

Environment and sustainability

Health Technical Memorandum

07-07: Sustainable health and social care buildings

Planning, design, construction and refurbishment

communities



environment



water use



flood risk and SuD

Health Technical Memorandum 07-07

Sustainable health and social care buildings: Planning, design, construction and refurbishment

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Preface

About Health Technical Memoranda

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

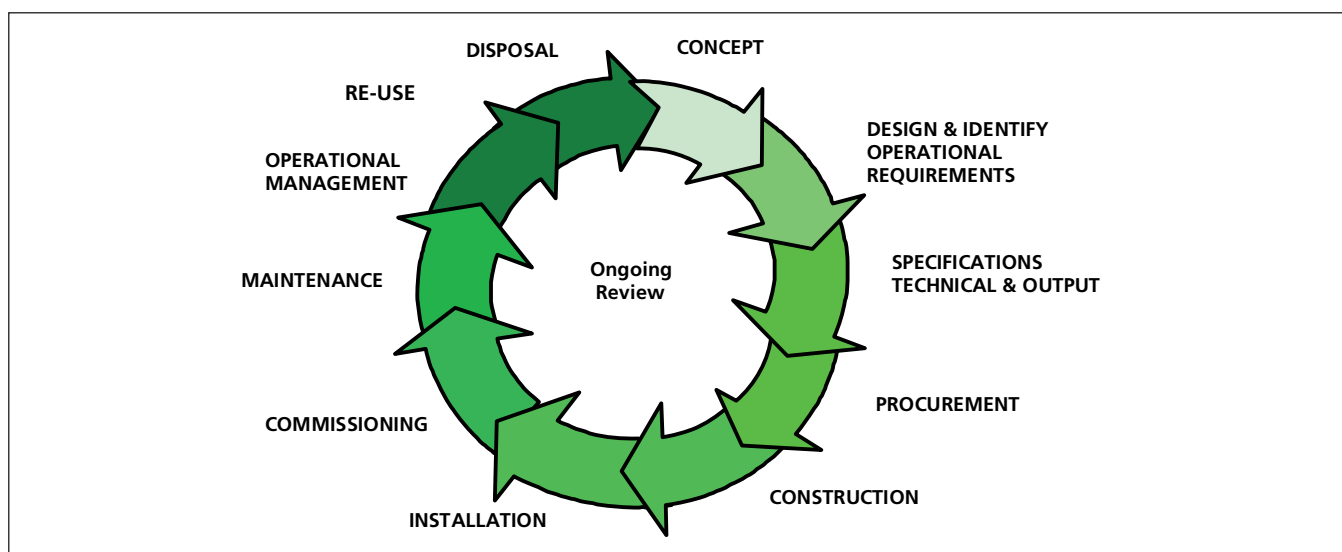
The focus of Health Technical Memorandum guidance remains on healthcare-specific elements of standards, policies and up-to-date established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle.

main source of specific healthcare-related guidance for estates and facilities professionals.

The core suite of nine subject areas provides access to guidance which:

- is more streamlined and accessible;
- encapsulates the latest standards and best practice in healthcare engineering, technology and sustainability;
- provides a structured reference for healthcare engineering.

Figure 1 Healthcare building life-cycle



Healthcare providers have a duty of care to ensure that appropriate governance arrangements are in place and are managed effectively. The Health Technical Memorandum series provides best practice engineering standards and policy to enable management of this duty of care.

It is not the intention within this suite of documents to unnecessarily repeat international or European standards, industry standards or UK Government legislation. Where appropriate, these will be referenced.

Healthcare-specific technical engineering guidance is a vital tool in the safe and efficient operation of healthcare facilities. Health Technical Memorandum guidance is the

Structure of the Health Technical Memorandum suite

The series contains a suite of nine core subjects:

Health Technical Memorandum 00

Policies and principles (applicable to all Health Technical Memoranda in this series)

Health Technical Memorandum 01

Decontamination

Health Technical Memorandum 02

Medical gases

Health Technical Memorandum 03
Heating and ventilation systems

Health Technical Memorandum 04
Water systems

Health Technical Memorandum 05
Fire safety

Health Technical Memorandum 06
Electrical services

Health Technical Memorandum 07
Environment and sustainability

Health Technical Memorandum 08
Specialist services

Some subject areas may be further developed into topics shown as -01, -02 etc and further referenced into Parts A, B etc.

Example: Health Technical Memorandum 06-02 represents:

Electrical Services – Electrical safety guidance for low voltage systems

In a similar way Health Technical Memorandum 07-02 represents:

Environment and Sustainability – EnCO₂de.

All Health Technical Memoranda are supported by the initial document Health Technical Memorandum 00 which embraces the management and operational policies from previous documents and explores risk management issues.

Some variation in style and structure is reflected by the topic and approach of the different review working groups.

DH Estates and Facilities Division wishes to acknowledge the contribution made by professional bodies, engineering consultants, healthcare specialists and NHS staff who have contributed to the production of this guidance.

Figure 2 Engineering guidance



Executive summary

The success of a building's performance in terms of sustainability outcomes is dependent to a large degree on the decisions taken at the design, procurement and construction stages of a development.

This guidance focuses on the actions to be taken at these stages and also includes the relevant action required at the post-completion, operational and end-of-life stages. It draws upon and refers to sustainability policy and procedures that are already in place to direct development in achieving design excellence and national objectives.

Purpose of Health Technical Memorandum 07-07

This Health Technical Memorandum addresses sustainable development within health and social care facilities by looking at the main issues that should be addressed throughout a building's life – highlighting key actions, commitments and responsibilities at every stage.

It also explores the reuse of existing buildings and provides advice on possibilities for sustainable refurbishment.

The guidance in this document is based on the principle that unsustainable development has a detrimental impact on the health of our communities and consideration should be given to the social, environmental and economic context with every decision made.

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Health Technical Memorandum 07-07 draws upon and refers to sustainability policy and procedures that are already in place to direct development in achieving design excellence and national objectives.

Capital development schemes are now required to use the BREEAM Healthcare methodology to demonstrate that healthcare projects are built with sustainability in mind.

This document makes extensive references to BREEAM Healthcare and offers guidance on how to comply with its criteria.

Target audience

Health Technical Memorandum 07-07 is applicable to healthcare projects of all scales and types, from the larger acute hospital buildings to the small community clinics run by individual specialists. For this reason, this guidance takes a comprehensive approach, emphasising the underlying principles that are applicable across the board and advising on ways to achieve these principles in a way that can be scaled by the reader according to requirement.

The guidance can also be used as an operational checklist to assist in making decisions on maintaining or upgrading existing facilities, including refurbishment or redevelopment opportunities.

While the target audience is primarily the project lead, it should also be used by contracted personnel involved at every project development stage, from inception to post-completion evaluation. This includes the specialists brought into the process, as required, such as planners and environmental consultants/engineers (roles and responsibilities are covered further in [Chapter 3](#)). In addition, it gives relevant advice that should be taken by:

- a. the scheme's sponsoring organisations (for example strategic health authorities (SHAs));
- b. commissioners (for example primary care trusts (PCTs)); and
- c. regulators (for example the Environment Agency and the Health and Safety Executive).

It will also be useful for estates/facilities and operational managers, and all other staff involved in the running and management of healthcare buildings, to make them aware of design considerations and their implications for day-to-day operations as they relate to achieving sustainable objectives.

Key recommendations

The key recommendations highlighted by this guidance document are to:

- set out a scheme's strategic sustainability objectives (see [paragraph 1.11](#)) at a very early stage and the options explored (for example refurbishment versus new build);
- ensure that these objectives are addressed in the project budget and project brief;
- ensure that sustainability measures are assessed not only on a whole-life cost/life-cycle cost basis but also from the perspective of other currencies (for example reduced carbon-dioxide emissions);
- ensure appropriate sustainability measures are embedded in the building's design;
- allocate key responsibilities at each stage;
- trace and evaluate progress towards achieving sustainability throughout the project's and building's life.

A flowchart (Chapter 5) outlines the key responsibilities, commitments and actions required at all stages of the project's and building's life.

Document structure

[Chapter 1](#) introduces the Government agenda.

[Chapter 2](#) expands on the concept of sustainability drivers and in particular the relevance of sustainability to, and its impact on, health.

[Chapters 3](#) and [4](#) respectively define the roles and responsibilities and issues that should be considered.

[Chapter 5](#) describes the level of engagement required at each stage of the capital development process:

- ***Commitment*** refers to critical decisions and commitments at each stage;
- ***Recommended action*** refers to work that should be completed or developed at each stage.

The [process flowchart](#), introduced in Chapter 5, maps out the content of the guidance. The flowchart visually sets out all the actions in the context of the overall process and the applied procurement route.

The case studies in [Chapter 6](#) seek to demonstrate the successful accomplishment of best practice design and procurement of sustainable buildings.

