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# OVERVIEW GREEN SPECIFICATION

In August 2010, Overview looked at general green specification principles and the available resources and suggested that these should be more integrated. As a sequel, this month we will focus on the use of NBS for green specification and ways of integrating it with BIM

## NBS and green specification

If you're reading this you'll probably know quite a lot about National Building Specification (NBS). Over 5,000 British offices subscribe to its products, including 96 AJ100 practices. You will probably also be aware that NBS, which is part of RIBA Enterprises, and in particular its NBS Building system, have a role in green specification. 'Green issues have been included within NBS for many years, says Stephen Hamil, director of design and innovation at RIBA Enterprises. 'Green specifying should not be considered special or different from conventional specifying', says Hamil. 'It should be integrated, and this is the approach NBS takes.' Hamil is absolutely correct, but it's worth listing what NBS currently provides to help architects ensure that their specifications are environmentally intelligent.

1. General guidance to work sections, under two headings, 'Environmental issues' and 'Health, safety and the environment'. For example, the general guidance for the section on F42 Straw Bale Walling Systems, includes topics such as framed and unframed types, durability and thermal performance, along with a full introduction.



Ryder Architecture  
Revit model of  
Manchester Central  
Library redevelopment

2. Clause guidance deals with particular product attributes with cross-references to general guidance where appropriate. NBS avoids green versions of clauses, for example Clause 270 includes 'recycled content' alongside other product properties, and there is guidance on the Waste Recycling Action Programme.
3. NBS is integrated with the RIBA Product Selector, enabling specifiers to search for products. For instance, search for green roof specialists and the results show a range of companies, products, case studies, and CPD material.
4. If a product is chosen it can be specified using NBS Plus, a library of manufacturers' product specifications with clauses that synchronise with only those manufacturers relevant to the clause. For example, the green roof clause in NBS has a selection of green roof manufacturers in NBS Plus to choose from. Manufacturers' product clauses can then be edited to suit project requirements.
5. Because NBS is not intended as a substitute for more in-depth research, it includes cross-referencing of relevant standards, reports and other literature

from around 400 publishers, many of which cover green topics. This is integrated with The Construction Information Service, providing digital access to many of these documents.

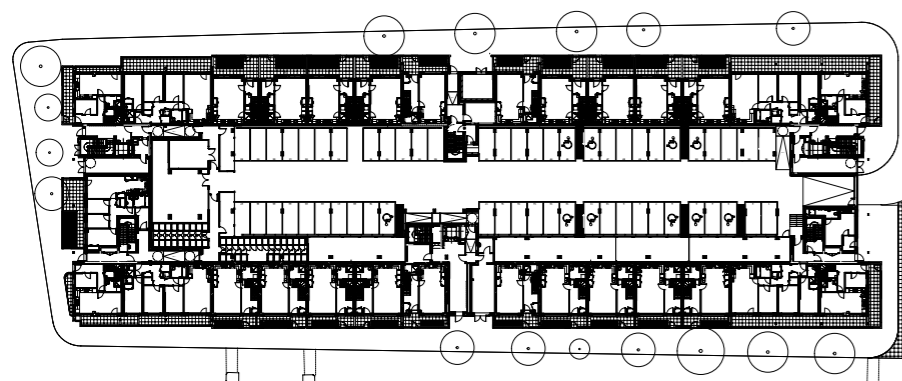
6. Although NBS focuses on traditional contract specification, it is also useful as a general source of information on green topics including BREEAM, recycled content, building technologies such as ground source heat pumps, solar heating systems and green roofs.

## Integration of NBS with BIM

'The future for NBS lies in its ability to integrate with geometric information models to provide a complete Building Information Model (BIM)', says Hamil. 'It is key that master specification systems raise their game and invest in improving their data and software so that the full benefits of BIM can be achieved.' These master specification systems and CAD systems need to inter-operate.

