

Children's Services

Sustainable Design Brief

For the Schools' Estate

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Version Control

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1. Purpose of the Brief

In 2010 the School Organisation & Capital Planning team produced a 'The Schools Sustainable Design Brief' to ensure that the issue of sustainability is central to and addressed within all major capital projects in the schools' estate; both new build and major refurbishment.

This document has now been reviewed and refreshed to provide a clearer brief on what should be aspired to in order to ensure that high quality sustainability is achieved in design of school buildings.

Case Study – Greenleas Lower School, new site at Kestrel Way

From inception stage a more sustainable design was sought to be delivered within the projects budget. Firstly increased insulation within the floor, walls and roof space – taking a 'fabric first' approach to deliver a more thermally efficient school building and therefore much lower gas use, heating costs and carbon footprint.

The second was to create more natural daylight and natural ventilation in to all of the School's rooms, therefore minimising use of electricity for daytime lighting and cooling. This was achieved through controlled high and low level windows, raked ceilings to from cross ventilation, sensor controlled lighting and roof lights to central spaces where surrounded by inner walls.

This also now takes into account a number of changes to national and local policy, development of technologies (particularly in cost to deploy) and a better understanding of what a major school new build or refurbishment project needs to be able to deliver to ensure the issues raised in this brief are properly and appropriately addressed.

In addition to this, the Council's emerging Development Strategy places a requirement on all non residential buildings over 1000m² to aspire to be built to BREEAM Excellent or an equivalent standard. This brief recognizes that this might not always be financially or logistically possible.

The brief therefore seeks to incorporate and promote the best of the ideals (and more) seen in a BREEAM excellent building to ensure new school buildings and refurbishments are carried out to an equivalent standard that embeds the core principles of sustainability and delivers schools that are efficient, vibrant and truly sustainable buildings.

Finally the brief now includes a sustainability checklist to ensure and better demonstrate how these issues have been considered and provide greater transparency with regards to why various design decisions are made.

This has been designed to highlight what issues should be considered at each stage of a project (from feasibility, design, construction to post occupancy), providing far greater clarity as to how the key sustainability issues are being addressed.

It is strongly recommended that this checklist is adopted as part of pre-application and application discussions to ensure that proposed design is both sustainable and acceptable in planning terms.

2. Background Information

The Council's Climate Change Strategy and Carbon Management Plan (CMP) acknowledges the importance of taking action now in order to reduce carbon dioxide (CO₂) emissions and to ensure that Central Bedfordshire is well equipped to cope with inevitable climate change in years to come.

This goes hand in hand with mitigating the impact of increasing energy costs as well as ensuring that the Council (and schools in Central Bedfordshire) are well placed to benefit from the wide ranging benefits of operating from more energy efficient and sustainable buildings.

The CMP states the business case for taking action in terms of carbon reduction, specifically explaining the huge financial risk, and therefore avoidable future costs associated with taking a 'business as usual' approach.

Currently emissions from schools make up 52% of CBC's carbon footprint. This makes it clear that the schools' estate must be engaged with and contribute to developing and implementing the Council's Climate Change Strategy.

From 2016 the government will introduce Energy Market Reform (EMR) to fund investment in energy generation and transmission infrastructure. It is anticipated that this could see an increase in electricity bills by 20% from 2016, rising to 50% from 2020 onwards.

To tackle these issues and lessen impact as far as practicable the School Organisation and Capital Planning Team has undertaken two on-going projects:

1. On-going energy efficiency and sustainability advice for schools
2. Sustainable design brief for major extensions and new school buildings.

Both of these projects are complimentary and the key principles and objectives are shared.

For example the benefits of better energy monitoring to deliver reduced energy use through proactive and reactive management is as equally relevant in existing school buildings as it is in new build. This is particularly important to ensure these buildings are operated as they are designed to be and perform as expected.

3. On-going energy efficiency and sustainability advice for schools.

To ensure all schools are fully involved in embracing energy efficiency the Schools' Carbon Reduction Action Plan (SCRAP) has been developed providing support and resources for the whole schools' estate. This is being delivered by a dedicated School's Energy Officer, funded through a top slice of the Dedicated Schools Grant by Schools Forum.