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- Recommended action – b-07 Energy and carbon emissions
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community



transport



local environment



water use



design quality



flood risk and SuDs



a genuinely sustainable building is one that is sufficiently adaptable that it remains operationally useful throughout its structural life

health and well-being



future proofing



Energy/CO₂ emissions



waste/materials





List of acronyms

AAP: area action plan	DfT: Department for Transport
ABC: appointment business case	DH: Department of Health
AEDET: Achieving Excellence Design Evaluation Toolkit	DRI: demolition recovery index
AIA: arboricultural implications assessment	EIA: environmental impact assessment
AMS: arboricultural method statement	EMP: environmental management plan
ASPECT: A Staff and Patient Environment Calibration Tool	EPBD: Energy Performance of Buildings Directive
BAP: Biodiversity action plan	EPC: energy performance certificate
BERR: Department for Business, Enterprise & Regulatory Reform (note: the Department for Business Innovation and Skills (BIS) formed June 2009)	ESCO: energy services company
BMS: building management system	ETF: Environmental Transformation Fund
BRE: Building Research Establishment	EU ETS: European Union's Emissions Trading Scheme
BREEAM: Building Research Establishment's Environmental Assessment Method	FBC: full business case
CABE: Commission for Architecture and the Built Environment	FIT: Fields in Trust
CCL: climate change levy	GJ: gigajoules
CCS: considerate constructors' scheme	GSHP: ground source heat pumps
CEMP: construction environmental management plan	GWP: global warming potential
CFBC: confirmatory full business case	IDEAs: Inspiring Design Excellence and Achievements
CHP: combined heat and power	IHT: Institution of Highways & Transportation
CIRIA: Construction Industry Research and Information Association	KDP: key demolition product
CLG: Department for Communities and Local Government	KPI: key performance indicator
CSR: corporate social responsibility	LAP: local area for play
D-BOQ: demolition bill of quantities	LCBP2: Phase 2 of the Low Carbon Buildings Programme
DEC: display energy certificate	LCC: life-cycle costing
Defra: Department for Environment, Food and Rural Affairs (note: the	LDF: local development framework
Department for Energy and Climate Change (DECC) formed October 2008)	LEAP: local equipped area for play
	LIFT: (NHS) Local Improvement Finance Trust
	LPA: local planning authority
	LVIA: landscape and visual impact assessment
	MW: megawatts
	NEAP: neighbourhood equipped area for play
	NER: new entrant reserve

NHS PASA: NHS Purchasing and Supply Agency

OBC: outline business case

OGC: Office of Government Commerce

PCT: primary care trust

PFI: private finance initiative

PIR: passive infrared

SAC: special area of conservation

SDC: Sustainable Development Commission

SEA: strategic environmental assessment

SEI: Stockholm Environment Institute

SHA: strategic health authority

SHAPE: Strategic Health Asset Planning and Evaluation

SOC: strategic outline case

SPA: special protection area

SPD: supplementary planning document

SPTF: Sustainable Procurement Task Force

SRN: strategic road network

SSDP: strategic service development plan

SuDS: sustainable drainage system

SWMP: site waste management plan

TA: transport assessment

TCP: tree constraints plan

TMP: traffic management plan

TS: transport statement

UDP: unitary development plan

UKCCP: UK Climate Change Programme

UKCIP: UK Climate Impacts Programme

VOC: volatile organic compound

WCED: World Commission on Environment and Development

WLC: whole-life costing

WRAP: Waste & Resources Action Programme

WRAS: Water Regulations Advisory Scheme

Glossary

Adaptability: the ease with which a building can be retrofitted or reconfigured to better meet the changing needs of occupants, maintenance and the larger community.

Area action plan (AAP): a statutory planning document that sets out a council's vision for what should be developed in a particular area over a particular period. It will also look at where new developments can happen and how existing facilities can be improved. Once developed, it will become part of the local development framework.

Biodiversity: the variety of life on earth. It includes all species, animals, plants, fungi, algae, bacteria and the habitats that they depend upon.

Biodiversity action plan (BAP): a plan that sets specific, measurable, achievable, realistic and time-bound conservation targets for species and habitats.

Brownfield: land that is or was occupied by a permanent structure, which has become vacant, underused or derelict and has the potential for redevelopment.

Building Research Establishment's Environmental Assessment Method (BREEAM): an environmental assessment method that is used to describe a building's environmental performance. Credits are awarded in nine categories. These credits are then added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent or Outstanding.

Building user manual: a guide that covers information relevant to staff, occupants, tenants and non-technical building managers on the operation and performance of the building. The project lead/contractor should complete the building user manual at the post-construction stage and hand it over to the estates/facilities and operational managers. It should contain the following information as a minimum:

- building services information;
- emergency information;
- energy use and environmental strategy;
- water use;

- transport facilities;
- materials and waste policy;
- re-fit and rearrangement considerations;
- reporting provision;
- training.

Climate change levy: a tax on the use of energy in industry, commerce and the public sector. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

Combined heat and power (CHP): a system that recovers the heat produced as a by-product of electricity generation instead of simply venting it via cooling towers. This recovered heat can then be used for domestic or industrial heating close to the plant.

Considerate constructors' scheme (CCS): a UK certification scheme that encourages the considerate management of construction sites. The scheme is operated by the Construction Confederation.

Construction environment management plan (CEMP): a strategy drawn up by the contractor to manage the potential impacts arising from construction activities, such as dust and mud, hazardous substances, pollutant gases, noise and vibration.

Demolition waste management plan: a plan that aims to segregate reclamation waste and to reduce waste to landfill.

Design and access statement: a document that explains the design thinking behind a planning application. It should show that the person applying for permission (the applicant) has thought carefully about how everyone will be able to use the places they want to build. The statement accompanies a planning application, but is not part of it.

Embodied energy: the energy used (and therefore the carbon dioxide emissions) in manufacturing, packaging and transporting a product, material or service.

Energy performance certificate: a certificate that confirms the energy rating of the building from A to G,

where A is the most efficient and G is the least efficient. The better the rating, the more energy-efficient the building is, and the lower the fuel bills are likely to be.

Environmental impact: the environmental consequences of land or site development.

Environmental impact assessment (EIA): an assessment that identifies and assesses the likely effects on the environment of a project, at the earliest possible opportunity, before a decision is made on whether to give consent to proceed with it. Under the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988, an assessment is required to accompany planning applications for developments that are likely to have significant effects on the environment by virtue of their nature, size or location.

European Union's Emissions Trading Scheme (EU ETS): Europe-wide scheme that aims to reduce emissions of carbon dioxide and combat the threat of climate change. The EU ETS puts a price on carbon, which businesses use; this, in turn, creates a market for carbon. The UK is committed to building on the EU ETS as its main way of pricing carbon in the economy. The scheme commenced on 1 January 2005. The first phase ran from 2005 to 2007. The second five-year phase started on 1 January 2008 and runs until the end of 2012. The next phase is likely to adopt the title of Emissions Trading System (visit the Environment Agency's website for further information).

Flood risk: the combination of the estimated probability of a flood occurring and the magnitude of the potential consequences of the flooding incident.

Flood risk assessment: a study to assess the risk of a site flooding and to assess the impact that any changes or development on the site will have on flood risk on the site and elsewhere. A flood risk assessment should be prepared according to the Department for Communities and Local Government's (CLG) Planning Policy Statement 25: 'Development and flood risk'.

Good corporate citizenship: a term that describes how healthcare organisations can embrace sustainable development through their corporate activities: that is, as employers, purchasers of goods and services, landholders and commissioners of new buildings and refurbishments: in ways that benefit rather than damage social, economic and environmental conditions. See the 'Good corporate citizen' website.

Greenfield: either a site that has never been built on or one that has remained undisturbed for five years or more.

Greywater: waste water from taps, showers and laundries.

Highway authority: a county council, a metropolitan council or a unitary authority. Highway authorities are responsible for producing the local transport plan and for managing existing or proposed new local roads in the area.

Highways Agency: an executive agency of the Department for Transport, responsible for the construction, maintenance and management of the trunk road and motorway network.

Key performance indicator (KPI): a benchmark by which an organisation can measure its environmental performance (for example carbon emissions, the amount of waste produced) in the context of achieving its wider goals and objectives.

Life-cycle costs: the total cost of a building or its parts throughout its life, including the costs of planning, design, acquisition, operations, maintenance and disposal (see **Whole-life costs**).

Locally-sourced materials: materials obtained from a defined radius around a project site, helping to support the local economy and reducing transportation costs and energy.

Local development framework (LDF): a set of documents prepared by a district council, unitary authority or national park authority which outlines proposals for how land will be used or developed. Community involvement is crucial in the development of the documents.

Local planning authority (LPA): the body responsible for formulating planning policies (in a local development framework), controlling development through determining planning applications and taking enforcement action when necessary. This is either a district council, a unitary authority, a metropolitan council or a national park authority.

Microgeneration: the production of heat and/or electricity on a small scale from a low-carbon source such as solar photovoltaics, solar thermal hot water, wind turbines and ground-source heat pumps.

New entrant reserve (NES): (in relation to the EU ETS) carbon-dioxide allowances that have been reserved for installations which started operation between 31 December 2003 and 31 December 2007 and for extensions to existing permitted installations.

Passive building design: building configurations which take advantage of a natural, renewable resource (such as sunlight, cooling breezes etc). Passive design strategies typically do not involve any moving part or mechanical processes.

Potable water: drinkable and/or mains-supplied water (includes water obtained by borehole abstraction and water sourced from rivers, mountain streams, lakes etc).

Radon: a natural radioactive gas which enters buildings from the ground and increases the risk of lung cancer. Radon comes from the minute amounts of uranium that occur naturally in all rocks and soils. Geological conditions in certain areas can lead to higher than average levels in some buildings. The Health Protection Agency (HPA) has advised that radon in homes above an action level of 200 becquerels per cubic metre should be reduced. The Ionising Radiations Regulations 1999 come into effect where radon is present above the defined level of 400 becquerels per cubic metre and employers are required to take action to restrict resulting exposures. For more information, visit the Health Protection Agencies website, and their UK radon website and the Health and Safety Executive radon website.

Renewable energy: the use of energy from a source that does not result in the depletion of the Earth's resources, whether this is from a central or local source (for example wind turbines).

Responsible sourcing (of materials): materials that have been harvested from sustainable managed sources which are natural, plentiful or renewable and have independent certification (for example certified wood).

Run-off: this is usually rainwater, but can also be groundwater or overspill from sewers and other sources.

Run-off rate: the rate of discharge of water from a surface.

Screening: the process of deciding whether a plan or programme needs a strategic environmental assessment.

Section 106 (Town and Country Planning Act 1990): a section within the Town and Country Planning Act 1990 which allows a planning obligation to a local planning authority to be legally binding.

Secured by Design: a police initiative that seeks to encourage the construction industry to adopt crime-prevention measures in the design of developments, to assist in reducing the opportunity for and fear of crime.

SHINE: the alliance for sustainable buildings. This is a learning network for the healthcare sector.

