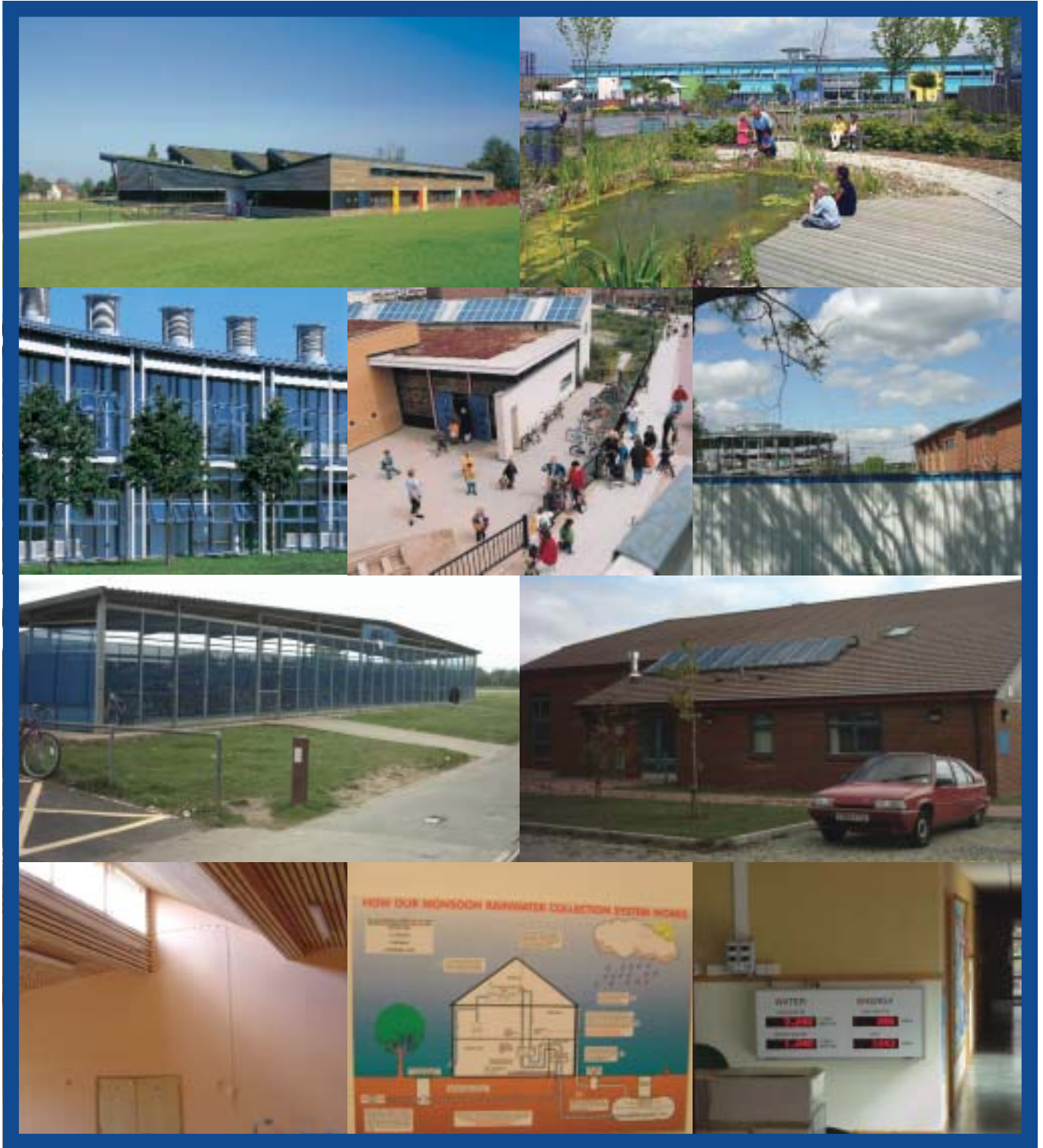


BREEAM Schools



Introduction

The buildings that we live and work in account for approximately 50% of the UK's total emissions of carbon dioxide, the primary greenhouse gas. Construction generates 72 million tonnes of waste per year, 17% of all waste. Globally the industry is responsible for 40% of the total flow of raw materials such as sand and gravel, clay and iron ore and takes one quarter of all timber use and 16% of water withdrawals.

