no cold spots ('thermal bridges') in the building fabric, ensuring continuity of insulation. All vulnerable areas are well ventilated, particularly wet areas like toilets and showers. Proprietary extract vents are powered by small photovoltaic panels. The building is heated using ground source heating feeding an underfloor system. A total of 33 boreholes were drilled to a depth of 100 metres and water is pumped through them to obtain a small temperature increase. Heat pumps, run on electricity purchased on a green tariff, then raise the temperature to the level where it can feed the underfloor heating system and provide domestic hot water. Cooling in the ICT suite is provided by running the

ground source heat pumps in reverse. Overall, the school reduces carbon dioxide emissions by 20 tonnes each year compared with using fossil fuels.

The main framing material for the school is steel. This helps form the curved geometry of the building and provides some future flexibility, as internal walls are non-loadbearing. Internal and external walls are mainly timber framed, which was chosen as a renewable resource with low embodied energy content. This was used in conjunction with high levels of insulation, using materials of high recycled content. For robustness and for added thermal mass, both sides of every internal wall have a double layer of plasterboard. The zinc roof is fully ventilated beneath the timber boarded substrate which supports the zinc, allowing warm air to circulate naturally in summer, reducing heat transfer into the building.

The specification for the building was reviewed by the Waste and Resources Action Programme (WRAP) as a pilot scheme, and this enabled the architect to identify any materials that could either be recycled or have a recycled content.

An artist worked with the pupils during the design stage, creating work that reflected sustainability and environmental issues. This has been incorporated into stained glass panels that are set into the windows facing the internal courtyard. External art work is also prevalent in the form of sculptural pieces found in the growing garden and the internal courtyard. The school grounds have been developed and have a variety of external spaces for pupil play and educational activities. Along with the SUDS, swales and ponds area there is a terraced growing garden which is actively attended by the pupils.

Evaluation

The aims of this project were clearly stated at the outset, a prerequisite for achieving a well-designed building. The architect led on the environmental agenda, and sought to create a building that was sustainable in both construction and operation and would adapt well to future climate change.

The building responds positively to its context and makes good use of the existing mature landscape. The access has been well organised, and the car parking does not overly dominate the setting. The orientation works well and the use of the SUDS drainage scheme as an educational feature is innovative and commendable.

The internal planning of the building is good. The use of a central corridor produces an efficient plan. It is an attractive space with good daylighting from north-facing rooflights and is enhanced by the small internal courtyard. The classrooms are attractive and provide an excellent learning environment. A sloping ceiling up to rooflights at the front offers even daylighting, creates a generous volume and provides through ventilation. The school has a number of additional teaching spaces and small rooms that can accommodate new approaches to teaching and learning. There is good storage and adequate provision for coats and bags that are sensibly located.



Sustainability in construction has been approached intelligently. The review of the specification to optimise recycling and minimise waste is laudable as well as cost effective and should be standard practice on all projects. The review of the design against predicted climate changes is also innovative and highly commendable.

One of the most interesting aspects of the project is the way the process of design was organised. Unlike many other recent schools projects, adequate time for design was provided in the programme. This allowed a well thought-out brief to be produced and a good dialogue to take place between the school and the design team, including a number of other design disciplines such as the landscape architect and artists. The design has clearly been through several iterations, including one following the review of the design against the sustainability and climate change checklists. This has clearly led to the achievement of a well-resolved scheme, which was procured through a straightforward, traditional route.

Key design features to look out for

- Sustainable design for a primary school.
- Flexible shared space adjacent to the classroom entrances.
- Larger spaces are all grouped together so that they can be separated for use by the community outside school hours.
- The building responds positively to its context and makes good use of the existing mature landscape.
- Successful distribution of indoor spaces.

Link and downloads

- School's website: <http://www.redhillprimary.org/>

Contact for further information

Project name

Red Hill C of E Primary School

Address

Midhurst Close, Worcester WR5 2HY

Architect and structural engineer

Worcestershire County Council Property Services

Services engineer

Shire Consulting

Landscape architect

Robert Bray Associates Ltd

Acoustic engineer

BDP Acoustics

Quantity surveyor

Bridgewater and Carlton

Client

Worcestershire County Council Children's Services

Consultants/contractor involved

Frank Galliers Ltd of Shrewsbury

Project type

New-build replacement school

No of pupil places (FTE)

210 plus 26-place nursery

Procurement type

Traditional – JCT IFC98 contract

Construction period

January 2006 – April 2007