The SCRAP, along with details of the range of services provided is available at: <http://www.centralbedfordshire.gov.uk/learning/schools/eco-schools/schools-carbon-reduction.aspx>

Progress so far

Good progress has been made by the Council in working with schools to become more energy efficient. CO2 emissions from the schools estate have reduced by 5,300 tonnes (28%) since the program began. The most proactive schools are seeing significant cost savings, in some cases as much as £8,000 per year, just through better monitoring and management of energy use. 2013/14 has seen the most significant improvement so far, reducing emissions by nearly 12% on the previous year and cutting combined energy costs across the school's estate by £250,000.

How the SCRAP Program is Being Delivered

Phase 2 of the SCRAP program was launched in May 2013. This saw the introduction of a more formalised engagement structure with schools and has had a good success rate with many new schools signing up to become involved.

Participating schools now have an energy audit and one-to-one support specific to that school from the Schools Energy Officer. An action plan is drawn up with the school with achievable goals for reducing energy use. Emphasis is placed on the school owning the action plan, with responsibilities for completing the actions resting primarily with the school. A follow-up mechanism allows for actions to be reviewed and next steps identified on a regular basis. This aims to ensure momentum is maintained.

The Council has invested significantly in smart meters. Currently over half of the sites in the schools estate now have these installed and are starting to benefit from the higher level of control over energy use that they facilitate. Smart meters allow schools to monitor progress and identify saving opportunities. A program of training, workshops and ongoing support for best practice use of the technology is being delivered alongside.

Some schools have started to take advantage of wider services provided by the Council through the Schools Energy Officer. These include student workshops, teaching tools and resources, alongside Eco-School accreditation that compliments the work being carried out through the energy audit and action plan process.

On 20th May 2014 the Council ran its second Carbon Reduction conference for schools. Over 80 delegates and 50 schools represented. The event was a

great success and was an opportunity for schools to discuss opportunities with each other and get updates on the next phase of SCRAP.

Invest-to-Save Funding

The Invest-to-Save scheme is currently in its third year. The scheme works by CBC providing finance to schools for energy efficiency measures up front. Schools pay CBC back over an agreed timescale as a result of the savings on their energy bill. In 2014 the scope of the scheme was broadened to include Solar PV.

Case Study – Caddington Village School

Caddington Village School have made significant savings on both their gas and electricity bills due to a host of complimentary actions. This has created a saving of nearly 8 tonnes of CO₂ over the autumn and winter months 2013-14, which translates as a cost saving of £9,000.

The school has achieved much of this reduction in energy consumption by adjusting opening times and ensuring the heating is on much stricter timing controls through use of their AMR technology. By regularly checking the data and fine tuning procedures as a result, the school has made significant savings.

They have also installed energy efficient T5 and LED lighting to newly refurbished areas as well as installing movement sensors to the lights, thermostatic controls to radiators and making their own "Hippos" to reduce water consumption.

The pupils have got involved as well and the school recently achieved Green Flag status against the national Eco School award scheme.

This is a great example of a school utilising support from the CBC energy team to drive investment, behaviour change and pupil involvement to see a real financial and ecological benefit through energy efficiency.

4. Sustainable design brief for major extensions and new school buildings.

Underlying principles

It is vital that new build, extension and refurbishment projects are fit for purpose in terms of today's requirements without either precluding future development or adversely affecting the environment.

Given the long lifespan of the buildings they also need to be designed with future sustainability implications at the forefront, particularly in relation to the impacts of the changing climate and continued increase in energy and other utility costs. To achieve this the following areas need to be carefully considered and incorporated into the scheme:

1. Contract Management

- Effective commissioning of the project and use of competent contractors/specialists to deliver it.
- Consultation with CBC sustainability and planning officers, local residents, staff, pupils and parents.
- Construction site impacts kept to a minimum and demonstrated through contractors management of environmental Key Performance Indicators (KPI's) such as energy consumption during construction works, traffic movements, measurements of waste recycled and to landfill
- Site kept safe and secure during construction and operation.
- Construction work completed to the highest standards.
- Contractor to provide seasonal commissioning of a building and its building management systems.
- Contractor to provide training for school and CBC in building management systems.

2. Waste

- Construction waste kept to a minimum and what is produced recycled as far as possible and demonstrated through KPI's.
- The use of recycled aggregates and other materials to promote closed loop approach to waste and materials.
- Sufficient facilities to encourage waste disposal in line with the waste hierarchy (Reduce, reuse, recycle).
- Consideration to decommissioning of the building or part of it through refurbishment, and whether the components can be reused or recycled.