Site waste management plan (SWMP): a plan that details the amount and type of waste that will be produced on a construction site and how it will be reused, recycled and disposed of. Since 6 April 2008 (in England), SWMPs have been a legal requirement for construction projects over £300,000.

Strategic environmental assessment (SEA): generic term used to describe environmental assessment as applied to policies, plans and programmes.

Strategic service development plan (SSDP): a plan that describes how services across the whole health community will be developed and that identifies the costs and practical steps needed to make the plan a reality. SSDPs should be updated regularly and should be prepared with the participation of local healthcare representatives, community and voluntary groups, and local government.

Surface water run-off: water flowing over the ground surface to a drainage system. This occurs if the ground is impermeable, is saturated, or if the rainfall is particularly intense.

Sustainable communities: places where people want to live and work, now and in the future. They should be:

- active, inclusive and safe;
- well-run;
- environmentally sensitive;
- well-designed and built;
- well-connected (good transport services and communications);
- fair for everyone.

Sustainable drainage system (SuDS): a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques. SuDS devices include:

- holding ponds;
- swales;
- reed beds;
- permeable paving – in areas where local geological and hydrological conditions allow this to function – for example block-paved surface on permeable sub-base over gravel bed to store the water and allow it to seep into the soil. For less permeable soils, the gravel layer might be deeper and the water taken to a soakaway, although this is not an option in some areas;
- local or centralised soakaways either as full systems or as overflow or holding systems, in areas where local geological and hydrological conditions allow them to function;
- run-off from roofs collected as a part of a rainwater-harvesting system;

- run-off from roofs directed to a local soakaway or other holding facility such as tanks, ponds, swales etc;
- green roofs.

Sustainable procurement: a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money in terms of generating benefits to the organisation, society and the economy, whilst minimising damage to the environment.

Third-party developments: where a private contractor develops primary-care premises on behalf of GPs or PCTs.

Travel plan: a strategy for managing all travel and transport within an organisation, principally to increase choice and reduce reliance on the car by seeking to improve access to a site or development by sustainable modes of transport. A travel plan contains both physical

and behavioural measures to increase travel choices and reduce reliance on single-occupancy car travel.

Wetland: a pond that has a high proportion of emergent vegetation in relation to open water.

Whole-life costs: all life-cycle costs plus non-construction costs (such as finance), business costs and income from sales and disposals etc (see **Life-cycle costs**).

Zero-carbon building: (with regard to all energy use in a building) a building that produces net zero carbon-dioxide emissions over the course of a year.

Note

At the time of writing, definitions associated with the low- to zero-carbon agenda are likely to be subject to Government consultation.

1 Introduction

- 1.1 This guidance urges healthcare organisations to aspire to excellence in sustainability in their healthcare buildings and not just to include the minimum necessary provision to meet statutory and regulatory requirements. Given the direction of travel of sustainability policy and the upward pressure on energy costs, such aspirations will also be in the long-term interests of the organisation.

Policy

- 1.2 The Brundtland Report of the World Commission on Environment and Development (WCED) defines sustainable development as follows: “Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their needs” (Brundtland, 1987).
- 1.3 Government policy is to commit to sustainable development initially through the UK Climate Change Programme (UKCCP) and to take it forward through the Climate Change Act 2008. The Government’s aim is to cut carbon-dioxide emissions by 80% before 2050 from a baseline of 1990. A more challenging aspiration is being delivered through the Government’s other policy networks to aspire to the ambition of attaining low- to zero-carbon buildings and net zero waste.
- 1.4 This Health Technical Memorandum explains these policy requirements and how they affect the capital development process. It aims to ensure that the right foundations are in place to work towards the aspiration of low- to zero-carbon buildings.

Government principles

Principles of sustainable development

- 1.5 As part of the sustainable development strategy launched in 2005, the UK Government, Scottish Executive, Welsh Assembly Government and the

Northern Ireland Administration agreed upon a set of five principles that provide a basis for sustainable development policy in the UK (‘One future – different paths: the UK’s shared framework for sustainable development’). For a policy to be sustainable, it should respect the principles and hallmarks of sustainability described below.

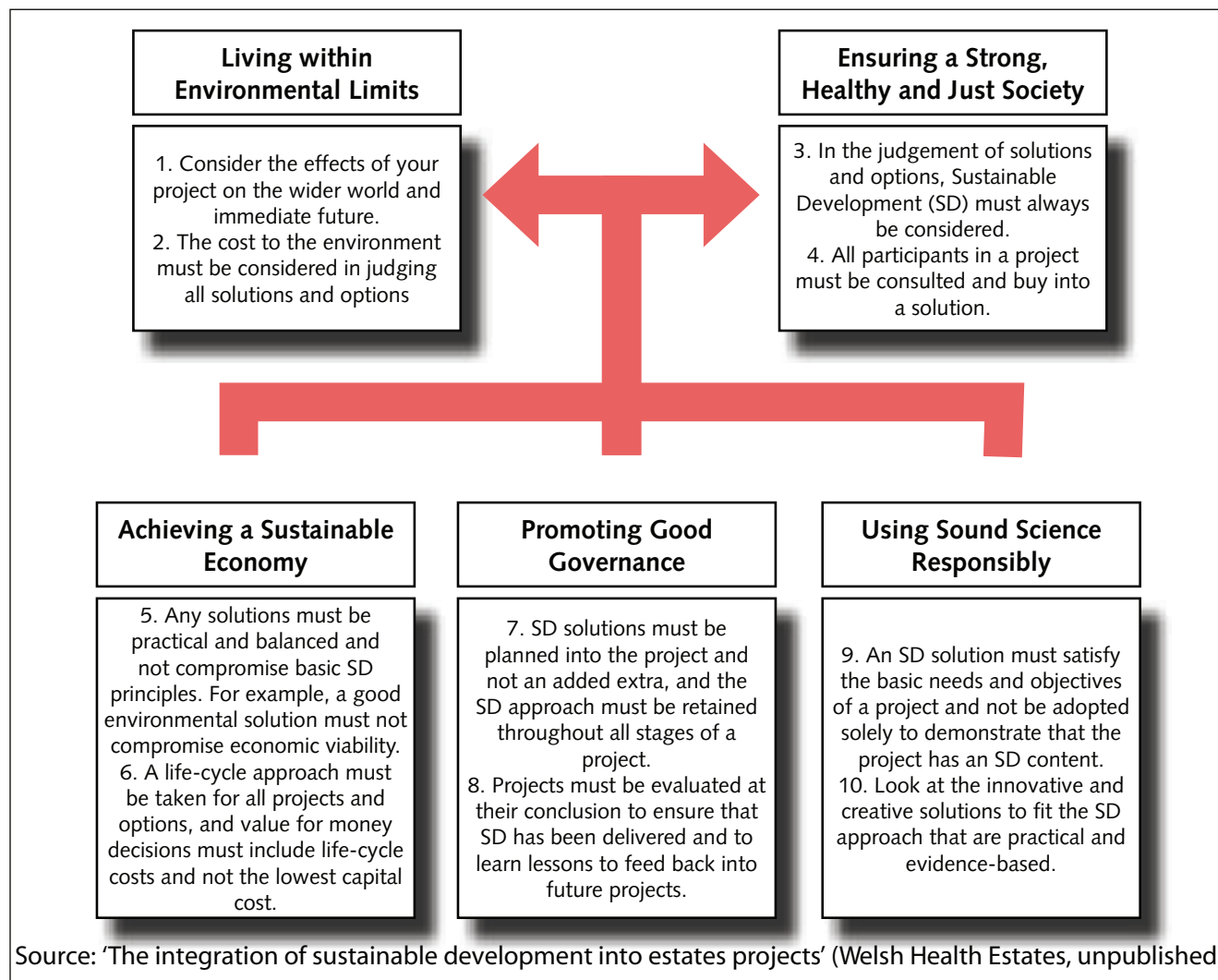
- 1.6 As leader of the health and social care system, and as Government lead on health and well-being, DH has embraced these principles as the underlying foundation stone for the healthcare sector and the people who work in it (‘Taking the long-term view: DH’s strategy for delivering sustainable development 2008–2011’).

The ten hallmarks of sustainability

The ten hallmarks of sustainability (see [page 2](#)) were introduced in Welsh Health Estates information paper ‘The integration of sustainable development into estate projects’ (unpublished).

- 1.7 These hallmarks should be applied to all health and social care facilities developments to ensure sustainability. The main aim of this guidance is to help stakeholders understand what and how sustainable development can be achieved based on these underlying principles and actions.
- 1.8 Sustainability principles should be integrated throughout the capital investment and development process. This will only be achieved in partnership with others closely involved in the process (for example local planning authorities (LPAs) and private partners).
- 1.9 Refurbishments or new developments will only achieve true sustainable potential if the infrastructure is in place to support it, such as transport links and networks, water and other utilities, and a wide range of local and community services.

Figure 1 The ten actions (or “hallmarks”) of sustainability that relate to the UK government's five principles for sustainable development policy



Legislation and government objectives

1.10 Relevant legislation is listed below, with direct links. This list is representative and not exhaustive.

Note

The Code for Sustainable Homes is instrumental in setting the levels of sustainability that are likely to be applied throughout non-domestic sectors.

Building Regulations.

Building Regulations Approved Document C – ‘Site preparation and resistance to contaminants and moisture’.

Energy Performance of Buildings (Certificates and Inspections) England & Wales Regulations 2007 (which implements the EU Energy Performance of Buildings Directive (2002/91/EC)).

Environmental Assessment of Plans and Programmes Regulations 2004.

Sustainable and Secure Buildings Act 2004.

Environmental Liability Directive (2004/35/CE).

Energy End-Use Efficiency and Energy Services Directive (2006/32/EC).

The European Union’s Emissions Trading Scheme (EU ETS) (2005).

Site Waste Management Plans Regulations 2008.

Climate Change Act 2008.

Carbon Reduction Commitment CO₂ emissions trading scheme.