Global warming and the resultant climatic changes could result in a wide range of impacts on our buildings and the ways we use them. Global average atmospheric temperatures have increased by 0.5 degrees over the last 20 years (Hadley Centre, UK) with the 1990s being the warmest of the 20th century. Future climate change scenarios for the UK have predicted milder, wetter winters with more storms and warmer, drier summers. This would lead to greater pressures on our buildings through subsidence, wind damage and flooding. As a result Government has set stringent targets for reductions in carbon dioxide emissions in an attempt to limit these increases in risk.

There is much that can be done to reduce the impacts of our buildings, both new and existing on the environment. With projected changes to our society, household numbers are set to increase dramatically with an additional 3.8 million new households by 2021. This will result in pressures on land, transport and amenities including the provision of education. Government has instigated a massive construction programme in schools over the next 10 to 15 years to bring our secondary school building stock up to modern standards and this presents a golden opportunity to address these issues.

The Building Research Establishment Environmental Assessment Method (BREEAM) was originally launched in 1990. It sought to

provide authoritative guidance on ways of measuring and minimising the adverse effects of buildings on the global and local environments while promoting a healthy and comfortable indoor environment. It was a world first and has since formed the basis for similar schemes in other countries. In the UK it has become widely accepted as representing best practice, with significant market penetration and was recognised as such by the recent report of the Sustainable Buildings Task Group published in June 2004. It is central to government policy and targets on improvements in construction.

This document outlines the results of work carried out by BRE to adapt BREEAM for use in the schools sector. This work was supported and funded by the Department. At present the scheme is in the final stages of development prior to becoming operational in January 2005. It will be updated on a regular basis in line with other versions of BREEAM to take advantage of new research, to reflect changing priorities in regulations, design and construction best practice. The aim is to ensure that BREEAM continues to represent current best practice, going beyond what is required by regulations. For this reason details of the technical content of the scheme are not included in this document but will be made available free of charge via the Department and BRE websites. The scheme will form the basis of an independent and credible certification scheme against which the Department will set targets for new and refurbished school projects. This scheme replaces the Schools Environmental Assessment Method – SEAM – published by the Department as a self-assessment tool in 1995. This has now been withdrawn by the Department for use in new build and refurbishment school building designs although it is still of interest for the management of existing schools.

SEAM will, however, be superseded by the new Framework for Sustainable Development in Schools (see later).

The BREEAM Schools scheme

The basis of the scheme is a certificate awarded to school new build and refurbishment building projects on the basis of 'credits' for a set of performance criteria. The certificate provides a 'label' for the building that enables the school's management and LEA, designers and constructions, to gain recognition for the buildings' environmental performance. It allows claims on environmental performance to be verified. It also provides recognition of the role that the school buildings play in the overall environmental impacts of the school. The certificate can be displayed in the building or used as part of an organisation's overall environmental statement. The building is assessed independently by trained assessors approved by BRE. BRE is responsible for specifying the criteria and methods of assessment and for quality assurance of the assessment process used.

The main objectives of the scheme are:

- to distinguish buildings of reduced environmental impact in the market place,
- to provide a flexible but robust way of setting standards and auditing performance,
- to encourage best environmental practice in building design, operation, management and maintenance,
- to set criteria and standards going beyond those required by law and regulations,
- to raise the awareness of owners, occupants, designers and operators of the benefits of buildings with a reduced impact on the environment.

BREEAM Schools was conceived as a tool to allow schools and their advisors to set robust, achievable and cost-effective environmental targets for the new buildings and refurbishment projects. In a climate where construction is growing rapidly in the education sector it is

important that lessons learnt are disseminated and applied in an appropriate and practical form.

