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Briefing Paper

Mitigation, adaption, resilience: managing climate change risk through BREEAM

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Heslington Hall © University of York

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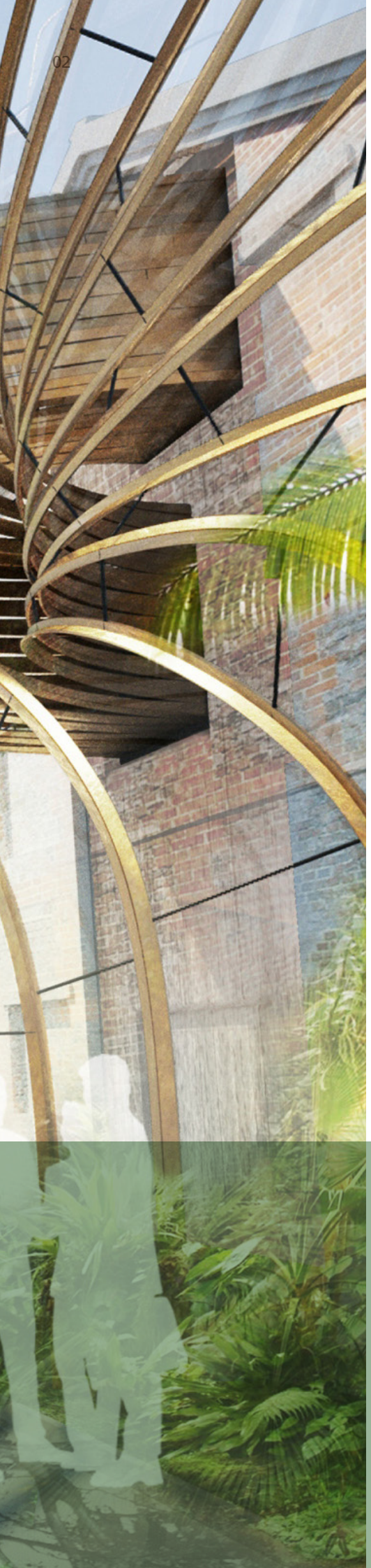
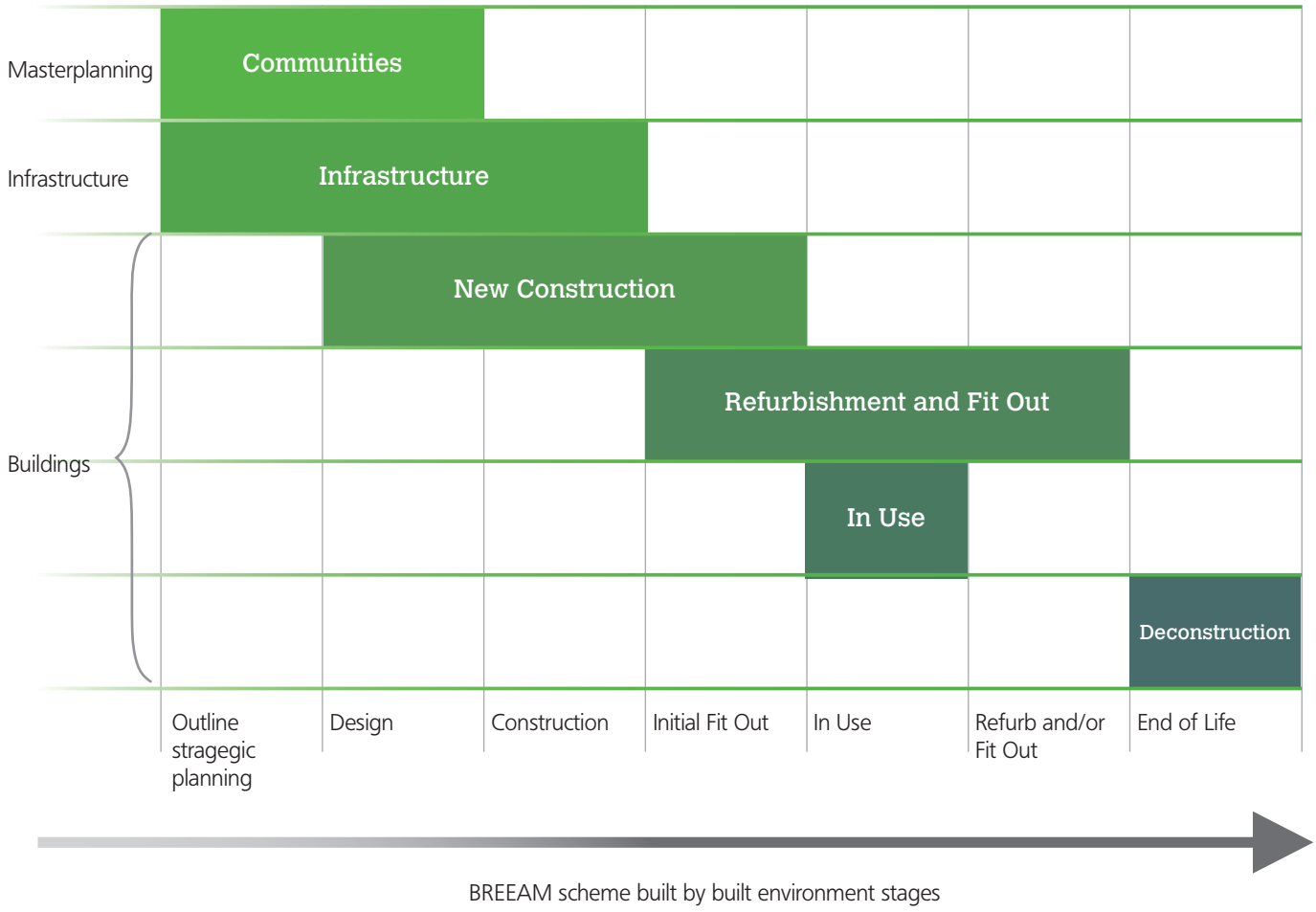