Code for Sustainable Homes.

Strategy for Sustainable Construction.

Zero carbon for new non-domestic buildings.

What does sustainability mean for you?

Strategic objectives

1.11 The following points should be considered:

- the greater sustainable and environmental benefits from refurbishment (see [paragraph 5.3, 'Scope for refurbishment'](#));
- the provision of healthy and sustainable environments by radically rethinking how to design, plan, create and operate genuinely sustainable developments;
- climate-change mitigation and how existing buildings can be adapted, or how future developments can be resilient to predicted climate-change scenarios;
- how to future-proof the design, functionality and maintenance of buildings with regard to level of utilisation, flexibility of use, energy and water efficiency, accessibility, waste prevention etc;
- the better use and management of resources through a whole-life costing approach, ensuring a capital-and-revenue method to achieve efficiency.

Leadership

1.12 The healthcare capital development programme is an ideal opportunity for the healthcare sector to be leaders among public-service providers.

1.13 Leadership will give communities and residents access to well-designed health and social care facilities. Leadership entails the ability to offer a range of service models, to take advantage of emerging best practice and to understand the applicability of that best practice within the healthcare sector.

1.14 The life-cycle costs of a facility are:

- the costs of acquiring it (including consultancy,
- design and construction costs, and equipment);
- the costs of operating it; and
- the costs of maintaining it over its whole life through to its disposal – that is, the total ownership costs.

1.15 These costs include (among others) refurbishment costs and the costs relating to sustainability and health and safety aspects.

Whole-life approach

1.16 Beyond life-cycle costing, healthcare organisations may want to take a wider economic project evaluation, which could include:

- whole-life costs (including non-construction costs (such as finance), business costs and also income from sales and disposals etc);
- whole-life value/best value;
- additional environmental benefits (for example carbon reductions);
- additional health benefits (for example improvements in internal environments that lead to shorter recovery rates for patients);
- economically most advantageous tenders etc.

1.17 The key role for any organisation considering a capital development project is to scope the requirements for a whole-life approach to the project.

1.18 See the European Commission's paper 'Life-cycle costing (LCC) as a contribution to sustainable construction: a common methodology'.

Roles and responsibilities

1.19 Sustainability is not the prerogative of just one organisation – all key stakeholders (for example commissioners and regulators) need to make it happen.

The imperative for change – why do it?

1.20 Sustainable construction is important given the size and extent of the health and social care estate and its capital development programme, which is continuing to change to meet the needs of healthcare in the future.

1.21 Sustainable development policy has been developed to ensure that existing healthcare services and facilities, together with planned and future capital investment, include sustainable development practices, processes and products.

1.22 This is not new for the health and social care sector. In 2005 the Department of Health's 'Sustainable development: environmental strategy for the National Health Service' explained the significant benefits to the NHS (including cost savings and improving quality) of adopting an approach based on the sound principles of sustainable development, environmental issues, economic

considerations and social impacts. But while this document has set the scene, it has not been the motivator for change that is now required.

- 1.23 The health and social care sector now needs a new impetus to improve the standards and meet the ambitions necessary to combat climate change. To understand the carbon impacts of the healthcare estate and its activities, the Sustainable Development Commission (SDC) has completed a

carbon footprinting study in conjunction with the Stockholm Environment Institute (SEI).

- 1.24 This study demonstrates that procurement, materials and transport can have a greater carbon impact than the direct energy required to run a facility and, therefore, should be accorded equal weight when assessing impact, risk and cost of a capital scheme.

2 Sustainability drivers

Implications of sustainable development on health

- 2.1 Anyone asking the question “why should I develop sustainably?” wants to know how sustainable development impacts on human health. For example, what are the effects of:
- an increase in private transport on air quality, as a result of a poorly-located development?
 - inadequate alternative transport modes?
 - the use of internal paints with high levels of volatile organic compounds (VOCs)?
- 2.2 Some factors have a less direct impact, such as the effects of heat on health as a result of climate change (as explained by the ‘Heatwave plan for England’).
- 2.3 The ‘Heatwave plan for England’ is an annual report that has been published since 2004, drawing from updates of heatwave patterns in the latest climate change scenarios and indicating impacts on health, as well as preventative and preparedness measures.
- 2.4 In seeking to make progress it is important to harness lessons from the past. History shows us how important the links between environment and health can be. The emergence of the discipline of town planning in the nineteenth-century came out of an understanding of the impact of the environment and capital development on human health. For many years this link was dismissed until the Planning and Compulsory Purchase Act 2004 redefined the role of planning to take account of social, economic and environmental impacts of development (often referred to as the “triple bottom line”).
- 2.5 In the same vein, the health and social care sector should take account of the lessons learnt within the capital development process.
- 2.6 Sustainable development matters to all those involved in the provision and delivery of healthcare

services and to all those who are affected by those services. This is in line with the key principles of “sustainable communities”, which advocate closer local partner and community engagement in the design and development of local healthcare services.

- 2.7 By following the above principles, healthcare organisations can benefit from a healthier population, improved staff morale and faster patient recovery rates.

Climate-change impacts

Energy and carbon efficiency – Low- to zero-carbon buildings approach

- 2.8 The Chancellor in his 2008 budget statement set an ambition for all buildings to be zero carbon by 2019, with the public sector aspiring to be zero carbon by 2018.
- 2.9 As a consequence of the rapidly emerging UKCCP, energy-efficiency targets were set for all NHS trusts by the Minister of State for Health to:
- reduce levels of primary energy consumption by 15% or 0.15 million tonnes carbon emissions from a base year of March 2000 to March 2010;
 - achieve 35–55 GJ/100 m³ energy performance for all new capital developments and major redevelopments/refurbishments and 55–65 GJ/100 m³ for existing facilities.

Note

These targets are under review.

- 2.10 To assist the health and social care sector in achieving these targets, the Department of Health, in partnership with the Carbon Trust, produced Health Technical Memorandum 07-02 – ‘Encode’ to provide guidance for energy managers on energy/carbon efficiency opportunities relating to both capital development schemes and the existing estate.

- 2.11 Through the Climate Change Act 2008, the move is being made away from energy to carbon-efficiency savings. This Act sets the scene for a new focus on reducing carbon-dioxide emissions of 80% by 2050 from a base year of 1990.
- 2.12 Energy consumption in new buildings is regulated by Approved Document L of the Building Regulations 2006, which sets minimum standards for construction, dealing specifically with energy consumption and areas such as airtightness, solar gains, and energy for heating, lighting and ventilation.
- 2.13 For larger, more energy-intensive buildings, energy is also capped for users through the Greenhouse Gas Emissions Trading Scheme Regulations 2005 (more usually referred to as the EU ETS). The requirement here is that any development anticipated to operate in excess of 20 MW thermal capacity will need to apply to the Environment Agency for an allocation of allowances from the “new entrant reserve” (NER).

Note

Defra/DECC are consulting on Phase II; the thermal capacity levels may be subject to change – refer to Defra’s website.

- 2.14 The Government is tasking the public sector to lead by example. Direction is provided through initiatives such as the Department for Business, Enterprise & Regulatory Reform’s (BERR) ‘Strategy for sustainable construction’. The Department for Communities and Local Government (CLG) is taking forward the initiative through their activities on sustainable development in non-domestic buildings (‘Report on carbon reduction in new non-domestic buildings: report from UK Green Building Council’ (CLG, 2007)).
- 2.15 Building regulations cannot regulate the occupant’s energy use. This is dealt with separately for public buildings under the requirements of the Energy Performance of Buildings (Certificates and Inspections) England & Wales Regulations 2007 (as amended), which implements the EU Energy Performance of Buildings Directive (EPBD).
- 2.16 The main objective of this legislation is to promote the improvement of the energy performance of buildings. It aims to encourage owners and tenants to choose energy-efficient buildings when seeking new accommodation and to improve the

performance of buildings they occupy. The Regulations introduced:

- energy performance certificates (EPCs), which should be displayed in all non-domestic buildings when constructed, leased, rented or sold; and
- display energy certificates (DECs) for larger buildings occupied by public authorities and institutions providing public services to a large number of people.

DECs are a requirement for buildings over 1000 m² from 1 October 2008 (see table below).

- 2.17 This should ensure a better understanding of the energy performance of the non-domestic building stock and make data collection and reporting consistent.

The UK government’s implementation timetable for phasing-in the EPBD measures

Date	European Energy Performance of Buildings Directive measures
01-Oct-08	EPCs required on the construction, sale or rent of all remaining buildings other than dwellings. DECs required for all public buildings >1000 m ² .
04-Jan-09	First inspection of all existing air-conditioning systems over 250 kW must have occurred by this date*.
04-Jan-11	First inspection of all remaining air-conditioning systems over 12 kW must have occurred by this date*.

Source: The EPBD Directive Implementation Advisory Group (DIAG)

Energy and carbon efficiency – Renewable and/or low carbon energy

- 2.18 The Climate Change Act 2008 sets a target to achieve 26–32% of all energy from renewable sources by 2020.
- 2.19 If the generation of renewable energy on-site is physically possible and shown to be feasible, it is encouraged as a way of reducing the carbon footprint of the building. The energy produced may be used to supply electrical, heating and/or cooling needs or may supply the energy requirements of one particular system or section of a building. Advice on logistical and cost feasibility should be sought from an environmental engineer.

- 2.20 An opportunity may exist to share renewable energy generation with another development in the vicinity, either on-site or off-site. Information can be sought through the LPA and can be managed by a third party.
- 2.21 Efficient technology such as combined heat and power (CHP) systems, which use the heat from the generation of electricity to supply heat-energy requirements, is normally recommended in buildings with long operational hours. Provided that the spatial and access requirements can be satisfied, they are a feasible way of reducing energy demand.
- 2.22 If on-site or off-site generation is deemed unfeasible, another option is to switch to a “green” electricity tariff. There are two types:
- Renewable energy tariff: for every unit of electricity used, the supplier will buy a unit of electricity generated by a renewable energy source;
 - Eco-funds tariff: the extra premium paid for the new tariff is invested in new renewable energy projects.