In addition the Government has committed itself to evaluating all new build and refurbishment procurement using BREEAM and the recent report of the Sustainable Buildings Task Group identified BREEAM as the basis for the proposed new Code for Sustainable Buildings.

BREEAM Schools was commissioned from BRE by the Department to enable standards to be set without prescribing specific design solutions to clients and design teams. It was guided by a sector advisory group comprising designers, LA representatives, NGOs and Department experts and policy staff.

BREEAM Schools assesses school buildings against a diverse range of environmental issues covering the impacts of buildings on the environment at global, regional, local and indoor levels. For each issue there are 'credits' available where specific levels of performance or process are achieved. For example, there are up to 10 credits available depending on the level of emissions of carbon dioxide (CO₂) relating to operational energy consumption in space/water heating, ventilation and lighting systems. Overall, more than 100 credits are available covering a wide range of environmental impacts many of which impact on each other. BREEAM provides a simple means of balancing these against each other as decisions are being made. The philosophy of BREEAM is to reward positive steps taken to improve the environmental performance of buildings, a feature much valued by clients. The levels of performance required to achieve credits is generally above the regulatory minimum. No credits are mandatory although compliance with statutory requirements under Part L of the Buildings Regulations is necessary before a BREEAM rating can be awarded.

The number of credits attained are translated into a single score using a consensus-based weighting system described below. This score is

then interpreted in the form of an overall rating of Excellent, Very Good, Good and Pass. All of these levels represent levels of performance in excess of the statutory minimum standards required under Building Regulations and Department mandatory guidelines. In line with other versions of BREEAM, it is envisaged that this method will be reviewed on an annual basis to ensure that it keeps fully up to date.

BREEAM provides a formal assessment process as an external audit. It has great value in this respect but there is a need to make sure that decisions taken in the design of new buildings and refurbishment schemes fully address the issues at an appropriate stage. Failure to achieve this can result in high cost solutions being proposed.

The Framework for Sustainable Development in Schools

The Department will be launching a new web-based framework for sustainable schools in November 2004. There are potential curriculum benefits that arise from a robust understanding of a school's environmental impacts and its buildings form a very significant proportion of these. The framework will take this forward into the management of existing schools. At present the BRE Schools Toolkit provides a simple means of evaluating a school's environmental performance. It is available from the BRE (see contact details on the rear of this document).

Benefits of more environmentally-friendly buildings

In addition to meeting government targets on environmental improvements, the setting of higher environmental targets for school buildings leads to a number of benefits for the school and those involved in the procurement process.

Several studies have been undertaken to identify the benefits of more sustainable buildings. Whilst these benefits are difficult to quantify, those relating to schools can be summarised as follows:

- Reducing energy and water bills through greater efficiency and controllability.
- Reducing maintenance and replacement costs through higher levels of durability and simplification of systems.
- Creating a better place for staff and pupils to work and learn more productively.
- Improving staff satisfaction and so reducing the incidence of staff sickness and the need for expensive temporary staff cover.
- Increasing student numbers, attendance levels and, therefore, school income as a result of a more attractive and productive school environment.
- Providing a simple flexible and widely understood method for the specification of higher environmental performance in the procurement of buildings.
- Providing an independently verifiable environmental label for construction/design auditing purposes.
- Benchmarking performance across a portfolio of school buildings on a single site, region or nationally.
- Ensuring that best practice is adopted wherever possible to guide improvements.
- Supporting a wider strategy for environmental improvement.
- Providing a learning resource through the demonstration of higher environmental standards to pupils, staff and the broader community.

There are also benefits for others involved in the procurement process including funders,

designers and constructors. These range from financial savings, increased knowledge and skills, business development and process efficiency and are outlined in a series of BRE information papers (BRE IP 13/03 parts 1–4).

The method is fully compatible with the requirements of an environmental Management System and so can form a part of a 'corporate' strategy on the environment at school or education authority level. Whilst the method concentrates on issues relating to environmental sustainability these can be set alongside social and economic issues when decisions are being made as part of a wider sustainable development agenda.