3. Health and Wellbeing

- Maximise use of daylight.
- Building orientation and fabric sufficient to ensure occupants are thermally comfortable.
- Acoustics are correct for teaching and measures are in place to minimise noise impact on neighbours.
- Indoor air and water quality.
- Lighting is at an appropriate level, in an appropriate location and has appropriate controls.

- Naturally ventilated building where possible.

4. Energy

- Design Effective energy monitoring and metering.
- Specify energy efficient building systems for heating, lighting etc.
- Focus on reducing CO₂ emissions and achieve EPC rating A.
- For extensions facilitating improvements across the remainder of the school site e.g. align boiler controls or building management systems.
- Building fabric and insulation to high level
- Appropriate use of low or zero carbon technologies.
- Appropriate use of Heat Recovery systems. Mechanical Venting with Heat Recovery (MVHR) can be very effective in partnership with highly insulated buildings.
- Early and more detailed energy modelling to more accurately predict energy consumption, consider end users and unregulated power consumption. The building should respond to the users needs.

5. Land Use and Ecology

- Site selection and best use of the site.
- Protection of ecological features.
- Mitigation/enhancement of ecological value, particularly as an educational resource.
- Low landscape and visual impact.

6. Sustainable Transport

- Public transport network connectivity.
- Pedestrian and Cyclist facilities, electric vehicle charging points
- Accessibility and connectivity to the highway and local amenities.
- Travel plans
- Travel information.

7. Materials

- Use of sustainable and recycled materials.
- Low embodied life cycle impact of materials.
- Responsible sourcing and use of materials from accredited sources e.g. Timber from FSC scheme certified forests.
- Materials used are appropriate, robust and durable and if need be are easily maintained and/or replaced in the future at a low cost to the school.

8. Water

- Efficient use of water across the site.
- Proactive water use monitoring in place.
- Water re-use and recycling (grey water use) as far as feasible.

9. Innovation

- Exemplary performance levels.
- Embraces new technologies and building processes.
- More than just an 'off the shelf' solution.

BREEAM

BREEAM is a rating and certification system used to independently assess the sustainability performance of a building project in the areas of; health, energy, transport, water, materials, waste, land-use, ecology and pollution. More details can be found at: <http://www.breeam.org/>

BREEAM assessments are made against a set criteria and ultimately provide an overall score which will fall within a band providing either a 'pass', 'good', 'very good', 'excellent' or 'outstanding' rating.

The Building Schools for the Future capital programme (BFS) (abolished in 2010) specified Secondary schools procured through BFS were required to achieve a BREEAM (or equivalent) 'Very Good' rating for all major new build projects valued at over £2 million and all refurbishment projects valued at over £2 million and affecting more than 10% of the floor area of the school.

In 2008, the consultants Faithful & Gould¹ undertook research with the BRE Trust to establish the costs of complying with BREEAM in schools. The research was used to help set the then DCFS (Department for Children, Schools and Families) – now Department for Education (DFE), funding models for programmes such as the Building Schools for the Future. This research concluded that:

- Location has an impact on the score. Schools built on brownfield sites and near good transport links had the advantage of getting several 'free' points under BREEAM. Rural schools and ones built on Greenfield sites had to work harder to get the same score and therefore usually cost more.
- The size of project had an impact on additional costs. Primary schools are usually smaller projects than secondary schools with less capital expenditure and therefore do not benefit from the same economies of scale.

Therefore:

- Depending on the location, a new build primary school might cost between 1.8–3.0% extra if complying with BREEAM 'Very Good' and 5.9–9.85% for 'Excellent'.
- Depending on the location, a new build secondary school might cost between 0.8–2.7% for 'Very Good' and 3.9–4.4% for 'Excellent'.

In 2012 Faithful & Gould noted that, since this research was undertaken, there have been updates to the Building Regulations and the BREEAM standard itself has been updated.

Whilst the principles of BREEAM are still much the same, the minimum standards prescribed by Building Regulations have increased. This,

¹ <http://www.fgould.com/uk-europe/projects/the-cost-of-breeam-compliance-in-schools/>

alongside industry being better geared up to comply with BREEAM and the on-going reduction in costs of green technologies², means that the costs of achieving 'very good' and 'excellent' BREEAM ratings are likely to have come down since this study was conducted and be at the lower end.

However, there will still be some additional up-front costs, which at a time of increasing financial constraint for the public sector may not be able to be accommodated in the financial funding allocated for school refurbishments and new build.