The NHS Sustainable Development Unit has issued ‘Saving carbon, improving health: NHS Carbon Reduction Strategy for England’. This addresses the key mechanisms for the NHS to understand and manage its activities to be in line with Government drivers.

Waste

- 2.23 Waste is linked to climate change activities, has potential for significant environmental impacts, is associated with carbon emissions and is therefore key in terms of efficiency savings likely to contribute to achieving the aims of low- to zero-carbon buildings for the future.
- 2.24 The Clean Neighbourhoods and Environment Act 2005 introduced a new requirement for site waste management plans (SWMPs) for construction and demolition projects. The Site Waste Management Plans Regulations 2008 make this a legal requirement for all construction projects over £300,000. They are designed to provide a structure for systematic waste management at all stages of a project’s delivery.
- 2.25 Project leads should take early action on waste. They should prepare a SWMP and give it to the principal contractor to monitor and update during the project’s life. Assistance is provided by the Waste & Resources Action Programme (WRAP).
- 2.26 It is also advisable to take action on waste management at the early project design stage to ensure sufficient space is provided for safe, secure storage of waste and recycling materials away from public areas.

Water

- 2.27 Water is a scarce resource and should be managed efficiently. See Health Technical Memorandum 07-04 – ‘Water management and water efficiency’ for further guidance on the efficient management of water.

Note

Defra and CLG are currently investigating water efficiency measures in non-domestic buildings (‘Water efficiency in new buildings: a joint Defra and Communities and Local Government policy statement’). It is likely that the Water Supply (Water Fittings) Regulations 1999 will form the regulatory base for non-domestic buildings in order to establish higher water efficiency standards. Defra is also developing domestic waste reduction metrics for the non-domestic building stock.

Procurement

- 2.28 In 2005, the UK Government set up the Sustainable Procurement Task Force (SPTF). The SPTF reported in June 2006, setting out a number of challenges aimed at putting sustainability at the heart of procurement and making the UK leaders in sustainable procurement by 2009. The SPTF’s national action plan ‘Procuring the future’ (Defra, 2006) stated:
- 2.29 Sustainable procurement is “a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole-life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment”.
- 2.30 In response to the SPTF, the Department of Health in association with NHS PASA published ‘Procuring for health and sustainability 2012: sustainable procurement action plan’ (June 2007), which sets out how the health and social care sector

in England will use sustainable procurement, not only of equipment and supplies, but also of buildings, facilities and services, to achieve improved health and well-being for the people, the environment and the economy.

- 2.31 The sustainable procurement action plan takes into account the impact of procurement on regional economies and social engagement, and demands that materials are ethically and sustainably sourced. These elements will be a deciding factor in procurement and contracting decisions.
- 2.32 The Energy End-Use Efficiency and Energy Services Directive also focuses on procurement activities as its main requirements:
- member states should adopt and aim to achieve an overall national indicative energy savings target of 9% by 2017;
 - the public sector is to fulfil an exemplary role in meeting the target;
 - member states are obliged to place obligations on energy suppliers and distributors to promote energy efficiency;
 - requirements on metering and billing to allow consumers to make better-informed decisions about their energy use.

Capital procurement

- 2.33 In line with the Office of Government Commerce's (2000) 'Constructing the best government client: achieving sustainability in construction procurement – sustainability action plan', all new healthcare development projects and refurbishments should achieve BREEAM scores of "excellent" and "very good", respectively.

Notes

Capital development schemes are required to use BREEAM Healthcare to demonstrate that healthcare projects are built with sustainability in mind.

BREEAM Healthcare superseded the NHS Environmental Assessment Tool (NEAT) in 2008.

Transport

- 2.34 All vehicles contribute to climate change because their engines burn fuel and therefore produce carbon dioxide. These emissions need to be reduced. The transport requirements of staff,

patients, visitors, ambulances and suppliers should be considered in assessing the sustainability of new schemes.

- 2.35 Transport plans are a necessary part of the local authority's planning approvals process. Combating congestion and nuisance whilst providing essential services is key to creating a community-integrated healthcare scheme. Further details about transport plans and transport management are available in Health Technical Memorandum 07-03 – 'Transport management and car parking' or from the Department for Transport's (DfT) website.
- 2.36 Partnering with public transport coordinators should ensure that maximum potential is derived from using train and bus services and from providing safe and secure cycling and walking routes.
- 2.37 Undertaking transport and travel surveys is part of the planning process. Data collection requirements should be addressed in any management data collection system. Transport data should capture business-related journeys; patient visits; contractor movements; and visitors' travel requirements. This will help not only to ensure that the site can cope with on-site traffic movements, but also to provide necessary information with regard to the carbon footprint, taking into account the increasing carbon emissions related to traffic. This will also be essential information in ensuring resilience of supply during adverse weather events caused by climate change.
- 2.38 If procuring fleet vehicles for transport, consideration should be given to the benefits of leased vehicles to reduce obligations not only on procurement and maintenance but also on disposal as laid down in the End-of-Life Vehicles Regulations 2003 and the End-of-Life Vehicles (Producer Responsibility) Regulations 2005. Further, when procuring or leasing vehicles, low-carbon-emission green-fuel options such as electric or dual fuel should be considered.
- 2.39 There should also be a commitment to meet the DfT's recommendations that the wider public sector should take up the new car fleet average of 130 g/km CO₂ (130 grams of carbon dioxide per kilometre) or lower.
- 2.40 Transport distance will inevitably be a deciding factor in procurement and contracting decisions across a range of services and supplies.

3 Roles and responsibilities

- 3.1 A definition of the roles and responsibilities of those involved at the various stages in the capital project.
- 3.2 In addressing the question of which healthcare organisations should be involved – it is clear that all should. The successful introduction of sustainable principles requires a mix of formal responsibility and moral obligation to make a difference. Progress requires conscious action – not passive acquiescence – to make it happen.

Roles

Sustainability champion/catalyst

- 3.3 This refers to the project's design champion, the sustainability champion (if different), specialist agencies (for example Community Health Partnerships), and external agencies (such as SHINE). These champions will act as a catalyst to ensure that sustainability is addressed continuously throughout the capital development programme.

Strategic authorities

- 3.4 This refers to bodies such as strategic health authorities (SHAs), local health boards, health agencies, special boards and also government health departments whose responsibility it is to require evidence of sustainable development objectives other than demanding justification for a health and social care service requirement.

The project lead/project manager

- 3.5 The project lead/project manager is responsible for ensuring that suitably ambitious sustainable development objectives/requirements are set at the development's inception stage and are carried through to the handover of the building.

The contractor

- 3.6 The contractor (the construction firm or development company) is responsible for:

- undertaking the building, construction and other works;
- the management of the site; and
- the receipt, storage, utilisation and disposal of building and other materials.

Specialist advisers

- 3.7 The specialist adviser is responsible for providing professional, up-to-date advice and support to the project lead and the project team in order to help achieve the sustainability objectives in the most feasible way possible.

Estates/facilities and operational managers

- 3.8 Estates/facilities and operational managers have the responsibility of being aware of the intended performance and operations of the building, are aware of its true performance, and seek continuous improvement through investigation, communication, training and maintenance by developing or using approved monitoring, audit and review procedures.

Responsibilities of healthcare organisations and other bodies

- 3.9 Other organisations involved in commissioning and approving business cases for capital development projects have a key role in ensuring the appropriateness and sustainability of service delivery. Such organisations include:
- health-service commissioners (for example PCTs, local health boards) and other commissioners of services;
 - healthcare providers (for example trusts and non-NHS providers for a resident population);
 - partner service agencies (for example local authorities, voluntary organisations, the private sector);
 - statutory authorities.

3.10 In discharging their sustainability responsibilities, healthcare organisations pursuing capital investments will need to actively engage with contractors and constructors of new and refurbished premises in order to ensure that appropriate sustainability actions are undertaken.

and expanded upon in greater detail in [Chapter 5, ‘How to build sustainable buildings’](#).

Note that these project stages apply equally to refurbishment and new build.

PCTs and trusts that are tenants of third-party developers should follow the sustainability principles at the relevant project stages.

Ideally, GPs who aspire to best practice in their developments may find these principles helpful.