Scope of the Assessment

There are a wide range of environmental impacts which arise from the construction and operation of school buildings. These relate to the following areas:

Climate Change

Global warming is increased by the operation and construction of buildings and the transport of people and resources to and from the buildings which is affected by their location. The design of a building's fabric and systems has a significant effect on the emissions of greenhouse gases such as carbon dioxide. Therefore the Government has set targets for reducing energy consumption and increasing the use of renewable resources of energy. These are increasingly being applied through Building Regulations and the planning system.

Ozone Depletion

Materials and buildings services can result in emissions of gases that harm the earth's fragile ozone layer. This layer acts as a filter, blocking harmful UV radiation from reaching the earth's surface and damage can result in the longer term. There are now a number of international agreements and controls aimed at phasing out the use of particularly harmful substances such

as Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) but these have yet to take full effect.

Resource Use

Construction uses approximately 6 tonnes of building materials for each and every UK citizen. This is, by any measure, a large amount of materials and much of this comes from finite resources. The exploitation of these resources causes major impacts on the global environment and can affect climate and biodiversity on a world-wide basis. Many steps can be taken in the design of buildings, the specification of materials and components, and the management of the construction process to reduce material use/wastage.

Waste

The UK generates 72 million tonnes of construction waste each year. This accounts for 29% of the total national waste burden. In addition schools generate a considerable amount of rubbish which must be disposed of including paper, office consumables, catering waste, metals and plastics. Much could be recycled. The UK is running out of land fill sites. This means that new methods of waste disposal are required which are often unpopular, cost more and cause other environmental problems. Careful planning of school buildings, the detailed design and specification of the building elements, and the careful management of the construction process and operation of the building in use can reduce this waste burden dramatically.

Land Use

12% of the UK will be developed by 2016 with much higher densities in highly populated areas such as the South East, Eastern England and the Midlands. Increasing pressures mean that densities are likely to increase over much of the UK.

The UK has a large bank of derelict and brownfield land which could be redeveloped to

decrease pressure on the countryside but such development tends to be at a premium as the land often needs some reclamation work. The Government has set targets for 60% of redevelopment to be on brownfield land.

Water Use

Water consumption in the UK has increased by over 70% over the last 30 years. Demand in the densely populated southern parts of England are now close to the potential extractable rainfall creating frequent shortages and with more development, consumption is likely to rise further. Plans are afoot for the UK's first desalination plant in response to this demand growth. Use of more efficient appliances and fittings, rainwater and grey-water and black-water systems can reduce consumption considerably as can careful monitoring of consumption through the provision of meters and leak-detection systems.

Impacts on Human Health

Buildings have a significant impact on the wellbeing of their occupants. On average we spend 90% of our lives inside them. These impacts include major health-related issues such as the release of bacteriological agents such as legionellosis via ventilation, cooling and water systems and the emissions of particulates and other hazardous substances. In addition, the creation of a satisfactory internal environment encompassing high levels of performance in terms of daylighting, artificial lighting, thermal comfort, ventilation, the acoustic environment and occupant controllability have a major effect on occupant satisfaction, health and productivity. There is much guidance available on addressing these issues in the design of new buildings and refurbishments.

Biodiversity

The UK's flora and fauna are under ever-increasing pressure from development, pollution and disturbance. Many of our historically

'common' species are under threat. With the development of our countryside and the more intensive farming of that which remains, our urban environment has an increasing part to play in maintaining and evolving the biodiversity of our country. Careful site selection, ecological protection and enhancement measures can be achieved through sensitive development. Education is an important aspect of raising awareness and so protecting ecosystems at school plays an important part in this, both for their pupils and staff and also for the wider community. Many schools seek to provide a good learning environment by providing wildlife gardens and ponds but more could be achieved by addressing the site as a whole.