Since the 1990s, BREEAM has been at the forefront of the resilience movement; embedding within its core key drivers for the design, construction and operation of a built environment that not only helps to mitigate climate change, but is also well adapted to manage its associated risks.

As the longest standing sustainability assessment method and rating system for the built environment, there is a BREEAM scheme for any type of building; new or existing, anywhere in the world.

Lifecycle stages covered by BREEAM globally



*BREEAM UK Infrastructure is currently under development. BREEAM Deconstruction is not currently available in the UK.

BREEAM uses recognised measures of performance, which are set against established benchmarks, to evaluate a building's sustainability. These performance measures represent a broad range of sustainability issues such as energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes.

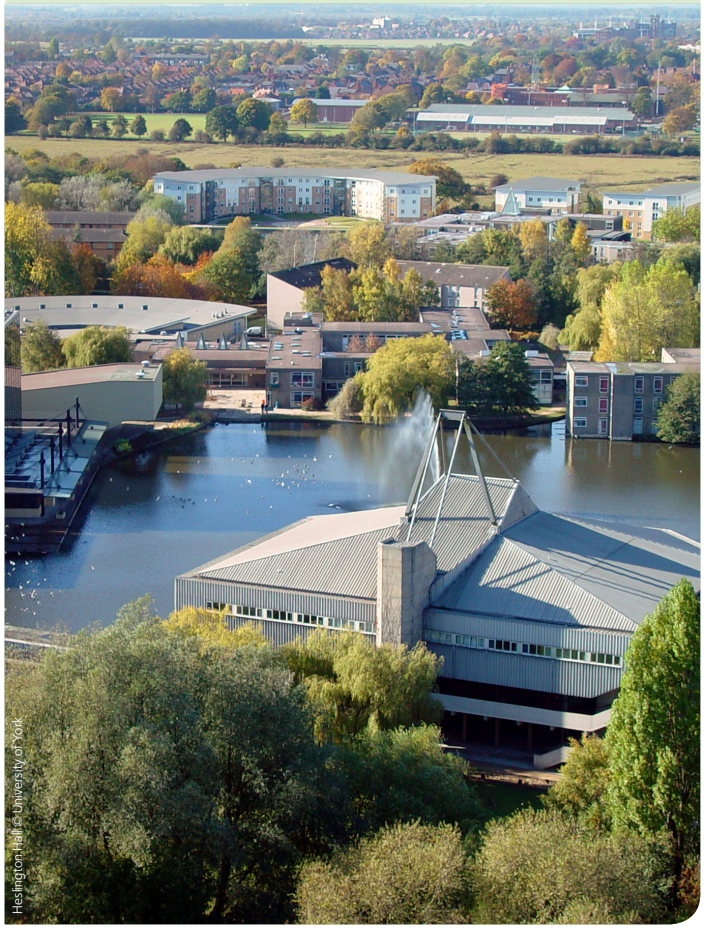
Across these issues in each scheme, are direct and indirect criteria that drive climate change mitigation, resilience and adaptability. The way in which this is approached differs in each BREEAM scheme, however there are common themes throughout, as shown on the following pages.