This is something that has already begun to happen. 'We've worked with those guys for many years', says Jay Baht, senior vice-president of Autodesk AEC Solutions. It is now possible to link NBS with Bentley Architecture, Autodesk Revit, Graphisoft ArchiCAD and Nemetschek >>

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Vectorworks. 'Graphisoft have been first off the ranks to integrate the annotations tool within their ArchiCAD software', says NBS head of specification Ian Chapman, 'But the others are all working on it.' Within NBS Building, it's possible to export your project specification to Autodesk Revit keynote format. This improves the way you coordinate the project info in the Revit BIM with the specification. But currently bi-directional editing is only possible with ArchiCAD.

There are obvious advantages of improved collaboration and change control procedures, along with automated scheduling and take-offs. 'We have sites using one copy of NBS, with 10 or more copies of the NBS link,' says Applecore Designs' managing director Scott Berry. 'The ArchiCAD BIM workstation only requires the NBS tools in addition to the link – not the full software itself – to pull over the clauses.'

But there are also disadvantages. Currently NBS specification products only run on Windows operating systems or with Apple Boot Camp. 'The tool as it stands exports every clause heading whether it is likely to be used or not', says Studio Klaschka director Robert Klaschka. 'This results in a huge list of possible notes to select from, of which you perhaps really need just one or two per cent. We often find it quicker to build our own list by cutting and pasting from the unfiltered list, because with the current version people go out of their minds scrolling down lists and lists of irrelevant clauses.' Thankfully the tool does not export every clause in the NBS library.

Hamil is convinced that integrating specification systems and CAD software is

the future. 'What is the alternative? That all of this information goes into the CAD objects and that each practice maintains their own libraries?' says Hamil. 'Over 200 key reference documents change each month. Who will research and maintain these CAD libraries to ensure best practice?' There are also developments afoot to radically change the way specifications are prepared, allowing information to be added to a single model at briefing stage. This can then be developed at outline, performance, compliance, full and record-specification stage. They will describe in detail the same objects that are visually represented in the CAD model. So within the CAD model you will be able to see how many windows you have, where they are located and what they look like. In the specification model the information behind the window will be recorded- what regulations and standards it must comply with, what workmanship and execution tasks are required, what manufactured products make up the window and, finally, what regular maintenance is required. In parallel, Bentley's soon to be released AECO Sim is intended for use throughout the project lifecycle of design, construction and operations.

#### Green specification and BIM

CAD and, in particular, BIM are already useful aids to green design. 'Although the BIM model used to design John Robertson Architects' Parmiter Street east London residential development for Family Mosaic was not integrated with NBS. It was used by our M&E consultant Max Fordham for environmental modelling', says project director Kamel Achrafie. It was also used for cost control,

The BIM model for John Robertson Architects' Parmiter Street development was used as a green design tool but was not integrated with NBS

quantities and clash detection and the model was assembled from an in-house 'warehouse' of components tagged with environmental profiles.

It would be difficult to compete with the NBS empire. Nevertheless, other organisations, such as Greenspec are operating in related areas. 'We're currently working on a TSB grant bid to develop a plug-in which will attach actual quantified life cycle assessment (LCA) data to Revit library blocks to provide what we hope will be the nearest thing to a whole building LCA', says Greenspec director Sandy Patience. 'Our main interest in BIM isn't so much specification but LCA.'

Hamil emphasises the potential for green BIM-integrated specification. 'A client will be able to put budget costs against the major elements of the building and set targets that the design team must work to, such as capital cost, embodied carbon, waste management and life cycle running costs. This information will go into the BIM prior to the CAD software even being opened.'

The specification information model that NBS is developing will cover all system and product properties. The target is for NBS to contain a complete set of system outline clauses. These will guide specifiers through the decisions necessary to create project specifications and will eventually be used to indicate financial, waste and CO<sub>2</sub> costs. As the following case studies indicate, it's still early days for BIM-integrated specification, not to mention green BIM-integrated specification, but following chief construction adviser Paul Morrell's suggestion that BIM should be mandatory for public sector projects valued over £5m (AJ 17.05.11), there is every indication that the 'T' in BIM is being taken seriously.