BREEAM Schools seeks to address the principal impacts of school buildings in all of these areas by drawing together best practice. It does this by establishing a set of issue categories under which specific credit requirements are grouped as follows:

Management

Overall policy, procedural and documentation issues relating to ongoing efficient operation of the buildings and maintenance of high levels of performance across all of the issues covered by BREEAM.

Health and Wellbeing

Indoor and external environmental issue relating to the health and wellbeing of the building's occupants and other users.

Energy

Emissions of CO₂ resulting from operational energy consumption and sourcing.

Transport

Provision of facilities for cyclists, safe pedestrian routes and locational issues such as public transport provision.

Water

Consumption and leakage of potable water and related issues.

Materials

Environmental implications of materials selection.

Site Ecology

Ecological value of the site including the changes resulting from development.

Pollution

Air, water and land pollution issues (excluding CO₂).

Within each category there are a number of discrete credit requirements that reflect the options available to building designers and managers. The number of credits in each category does not reflect the relative importance of these issues.

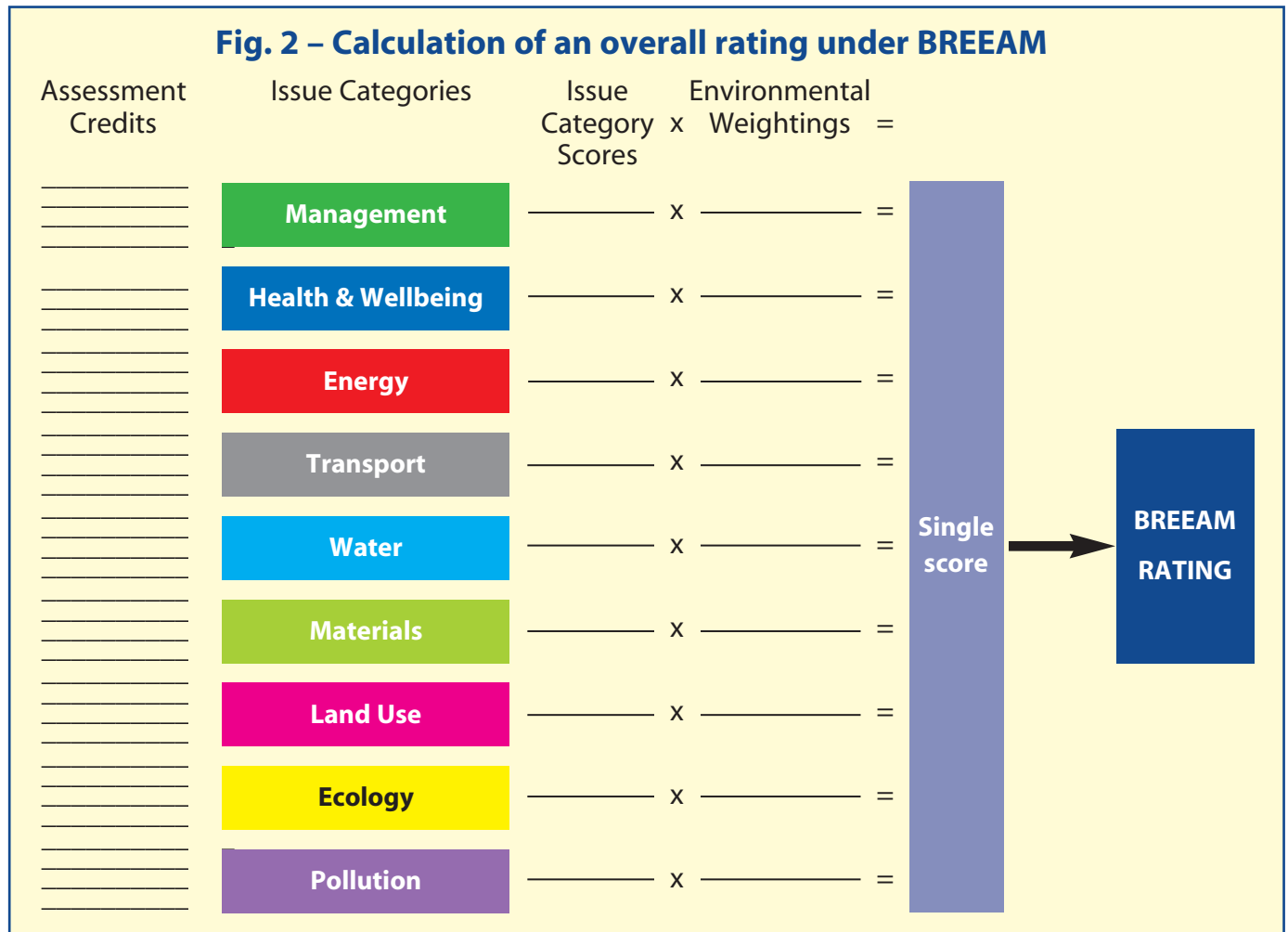
The BREEAM Rating & scoring

BREEAM includes a consensus-based weighting of all the issues covered which is used to reflect

their relative importance and arrive at a single score relating to the overall environmental impacts of the building.

By applying weightings in this way, BRE is able to make sure that these fully reflect current knowledge and consensus. It is also possible to amend specific actions in the form of credit requirements without affecting the overall importance of an issue to the overall score.

The assessment manual and calculation tool allow a score to be calculated. They will be made available for downloading from both the Department and BRE websites free of charge. Whilst this allows clients and designers to make initial estimates of the environmental impacts of their proposals such predictions are unlikely to be accurate and a fully qualified assessor should be brought into the process early on to ensure that targets are achieved in a cost-effective and timely fashion.



Assessment Process

The BREEAM Schools method has been developed to provide flexibility to fit in with the range of construction procurement routes used in the education sector. The most appropriate form of assessment service will vary depending on the nature of the building being assessed.