Who has to do what and when

3.11 There are a number of stages of a building’s life. These are broken down in the table and [Figure 2](#),

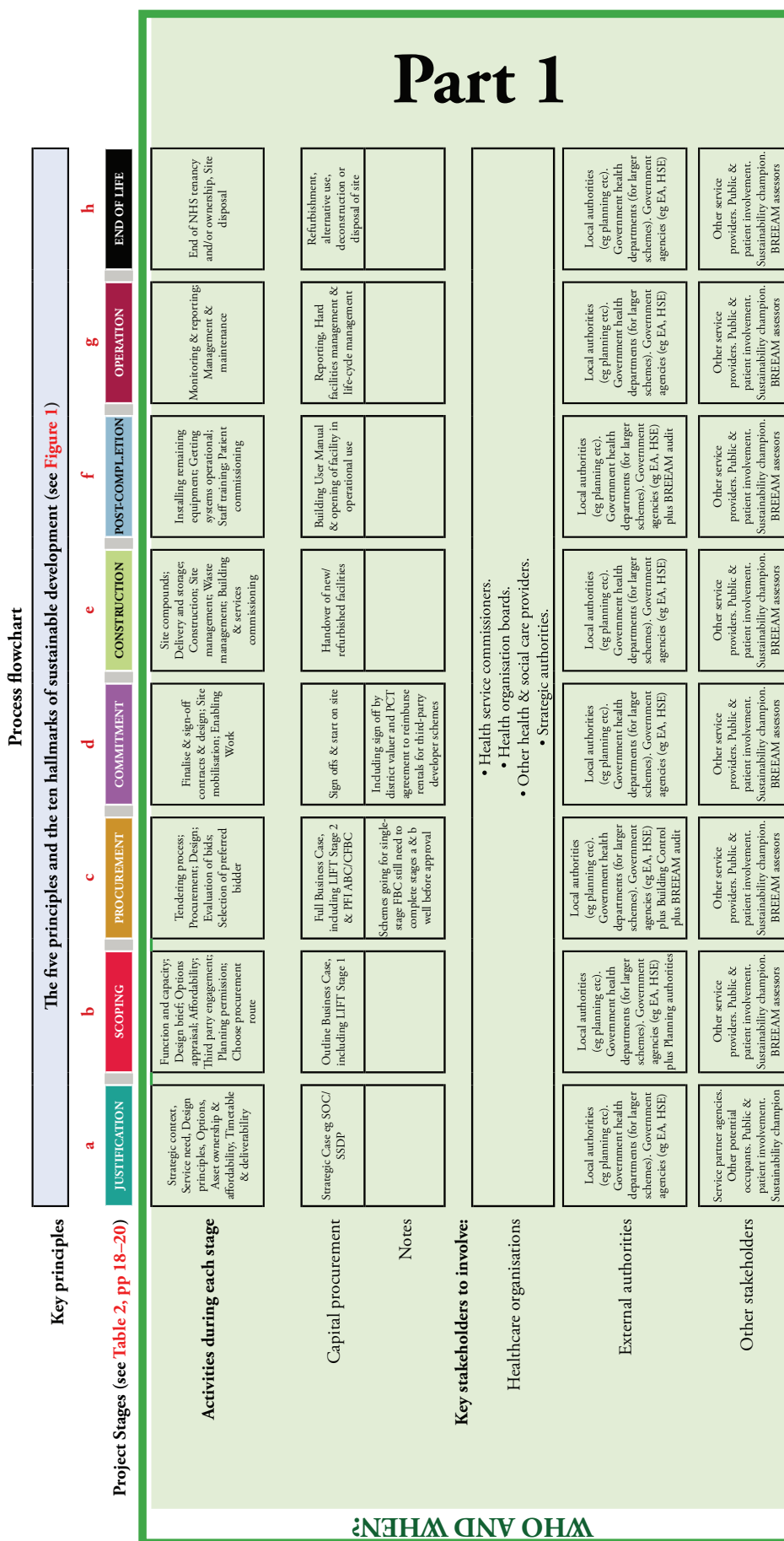
Project stages

Project stage	Actions
Justification (a)	<p>At this stage, a strategic outline case (SOC) (or equivalent) may be developed to describe the business outcomes and service/works requirements in a way that is unambiguous. The total project scope will be described and requirements will usually be specified in terms of outcome, based on “what” rather than “how” (see the OGC’s website).</p> <p>The justification stage is a crucial opportunity to ensure that any development is proposed with a holistic sustainable approach from a social and environmental point of view as well as the economic perspective. This implies consideration of issues such as:</p> <ul style="list-style-type: none"> • the reuse of existing buildings as opposed to new build; • reducing travel by private transport; • community-scale solutions (for example for energy) and contributions to local regeneration and development plans; • the preference to using brownfield land; • scope to improve the ecological value of greenfield land. <p>For this reason, it is important to engage with planning authorities and entities such as the Highways Agency at this early stage in order to understand other strategic priorities beyond those of health and social care services and any quality and sustainability objectives that require approval by third parties (for example the Environment Agency).</p> <p>At this stage the project lead should develop plans for service delivery in health and social care, as well as sustainability objectives, ideally in the form of a sustainability strategy for the project.</p> <p>After a SOC has been established, a design review workshop is encouraged to ensure that all design options are considered/explored as early as possible, in order to achieve an eventual optimum design solution.</p>

Project stage	Actions
Scoping (b)	<p>At this stage, the project team should formally test the project to ensure that it accords with local and national policy and that it is affordable. The outline business case (OBC), or equivalent, confirms that each of the criteria approved from the strategic case has been met.</p> <p>The project leads should undertake the following:</p> <ol style="list-style-type: none"> Confirm availability of site. Update financial projections. Produce initial concept designs. Calculate site-specific outline costings. Check delivery against sustainability objectives. Produce a planning application. <p>Sustainability work at this stage should include a detailed assessment to investigate sustainability options and to verify targets and key performance indicators (KPI) that are deliverable and affordable. All this should be done within the context of community and planning requirements; therefore, discussions with the relevant third parties are critical at this stage.</p> <p>The project lead should also develop a project brief at this stage, drawing on the results of community involvement, a thorough site investigation, reports on constraints and opportunities, and sustainability assessments. This will establish the requirements for procurement of a project team and the desired outcomes of the development. This level of investigation obviously requires a team of experts – in particular, planners, cost consultants, architects and sustainability consultants.</p> <p>At this stage, and prior to OBC submission, a design review is encouraged to ensure that the optimum design solution is included in the preferred option.</p>
Procurement (c)	<p>This is the stage that takes forward all the issues from the OBC for finalisation in the full business case (FBC) or equivalent. It includes information required for planning approval, the tendering process, sustainability accreditation, site mobilisation and sustainable site activity.</p> <p>The most important sustainability obligations at this stage are ensuring that the right skills are on board and that the sustainable development objectives are communicated clearly. In terms of communication, it is crucial that the criteria from the outline design stages are known by all team members and are not considered too late in the design process when they become harder to achieve. In terms of skills, two very important roles for which active engagement is required are the environmental designer/engineer and the certified BREEAM Healthcare assessor.</p> <p>At this stage, and prior to FBC submission, a design review is encouraged to ensure that an optimum final design solution is taken forward.</p> <p>Note: PCTs working with third-party developers should discuss with the district valuer the merits of offsetting rental costs against energy costs in order to deliver low-carbon buildings (for example using energy bills instead of “square-metre” costs – this will also need to take into account whole-life cost principles).</p>
Commitment (d)	<p>This stage marks the signing off of finalised information, which enables works to proceed on site. Preparing for the construction phase implies the involvement of new members of the project team who should be made aware of the aims and objectives that have been set for the development. This can be assisted through early dialogue during the tendering process, preferably involving sustainability advisers and specialists in key areas (for example energy) from both the project lead and contractor teams.</p> <p>The contractor should also ensure that signed-off drawings and details of the proposed development continue to achieve the committed sustainability objectives. This should include a completed BREEAM Healthcare assessment and other evidence of pre-determined KPIs that may be required.</p>

Project stage	Actions
Construction (e)	<p>This marks the stage between site mobilisation and handover of the building. It is relevant to new build and refurbishment. It includes details of site preparation with a focus on mitigating the impact of activities on the community and environment and ensuring design quality.</p> <p>The key activity during this phase of development is management, regular monitoring and reporting, in accordance with project objectives at both the design and construction level.</p> <p>In design terms, changes to the design and instructions issued by the design and engineering team, which may be required during the course of site works, should be approved by the project lead or an appointed representative. It should be ensured that such alterations do not impact on the project's sustainability objectives – this should ideally be reviewed by a specialist sustainability adviser.</p> <p>For site activities, monitoring and reporting should be in line with methodologies set out in industry schemes such as the SWMP and commitments outlined in the “considerate constructors’ scheme” (CCS) etc. The contractor should also commit to ensuring that site activity causes minimum disruption for the community and environment. This is done through the CCS and by submission of the construction environmental management plan (CEMP) report prior to mobilisation.</p>
Post-construction (f)	<p>The main objective of this stage is to prepare the building and users for occupation. The building should undergo a commissioning process in accordance with regulatory requirements and contractual obligations to sign off completion and to ensure that the building and equipment is functioning as intended.</p> <p>End-users will have a significant impact on the carbon footprint, water consumption and waste produced. For this reason, it is fundamental that staff are informed and trained about building operations and systems put in place to reduce the building's impact on the environment.</p> <p>Furthermore, commissioning will be required following building handover (after construction works have been deemed satisfactory) and before occupancy. This commissioning should be monitored by an appropriate team member, both for compliance to current building regulations and guidance and against the intended sustainability performance.</p>
Operation (g)	<p>In a similar way to the construction phase, the key activities relating to sustainability of building operations include management, monitoring, reporting and post-project evaluation.</p> <p>The project leads should prepare a programme for monitoring the different aspects of the building that were intended to influence its sustainability performance. Monitoring could be in the form of user surveys, meter readings and third-party surveying work.</p> <p>Once a sustainable building is ready to receive staff and visitors, the users' behaviour will determine whether it is truly sustainable. The project lead should appoint a person with the responsibility of keeping activities within and around the building sustainable through user communication, good management and monitoring. The “good corporate citizen” self-assessment test is a good start for assessing and improving operational behaviour in key areas.</p> <p>After a year of occupation, an operational stage BREEAM Healthcare assessment is required to verify the intended performance and for formal design and procurement certification. BREEAM credits developments that are seasonally commissioned during the first year of occupation.</p> <p>Planned preventive maintenance should be identified for the continued efficient sustainable running of the building through its life-cycle.</p>
End of life (h)	<p>This stage defines the end of ownership, occupation or rental, hence implying opportunities for conversion or change of use, or demolition when there is no environmental and financial benefit from reusing the building.</p> <p>In the first instance, the owner or landlord of a healthcare facility is responsible for evaluating the condition of the estate and investigating opportunities for reuse in response to strategic service and planning requirements.</p> <p>In addition, the owner of the healthcare facility should make sure that whatever happens to the estate is done in the most sustainable manner possible. As good practice, a demolition/disposal plan, including steps to mitigate impact on the community and the environment, should be produced prior to any on-site works related to its disposal.</p>

Figure 2 Procurement routes (adapted from the process flowchart)



4 Issues to be considered

4.1 The 13 “issues” that should be addressed at each project stage are outlined in the table below (click on the links in the table for further information and guidance).