An alternative approach

Whilst the School's Sustainable Design Brief doesn't rule out formal BREEAM certification, it does recognise that it is likely to be the preferred option to integrate sustainability into school refurbishment and new build projects.

The Council's alternative approach therefore attempts to provide an equivalent alternative. This is based closely around the requirements of BREEAM in order to provide a comparable equivalent that should deliver similar sustainable outcomes and complies with emerging planning policy. This is based on the following rationale:

- Whilst not perfect, BREEAM has done much to improve the sustainable performance of school projects and the industry has moved on in recent years to be better at integrating these requirements as matter of course.
- Given the key role BREEAM played in the BSF programme, the majority of new school design guidance picks up on many of the sustainability issues from BREEAM and deliver very efficient schools.
- Many of the modular building schemes for schools are designed to meet BREEAM 'very good' already.
- There may be limitations as to what can be delivered through a project due to timescales for delivery, site restrictions or other factors. A more flexible approach allows key sustainability aspects to be properly considered and integrated without resource being spent disproportionately.

It is vital that all aspects of a project relating to sustainability are:

- Based on site specific information.
- Consulted with all parties.
- Owned by the Design Team and end user.
- In this way, a more tailored approach to sustainability needs to be incorporated into every project, whereby genuine carbon savings can be made at lower costs.

² For example the cost of Solar PV panels has fallen by over 60% between 2010 and 2014.

5. Addressing sustainability requirements

To ensure that the ten sustainability themes detailed in section 4 and the Council's alternative approach to sustainability are addressed by the Design Team (and ultimately the Contractor) in a meaningful and appropriate way, specialist assistance will be required.

This will be done through making best use of the Council's own in-house expertise in sustainable buildings, wider environmental issues and sustainable transport planning.

However, the level of advice required will differ depending on the nature, size and scale of the proposed works i.e. new build will require a different level of advice to smaller refurbishment projects.

Sustainability issues for major school refurbishment and new build will be addressed through:

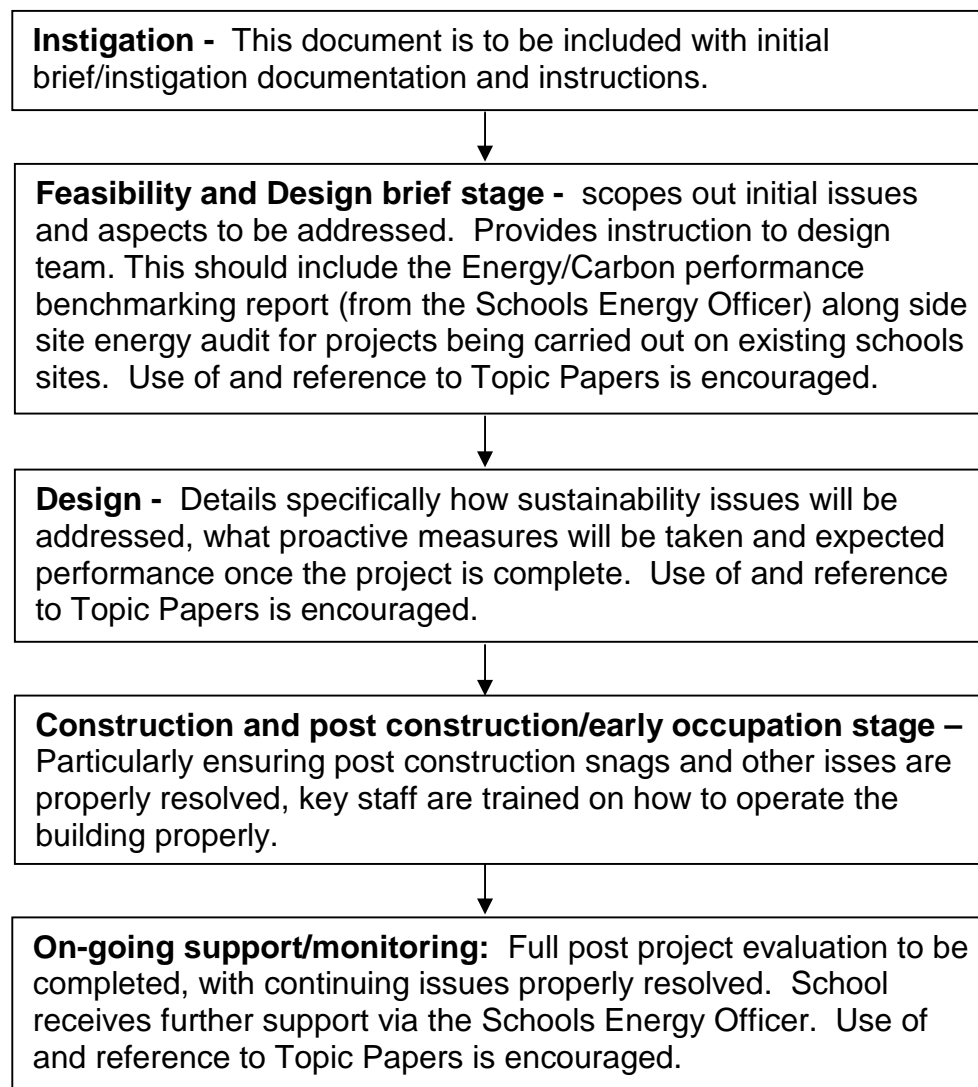
- 1) Up-front provision of current performance data in relation to energy use for extensions and major refurbishment of existing school buildings.
- 2) Early and on-going consultation with the Council's Environmental Policy Team, particularly the sustainable building's specialist, alongside the Sustainable Transport Team in relation to transport issues.
- 3) Completion of the appended checklist. This details the areas that need to be explored, including the types of initiatives, surveys and standards that need to be implemented. This provides flexibility of having a starting point from which to work and being able to demonstrate how sustainability aspects have been considered; both in terms of what represents an affordable solution and what is truly appropriate for the school/site in question.
- 4) The checklist is based loosely around the BREEAM standard, allowing the project to be benchmarked against an internationally recognised definition of what exemplar sustainable new buildings or refurbishment projects could look like.
- 5) The checklist facilitates discussion with the client and school and consideration of their specific needs and priorities ensuring that appropriate sustainability measures are proposed. This approach will ensure buy-in and ownership of included measures by the school.
- 6) When the planning application for the new build (or major refurbishment if required) is submitted the completed checklist will provide the Planning Officer with the necessary information to demonstrate planning policy in relation to sustainable buildings has been satisfied.
- 7) The School's Sustainable Design brief will be supported by a series of topic papers. These will look in more detail at a range of issues and innovations and are designed to provide advice and inspiration. These will