Assessment services will be available from established BREEAM assessors as with other schemes. In addition it is envisaged that LEA assessors will be able to offer BREEAM Schools assessment services as a part of their support services for school development projects. BRE will train and license all assessors and will operate the scheme under its current stringent

quality management regimes to ensure credible and consistent assessments. Only BRE issue certificates under the scheme to ensure that these procedures are followed and that assessments comply with the quality standards. The following table sets out the range of assessment services that licensed assessors offer.

Formal assessment can only occur towards the end of the detailed design stage. However, it is important that the issues covered by BREEAM are considered well in advance of this. Involving an assessor at an early stage in the development of a design can ensure that the environmental performance and therefore the BREEAM rating is optimised.

SERVICE	DESIGN STAGE	FOR DOE SERVICE
Design Consultancy	All stages	The assessor can be included in an appropriate way into the design team to guide the design process.
Outline design stage guidance meeting	Outline design RIBA stage A–C	<ul style="list-style-type: none"> ● The assessor will hold a meeting with the Client/Design Team to outline issues for consideration at this stage.
Detailed design stage guidance meeting	Detailed design (early) RIBA stage D	<ul style="list-style-type: none"> ● The assessor will hold a meeting with the Client/Design Team to outline issues for consideration at this stage. ● Additional meetings can be organised at the request of the design team/client as required
Formal design stage assessment review	Detailed design (late) RIBA stage D–E	<ul style="list-style-type: none"> ● The assessor will review information provided by Client/Design Team and produce a provisional and final assessment rating.
Final design stage certification	Detailed design (late) RIBA stage D–E	<ul style="list-style-type: none"> ● Formal certification by BRE will follow directly.
Post Construction Review	Post construction RIBA stage H	<ul style="list-style-type: none"> ● Specification issues will be revisited to ascertain changes that have occurred during the construction stage. Checks will be based on information supplied by the Contractor and Design Team.
Post Construction Review certification	Post construction RIBA stage H or later	<ul style="list-style-type: none"> ● Formal certification by BRE will follow directly. ● This certificate replaces any design stage certificate issued.

Note: Shaded services form mandatory stages of the formal certification process; other services are optional and would be provided on a consultancy basis.