4.2 Actions that should be taken at each stage are explained in [Chapter 5, ‘How to build sustainable buildings’](#).

Issue	Legislative/strategic/other context	Comments
Community (see also the “Health and well-being” section)	<ul style="list-style-type: none"> • CLG’s “sustainable communities” • Strategic environmental assessments (SEAs) • Lord Darzi’s ‘High quality care for all: NHS next stage review final report’ (Department of Health, 2008) • The Prince’s Foundation’s “Enquiry by Design” planning tool • DH/SDC’s “Good Corporate Citizenship” model • The NHS Institute for Innovation and Improvement’s ‘Opportunity locator user guide’ • DH patient and public involvement initiatives and statutory requirements 	Health and social care providers to consciously seek the input of public and partner organisations in the scoping of healthcare developments and to use them as a valuable source of information and for environmental improvement strategy linking into local policies
Local environment	<ul style="list-style-type: none"> • The Environmental Assessment of Plans and Programmes Regulations 2004, and the Environmental Protection Act 1990 – noise, dust, harm to the environment etc • Local planning authorities (LPAs) – location, site, amenity, transport and accessibility, services (for example water supply). Check with the local authority to find out what regulations apply about radon prevention in new buildings in the area. • BREEAM Healthcare: “excellent” for new builds or “very good” for refurbishments will assist delivery on this requirement 	<p>Environmental management to reduce environmental impacts and manage environmental risks.</p> <p>Look at maps that summarise the areas where preventive measures are required in all capital development schemes. Visit the HPA’s website or BRE’s website</p>

Issue	Legislative/strategic/other context	Comments
Design quality	<ul style="list-style-type: none"> DH tools such as AEDET Evolution and ASPECT recommend specific design solutions to help achieve quality for healthcare environments The Carbon Trust's building design advice DH's Strategic Health Asset Planning and Evaluation (SHAPE) – demographic and clinical demand aspects NHS Design Champions Event 2008 	<p>Independent/objective reviews should take place at key project development stages. The focus should be on improving the quality of the healthcare estate and ensuring that good design becomes an intrinsic part of every development project.</p> <p>Service planning – strategic and local</p> <p>Fit for purpose</p> <p>Stakeholder engagement – comprehensive understanding of what the facility is to achieve</p> <p>Well-designed buildings can improve patient recovery, increase sense of well-being, improve staff performance, aid recruitment, and improve community regeneration prospects</p> <p>Essential to conduct a thorough investigation of the local physical environment to inform the design process and potential impact on the locality</p>
Flood risk and SuDS	<ul style="list-style-type: none"> Local authority planners' and the Environment Agency's advice on risk minimisation Defra's guidance on sustainable urban drainage backed up by the LA for local opportunities 	<p>Crucial to minimise amount of land area given to hard impermeable surfaces and to create more opportunities for effective and efficient surface water run-off through a sustainable drainage system (SuDS) without passing water/flood problems to neighbouring areas</p>
Future-proofing	<ul style="list-style-type: none"> UKCCP and Climate Change Act 2008 to encourage appropriate response to changes in the elements and for future buildings to embrace the need to adapt to changing weather scenarios (for example flood, gale, drought) Government reform programme for the NHS (for example the ‘Choosing health’ White Paper (Department of Health, 2004) and Lord Darzi's report (Department of Health, 2008)) leads to need for flexibility of design to meet changing service provision DH's ‘Heatwave plan for England’ addresses opportunities for mitigating climate change within healthcare facilities 	<p>Buildings should respond to future changes in requirements, change of use, strategic perspectives, clinical/medical drivers, national policy and changing climate</p> <p>Value of whole-life costing (WLC) and life-cycle analysis to future-proof the long-term and economic viability of the development</p> <p>A genuinely sustainable building is one that is sufficiently adaptable that it remains operationally useful throughout its structural life</p>

Issue	Legislative/strategic/other context	Comments
Health and well-being (see also the “Community” section)	<ul style="list-style-type: none"> DH’s BREEAM Healthcare, AEDET Evolution, ASPECT etc all focus on ensuring that buildings meet satisfactory levels Legislation for planning requirements and building controls recognise links between environmental impact and health and the role of buildings and construction The Commission for Architecture and the Built Environment’s (CABE) “healthy hospitals” campaign demonstrates effects of good design on patients and staff ‘Health effects of climate change in the UK’ (Department of Health, 2001) identifies how extremes of weather can strain public health, and lists consequences of related illness and death 	Well-designed, sustainable healthcare environments can bring considerable benefit and a sense of well-being to those who use, own and operate healthcare facilities
Energy and carbon emissions	<ul style="list-style-type: none"> DH’s mandatory energy/carbon efficiency targets 2000–2010 Health Technical Memorandum 07-02 – ‘Encode’ Legislation is being introduced to help combat the problem associated with climate change and carbon-dioxide emissions: <ul style="list-style-type: none"> the European Union’s Emissions Trading Scheme (EU ETS); Energy Performance of Buildings (Certificates and Inspections) Regulations; Climate Change Act 2008; Carbon Reduction Commitment (2010); Energy End-Use Efficiency and Energy Services Directive; The Carbon Trust’s building design advice; NHS Carbon Management Programme 	<p>Health and social care facilities can be energy-intensive with requirements for heating, cooling, medical technology, computer and other technology, ventilation and lighting etc</p> <p>Opportunities are available with good design to take advantage of natural light and ventilation; renewable technology solutions are becoming more cost-efficient and resilient; good management systems and staff trained in their optimal use; good housekeeping (for example turning lights and equipment off when not in use)</p>
Transport	<ul style="list-style-type: none"> CLG’s Planning Policy Guidance 13 – ‘Transport’ advises local authorities that new developments should be sited to maximise accessibility by means other than the car Health Technical Memorandum 07-03 – ‘Transport management and car parking’ Welsh Health Estates/Welsh Assembly Government’s “Travel Plan Toolkit” 	<p>A substantial proportion of a community’s traffic is related to health and social care activities involving staff, patients, visitors, ambulances, deliveries and logistical support</p> <p>Heavy traffic levels lead to congestion, missed appointments, road casualties, severance of communities, exhaust emissions and pollution, stress etc, leading to health concerns plus extra strain on health providers of service</p>

Issue	Legislative/strategic/other context	Comments
Water use	<ul style="list-style-type: none"> • CLG are developing requirements for water-efficient plant and equipment • Defra's (2008) water strategy 'Future water' • Government are keen to encourage project leads/contractors to introduce water-saving strategies • Local authorities will need impact assessments for new developments in areas faced with water stress • Health Technical Memorandum 07-04 – 'Water management and water efficiency – best practice guide for healthcare organisations' 	<p>Buildings should play a key role in reducing demand for water. Healthcare facilities have to gauge this against added responsibilities for maintaining cleanliness and infection control</p> <p>Facilities managers should give advice when specifying water fittings and appliances, and should consider opportunities for rainwater harvesting in non-clinical areas</p>
Materials	<ul style="list-style-type: none"> • WRAP's (Waste & Resources Action Programme) website includes information on the recycled content of construction materials and relative costs • BERR's "Strategy for sustainable construction", which addresses materials specifications as well as waste prevention 	<p>Materials procurement and supply chain management is the ideal opportunity to move away from virgin materials to including recycled content. This requirement can be embedded in specifications and briefs</p> <p>Materials have environmental impact associated with resource depletion, pollution and embodied energy; plus associated travel distance, longevity and energy performance</p> <p>Healthcare organisations should expect more detailed information from suppliers about whole life-cycle scenarios from which to base informed procurement decisions</p>
Waste	<ul style="list-style-type: none"> • BERR's 'Strategy for sustainable construction' seeks to reduce the amount of construction waste generated • WRAP offers software tools to assist in management of waste • Defra has introduced the legal requirement for site waste management plans (SWMPs) • Health Technical Memorandum 07-01 – 'Safe management of healthcare waste' 	<p>Good design provides sufficient usable space for waste management and segregation, recovery, reuse, recycling opportunities</p> <p>Healthcare organisations can engage with suppliers to reduce waste through selective procurement</p> <p>The aim is to reduce, reuse and recover – disposal being the final option during both construction and operational phases</p>

Issue	Legislative/strategic/other context	Comments
Land use and ecology	<ul style="list-style-type: none"> Defra through its local authorities requires biodiversity action plans (BAPs) to support new developments and also into the operational context to conserve and enhance wildlife CLG's Planning Policy Statement 9 – 'Biodiversity and geological conservation' sets out planning principles Natural Environment and Rural Communities Act 2006 Approved Document C – 'Site preparation and resistance to contaminants and moisture' BRE's 'BR211 – Radon: guidance on protective measures for new buildings' (for advice on radon protection measures) 	Responsible healthcare organisations should liaise with local wildlife organisations etc to promote local wildlife and flora and fauna for the benefit of ecological balance to protect and enhance the well-being of the community
Pollution	<ul style="list-style-type: none"> BREEAM Healthcare assessors require evidence and clarification of indicators with respect to the low pollution objectives committed to by the project lead Methodologies for mitigation of pollution arising from site activity are an important part of the CEMP The building user manual should emphasise the pollution policy adopted by the development so that procurement of materials and systems during operation do not infringe the sustainability intent 	<p>A building with a healing function should not contribute to health-damaging pollution, both with regard to internal environments and to the community</p> <p>The project lead should commit to specifying systems and materials that do not pollute by way of their application and operational processes, notably nitrogen oxides in heating systems, global warming potential (GWP) from insulation products and VOCs from coatings</p> <p>Reducing pollution from vehicles will be addressed by a commitment to a travel plan</p>

5 How to build sustainable buildings

- 5.1 ‘How to build sustainable buildings’ summarises what should be done (**commitment**) at each project stage and what works should be completed or developed at each stage (**recommended action**).
- 5.2 It details the various project stages of a building’s life, namely:

a. justification
b. scoping
c. procurement
d. commitment
e. construction
f. post-construction
g. operation
h. end of life

Scope for refurbishment

- 5.3 In terms of resource use, minimising adverse environmental impacts and other sustainability perspectives, the adaptation of an existing building may prove to be a superior option to new build. This can only be determined by a robust option appraisal that includes life-cycle considerations. The European Commission has provided methodological guidance in ‘Life-cycle costing (LCC) as a contribution to a sustainable construction: a common methodology’.
- 5.4 There are several opportunities for improvement to the social, economic and environmental sustainability of an existing building. These range from an upgrade of operations to reduce and improve their impact on the community and environment, to physical changes to the building that improve it in terms of quality and environmental performance.
- 5.5 If physical changes to an existing building are planned, this should also be managed in such a way that reduces the impact on the community and environment.