## CASE STUDY 1 WILLIAM LEECH SCHOOL, LYNEMOUTH, RYDER ARCHITECTURE

### GREEN SPECIFICATION

Ryder Architecture has been a user of NBS since the 1970s. Since adopting Revit for technical design in 2006, we have linked our specification clauses to objects within the BIM model. This is a simple cross referencing method that doesn't directly import data from the spec into the model. Nevertheless it has created efficiency savings in change management during the design process. We have also improved productivity when measuring the carbon footprint of our designs by adding parameters to BIM objects which report the object's BRE Green Guide rating. Quantities of materials are extracted from the model and both sets of data are entered into the BRE Green Guide Calculator Tool. This speeds up the options process and securing credits against the BREEAM Materials Credit MAT 1.

Currently links between NBS clauses and Revit objects are only dynamic in the sense that a change to a clause reference will be replicated in each instance of the object in the model when entered manually. I know this is an area NBS are seeking to improve. This interface works better in ArchiCAD at present using a tool NBS developed. Regarding the BRE Green Guide ratings, The Green Guide calculator web tool is only accessible to registered BREEAM assessors and entering data from the model is manual. Perhaps this is a functionality BRE should seek to improve.

Peter Barker, architectural director,  
Ryder Architecture



Northumberland Church of England Academy is a new educational establishment amalgamating ten existing schools within Ashington and Wansbeck to form a single academy split across five sites. Ryder Architecture were commissioned to design three schemes across the main campuses at Hirst, Lynemouth and Newbiggin-by-the-Sea. The William Leech campus, a new build primary school for 150 pupils aged three to 11, is being built on the site of Lynemouth First School.

A BIM responsibility matrix was completed prior to starting the project so that all parties understood their responsibilities, technology to be used, interoperability standards and output requirements. 3D architectural and structural models supported integrated design practices, giving stakeholders a collective understanding of the design intent. Collaborative working and weekly review meetings enhanced communication between team members and enabled problems to be solved efficiently. A BREEAM pre-assessment was conducted to ensure the building design conformed to best practice and industry standards for environmental performance.

The constraints of the programme required rapid procurement of the steelwork design. This was achieved through an

Ryder Architecture's William Leech School used combined Revit architectural and structural models