Flood risk

Climate change is expected to increase the risk of flooding in some countries and regions. BREEAM criteria address flood risk with reference to government defined flood zones. Buildings that are within areas considered to be at high risk from flooding must build ground floor heights and access levels above the predicted flood levels. Measures must also be taken to improve the resilience and resistance of the building to flood events through a range of measures appropriate to the context of the site. Surface water management is important in reducing localised flooding. BREEAM defines criteria and standards relating to the management of peak rates and volumes of run-off, in the use of sustainable drainage techniques for example.

Heslington East Campus

The majority of buildings within the Heslington East campus at the University of York have been BREEAM assessed and ratings of Very Good have been achieved, both at the design stage and post construction. The site includes a ten hectare man-made lake which was completed in August 2010 and has been designed to mitigate against a one in one thousand year flood event. The lake acts as a balancing regulator to prevent flooding of the water courses that connect to the River Ouse. Surface water from the campus buildings and from the local suburb of Badger Hill is channelled into swales or drainage ditches, to take the water down to the lake via a series of reed beds.



Heslington Hall © University of York

Water scarcity

As rainfall becomes more unreliable so then does our supply of water. Criteria that drive water efficient specifications and processes, including the reduction of water wastage, are included within all BREEAM standards. The schemes address water scarcity in many different ways which can include incentivising the specification of water efficient fittings and leak detection systems, encouraging the utilisation of rainwater harvesting and greywater and establishing appropriate water monitoring systems and management processes.

Saw Swee Hock Student Centre

At the BREEAM Outstanding Saw Swee Hock Student Centre, LSE rainwater and greywater is used to flush WCs. Furthermore, the WCs installed are low-flush, whilst infra-red sensors have been fitted on taps and live LED screens display water usage figures to building users.