cover areas ranging from Sustainable Drainage Systems (SuDS), incorporating Public Art, Trees and the use of specific technologies, such as Green Roofs and Renewables.

Implementing the School's sustainable design brief

The checklist identifies the range of sustainability issues which should be considered at key phases in a new school build, extension or major refurbishment project. The project manager/design team should make it clear how each of the issues identified have been considered, where proactive measures are taken to address/implement these, or where it is not possible to take action and why.

The process has been identified to broadly follow these steps:



There are key principles that also underline the implementation of the Schools Sustainable Design Brief. These are:

- 1) The Design Team, with the support of the Council's sustainability specialists, will be required to address each of the ten sustainability themes in a tailored manner.
- 2) The School's Sustainable Design Brief should be considered at the earliest opportunity in the project, it should form part of the over all project brief and designers, consultants and contractors should approach the issues it raises in a proactive and positive manner.
- 3) If considered early enough many of the measures taken to satisfy the brief needn't cost more. In some cases there will be savings from what would normally be carried out as default e.g. building orientation and natural ventilation can remove the need for air conditioning.
- 4) This will ensure that the design offers appropriate but cost effective measures in terms of performance, environmental impact, energy efficiency, low carbon and wider sustainability credentials. This will be demonstrated through completion of the appropriate checklist.
- 5) Central Bedfordshire Council's projects will not be formally assessed under BREEAM, but instead should incorporate the best of its ideals. This Schools Sustainable Design Brief and supporting checklists has been designed specifically to do this.

All projects (over £100k) will be subjected to a full Post Project Evaluation to assess the design solution in order to verify the extent to which the objectives have been met. This will link in with the support provided to existing schools on energy efficiency through ensuring the necessary support infrastructure is in place. This includes:

- Install of Smart Meters at any new build. This includes training key staff in how to monitor usage and identify issues/opportunities once the school is ready to open.
- Audit/Action plan of site with key staff prior to opening to ensure energy efficient process are embedded from the buildings first use.

Successes in terms of carbon savings and other sustainability implications will be widely publicised.

6. Supporting Documents

Schools Sustainable Design Brief – Sustainability Checklist

Topic Papers

No1: SuDS