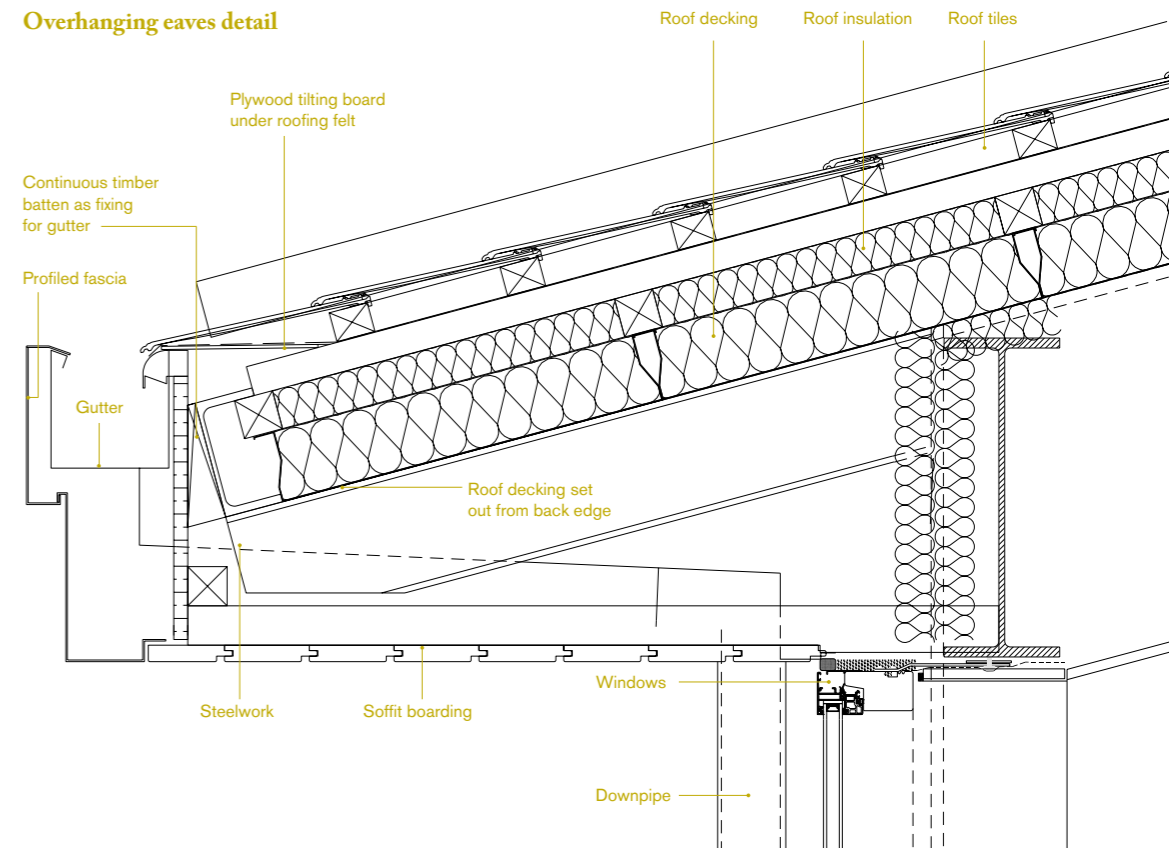
integrated approach in collaboration with the structural engineer, using combined Revit structural and architectural models.

Other benefits included reducing waste through spatial coordination practices, time-saving automated quantity take-offs, and consistent and accurate information with a high level of detail.

#### Project data

**Client** Northumberland Church of England Academy  
**Architect and Design Team Leader** Ryder Architecture  
**Civil and structural engineer, MEP, BREEAM, fire, and acoustics consultant** Aecom  
**Procurement** Academy Framework  
**Area** 1,486 m<sup>2</sup>  
**Contract Value** £3.4 million  
**Completion** July 2011  
**Main contractor** Kier North East  
**BREEAM Rating** Excellent

## CASE STUDY 2 CASTLE SCHOOL, NEWBURY, NIGHTINGALE ASSOCIATES



### GREEN SPECIFICATION

NBS Specification references were included on the drawings and other documents, for ease of cross referencing. Within the individual specification clauses for particular elements and materials, we included additional important information for green specification and sustainability, such as green guide ratings that needed to be achieved to ensure that even if materials were substituted they would still meet our stringent green and sustainability requirements.

Green Guide A and A+ rated materials and finishes were specified throughout as far as possible. These include Polyflor vinyl flooring, InterfaceFLOR carpet tiles, Marshalls concrete paving and Celotex Insulation. Materials, including concrete and Ibstock bricks, were locally sourced where practical.

Lindsay Webb, project architect,  
Nightingale Associates

**Above** Nightingale Architects' Castle School has Green Guide grade A+ rated Marshall's concrete paving and locally sourced Ibstock brick

**Right** Clerestory glazing provides passive solar gain in winter  
**Far right** Classrooms and specialist accommodation are arranged in two wings

#### Project data

**Start on site** July 2010

**Contract duration** 35 weeks

**GIA** 681m<sup>2</sup>

**Procurement** Two stage design and build

**Total cost** £1.8 million

**Client** West Berkshire Council

**M&E consultant** Hoare Lea

**Main contractor** Kier

**Estimated annual CO<sub>2</sub> emissions** 18.82kg/m<sup>2</sup>

**Airtightness at 50 Pa** 6.99 m<sup>3</sup>/h.m<sup>2</sup>

**On site energy generation**

50 per cent of peak hot water load

**Estimated annual mains water consumption**

7m<sup>3</sup>/occupant/year



This post-16 facility for young people with special educational needs is designed to meet the requirements of up to 30 students with various learning difficulties, including autistic spectrum disorders.