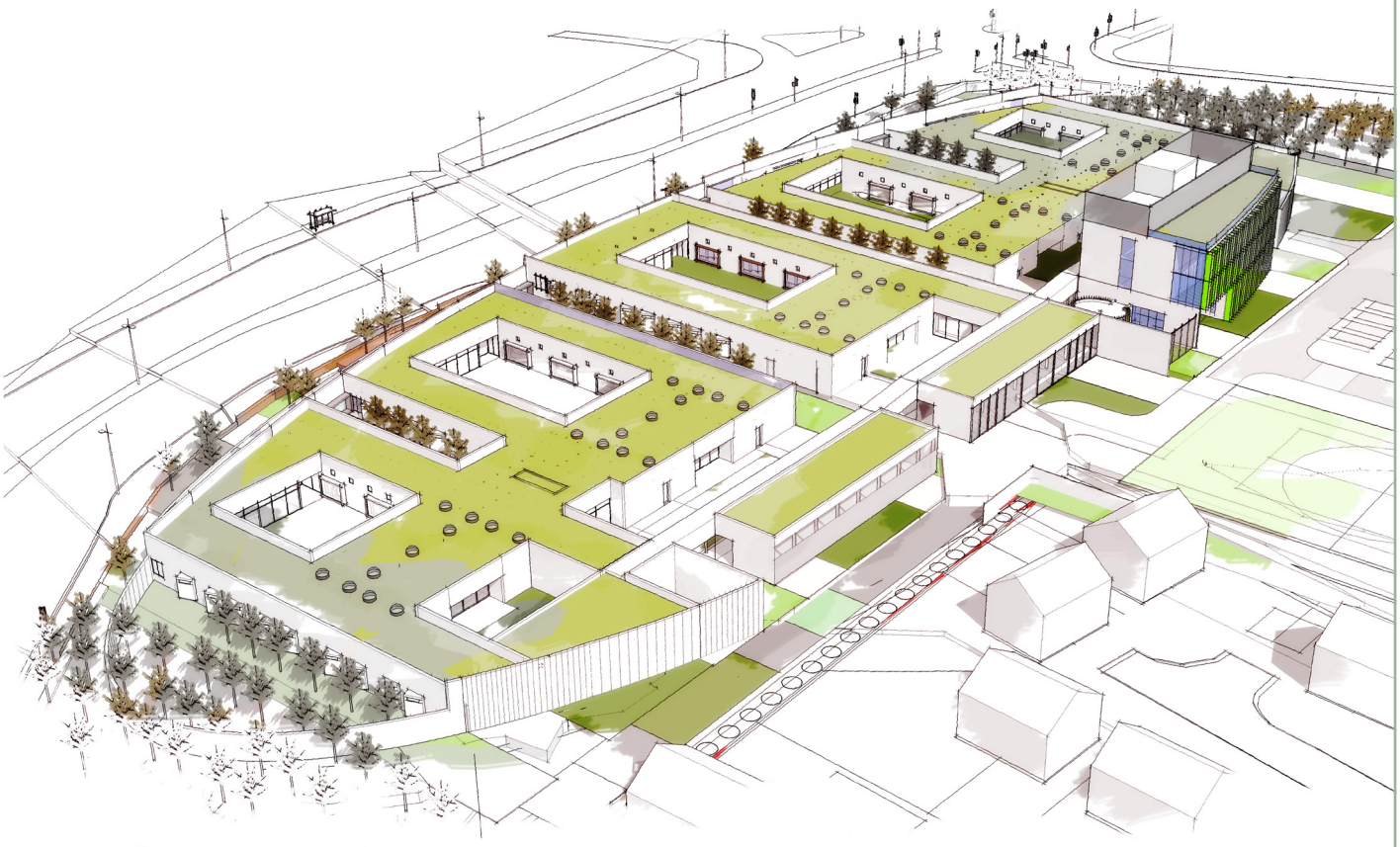
Materials resilience

Changes in climate are expected to impact on the rate at which construction materials degrade. Both the BREEAM new construction and refurbishment schemes advocate that exposed building elements should be designed to limit effects such as fading, rotting and salt crystallisation, thereby reducing the frequency of replacements, repairs and maintenance through the lifecycle of the building.

Clock View, Liverpool

Clock View Liverpool, has achieved an interim rating of BREEAM Excellent.

The mental health facility includes finishing and detailing of a highly robust nature. For example, the render wall system is anti-crack and high impact resistant and the silicone-based top coat is rot resistant, non-swelling and UV stable.



Thermal comfort

As global average temperatures increase so does the risk of buildings overheating. Criteria in the new construction and refurbishment schemes require that thermal modelling includes climate change scenario analysis. There are also requirements for the design team to demonstrate that recommended operating temperatures will be achieved in those scenarios.

Co-operative Headquarters

The BREEAM Outstanding headquarters of the Co-operative in Manchester incorporated the findings of a comprehensive climate change adaptation study. This assessed the impact of climate change on the passive design measures using projected climate change scenarios.

The study showed that the specified earth tubes would act as effective adaptation measures due to their reliance on ground rather than ambient temperatures. The double skin façade was seen as another effective measure, reducing cooling demand through the removal of hot air from the façade cavity.

Extreme weather risk management

BREEAM encourages a risk assessment to be carried out to identify and evaluate the impact of extreme weather conditions. This must consider the impacts on the building over the whole projected life cycle and, where feasible, include mitigation measures. The risk assessment is also expected to cover hazard identification, hazard assessment, risk estimation, risk evaluation and risk management.

Crossrail

The risk of extreme weather events has been considered for one of the most significant infrastructure projects in the UK; Crossrail. Climate change risks identified as relevant to the project include extreme temperatures and an increase in extreme weather events (snow, cold, wind).

Examples of measures that will address these risks include; rolling stock systems designed to operate in high temperature environments, continually welded de-stressed railtrack to prevent buckling in high temperatures, and underground stations with full height doors at platform edges separating them from tunnels to allow platform areas to be mechanically cooled. Crossrail aim to achieve BREEAM Very Good for all underground stations.

Photo © Crossrail Ltd

Mitigating climate change

In addition to adapting to climate change it is important that developments reduce the rate of greenhouse gas emission associated with their operation to avoid continued contribution to climate change. Numerous issues across the various BREEAM schemes seek to minimise energy use and carbon emissions, for example through passive design, the use of low carbon technologies and the procurement of energy efficient equipment. The use of refrigerants, emission of nitrous oxides and transport associated emissions are also addressed through various BREEAM criteria.

Crouch Hill Park, Islington

Crouch Hill Park in Islington, London is a carbon-negative development including Ashmount Primary School, Bowlers Nursery, an energy centre, a youth club and an ecology centre. The exemplary sustainable community is heated and powered via the gas CHP network, with a biomass boiler providing winter demand top-up and excess heat being exported to adjoining blocks of flats. The BREEAM Outstanding school is naturally ventilated, utilising heat recovery and night-time cooling techniques. The development achieved an interim rating of BREEAM Outstanding.

Further details on the BREEAM criteria can be found in the relevant scheme manuals. Copies of the manuals can be downloaded free of charge from **www.breeam.com/resources**

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