Its orientation and siting are designed to maximise the spatial quality of the teaching spaces through natural daylight, optimum views and protection from noise sources. It is arranged in a horseshoe configuration around a landscaped garden. A light and airy central common room has direct access to this garden, providing opportunities for outdoor study and recreation. Administration and staff support areas are near the main entrance for enhanced security and passive supervision. The kitchen, plant and other services are located along the northern elevation adjacent to the car park, and classrooms and specialist teaching spaces are arranged in two wings.

Materials used within the school compliment its natural setting as well as the adjacent buildings. Hard materials form an 'acoustic edge' to the car park and softer materials such as timber connect

the building with the garden and landscape beyond. Flexibility is provided by a range of room sizes and acoustic movable partitions between classrooms.

The school was designed to achieve a BREEAM Excellent rating by using materials with low embodied energy and natural ventilation. Clerestory glazing provides passive solar gain in winter and external louvres prevent overheating in summer.



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## CASE STUDY 3 OPEN ACADEMY, NORWICH, SHEPPARD ROBSON ARCHITECTS

### GREEN SPECIFICATION

We used the NBS Building tool to assess the specification of Open Academy's laminated softwood structure and other building elements. It enabled us to quickly access manufacturers' data and assess their green credentials. Its use of BREEAM clauses, although still at an early stage, allowed parameters to be built into the specification from the outset.

By combining standard NBS clauses with our office Masterspec we were able to produce a sustainably robust specification. For example, in section M60 we limited VOC content from the outset in order to meet BREEAM requirements. Given the central role of timber, we included strict clauses on timber sourcing, certification and processing, helping to boost the project on its way to its targeted BREEAM Excellent rating.

With regard to integration of the NBS Building specification and CAD systems, our familiarity with the system helped us to allocate specification clause references at quite an early stage. This allowed the architectural project team to integrate these references into their drawing as the specification progressed, enabling the detailed drawings and specification to be produced in tandem. These grew alongside each other and played a part in each other's development. We hope to exploit this benefit further by integrating specifications with BIM.

.....  
Gavan Knox, specification writer,  
Sheppard Robson



Sheppard Robson's  
Open Academy social  
and learning space

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**Below** Sheppard Robson's Open Academy social and learning space with cross-laminated

timber panels supported by canted glulam arches **Right** Window, door and services openings are pre-cut



The 950-pupil, Open Academy in Norwich is currently the largest cross-laminated timber panel building in Britain. The Academy wanted a vibrant, attractive and stimulating learning environment that would complement its 'open' community. The three-storey main drum houses classrooms that are built around a central, multi-functional social and learning space. A gently curving roof encloses the central torus, formed from cross-laminated timber panels that are supported by 12 canted glulam arches.

The oval plan works in three concentric bands. The outer band houses the main



teaching accommodation, with the greatest potential for natural daylight and ventilation. The second provides the ancillary spaces such as storerooms and offices and the innermost band acts as the primary circulation, stacked as open balconies around the central forum.

Modern methods of construction elements include pre-cut window, door and services openings. The panels were erected by 10 people in 18 weeks and the four-court sports hall was built and weathertight in four days. The reduced programme on site allowed quicker access to follow-on trades, which saved time and money.

**Project data**

**Employer** Kier Eastern  
**Client** Norfolk County Council  
**Architect** Sheppard Robson  
**Structural Engineer** Ramboll  
**Area** 9,000m<sup>2</sup>  
**Cost** £20 million  
**Completion** September 2010

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