Process flowchart

- 5.6 The process flowchart maps out the content of the guidance with paragraph numbers for easy reference to further information found within the various chapters of this document. The flowchart visually sets out the actions in the context of the overall process and the applied procurement route.

How to use the flowchart

NOTE: if you are intending to print out the flowchart it will be much more legible if you use an A3 printer.

The flowchart works on the same principle as a matrix.

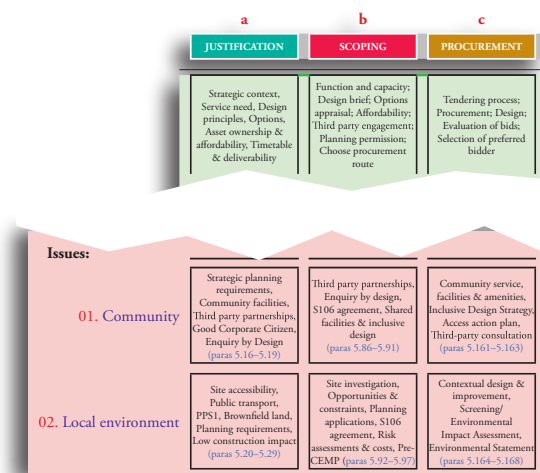
Each of the 13 “issues” identified under [Chapter 4](#), “Issues to be considered” has been given a number based on its hierarchy in that table. “Community” is first in the list and is therefore assigned “01” in the flowchart. “Local environment” is second in the list and is assigned “02” – and so on until the last of the 13 (“pollution”), which is accordingly assigned “13”. These subjects are ranged down the left-hand column in Part 2 of the flowchart.

Each of the eight project stages shown under [paragraph 3.11](#), “Who has to do what and when” is ranged along the top row of the flowchart in the order of project progress. “Justification” (being the first stage) is assigned the alphabetic value “a”; “scoping” is assigned “b” etc.

Information can be found on the issues to consider at each project stage by scanning across the top row and down the left-hand column, then reading the information in the cell where the two sites intersect each other. For example, to find out about local environment issues at the justification stage, scan down to “02” in the left-hand column and scan across to “a” along the top row, and read the intersecting cell for a basic summary of information needed. A cross-reference is then given to the main narrative, which gives more detailed information. See [Figure 3](#).

The subheadings relating to the “13 issues” are given alphanumeric values (based on their position in the flowchart) for easy cross-reference back to the flowchart. Thus, in the example in the [previous paragraph](#), the subheading would read “a-02 Local environment” – which refers to the subtitle “local environment” within the section on “justification”, prefixed by its alphanumeric value (that is, “a-02”).

Figure 3



Justification (a)

Commitment

- 5.7 Capital projects require approval by internal bodies. This internal approvals process seeks to ensure that all new developments are fully consistent at national, regional and local levels.
- 5.8 Priorities include not only current and future needs in terms of service delivery but also known sustainability objectives such as the energy-efficiency targets described in [paragraph 2.8](#), ‘Energy and carbon efficiency – Low- to zero-carbon buildings approach’.
- 5.9 Any individual building project for health and social care should be considered in the context of a strategic service development plan (SSDP) for the local area or relate to a PCT’s strategic plans and annual operational plans. The aim is to ensure that any investment in premises will improve services. As part of an SSDP, existing services should be reviewed with respect to the distribution of medical resources, current capacity and delivery patterns.
- 5.10 Once the broad principles and “ideal scenario” for developing new premises in a particular locality have been documented, it is necessary to examine how existing premises fit with this vision. The pattern and condition of existing premises should be documented using available tools such as SHAPE and the Estates Audit Toolkit.
- 5.11 An options appraisal should be carried out to establish the optimal configuration of services across a local area. This should be a collaborative exercise involving local healthcare providers (for example GPs), the community, the voluntary sector, social services staff, local government managers and patients.
- 5.12 The justification stage is a crucial opportunity to ensure that sustainability – and not just economic benefits – are taken into account when any development is considered. This implies consideration of issues such as:
- the reuse of existing buildings as opposed to new build;
 - social accessibility, which also factors in the aim to reduce travel by means of private transport;
 - using brownfield land with a scope to improve the ecological value of greenfield land.
- 5.13 For this reason, it is important at this early stage to engage with planning authorities, public transport providers and entities such as the Highways Agency in order to understand other strategic priorities beyond those of health and social care services and also the wider determinants of quality and sustainability objectives that may be required by third parties.

Key principles

The five principles and the ten hallmarks of sustainable development (see [Figure 1, page 2](#))

Process flowchart

h

g

f

e

d

c

b

a

Project Stages (see [Table, pp 10–12](#))

JUSTIFICATIONSCOPINGPROCUREMENTCOMMITMENTCONSTRUCTIONPOST-COMPLETIONOPERATIONEND OF LIFE

Activities during each stage

Strategic context, Service need, Design appraisal, Options, Asset ownership & affordability, Timetable & deliverability	Function and capacity; Design brief; Options appraisal; Affordability; Third party engagement; Planning permission; Choose procurement route	Tendering process; Procurement; Design; Evaluation of bids; Selection of preferred bidder	Finalise & sign-off contracts & design; Site mobilisation; Enabling Work	Site compounds; Delivery and storage; Construction; Site management; Waste management; Building & services commissioning	Installing remaining equipment; Getting systems operational; Staff training; Patient commissioning	Monitoring & reporting; Management & maintenance	End of NHS tenancy and/or ownership; Site disposal
Strategic Case eg SOC/SSDP	Outline Business Case, including LIFT Stage 1	Full Business Case, including LIFT Stage 2 & PH ABC/CFBC	Sign off & start on site	Handover of new/refurbished facilities	Building User Manual & opening of facility in operational use	Reporting, Hard facilities management & life-cycle management	Refurbishment, alternative use, deconstruction or disposal of site
Notes	Schemes going for single-stage FBC still need to complete stages a & b well before approval		Including sign off by district valuer and PCT agreement to reimburse rentals for third-party developer schemes				

Key stakeholders to involve:

- Healthcare organisations
- Health service commissioners.
- Health organisation boards.
- Other health & social care providers.
- Strategic authorities.

External authorities

Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE) plus Planning authorities	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE) plus BREEAM audit	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE)	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE)	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE)	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE) plus BREEAM audit	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE)	Local authorities (eg planning etc). Government health departments (for larger schemes). Government agencies (eg EA, HSE)
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Other stakeholders

Service partner agencies Other potential occupants. Public & patient involvement. Sustainability champion	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors	Other service providers. Public & patient involvement. Sustainability champion. BREEAM assessors
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WHO AND WHEN?

WHAT?

Commitments

Sustainability targets and KPIs (paras 5.7–5.15)	Commission key expertise, WLC Feasibility study, BREEAM Pre-Assessment, Verify KPIs & targets, Sustainability statement (paras 5.80–5.85)	Clarify sustainability objectives, Commission expert team, BREEAM (D&P), Focus on sustainability targets (paras 5.156–5.160)	Sign off design & procurement sustainability objectives, Commitments for sustainable site activity (paras 5.224–5.227)	Considerate Constructors Scheme (CSS), Construction Environment Management Plan (CEMP), Appoint Site Manager (paras 5.264–5.267)	Commissioning, Building User Manual, Appoint estates/facilities manager (paras 5.299–5.302)	User Awareness, Management, Monitoring, Good Corporate Citizen Test, BREEAM (PCR & M&O), Seasonal commissioning (paras 5.332–5.336)	Estate evaluation, Opportunities for reuse, Sustainable disposal, Environmental Management Plan for demolition (paras 5.365–5.370)
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Issues:

Refer to BREEAM Healthcare Assessment							
01. Community	Strategic planning requirements Community facilities, Third party partnerships, Good Corporate Citizen, Enquiry by Design (paras 5.16–5.19)	Third party partnerships, Enquiry by design, S106 agreement, Shared facilities & inclusive design (paras 5.86–5.91)	Community service, facilities & amenities, Inclusive Design Strategy, Access action plan, Third-party consultation (paras 5.161–5.163)	CCS, BREEAM management commitment (paras 5.228–5.229)	CCS, BREEAM (paras 5.268–5.269)	User awareness, Signage, Accessible controls (paras 5.303–5.305)	Good Corporate Citizen, Shared facilities & accessibility community surveys (para 5.337)
02. Local environment	Site accessibility, Public transport, PPS1, Brownfield land, Planning requirements, Low construction impact (paras 5.20–5.29)	Site investigation, Opportunities & constraints, Planning applications, S106 agreement, Risk assessments & costs, Pre-CEMP (paras 5.92–5.97)	Contextual design & improvement, Screening/ Environmental Impact Assessment, Environmental Statement (paras 5.164–5.168)	CCS/ CEMP Mitigation of impact on local environment, BREEAM management commitment (paras 5.230–5.231)	CCS, CEMP, BREEAM (paras 5.270–5.273)	Mitigate impact of occupation (para 5.306)	Strategic plans for development, Improve public spaces, By Design, Environmental management plan (paras 5.375–5.377)
03. Design quality	Design review, AEDET Evolution & ASPECT criteria (paras 5.30–5.32)	Design review, Design Champion, Design brief, AEDET Evolution, ASPECT (paras 5.98–5.99)	Design review, AEDET Evolution, ASPECT, Design & Access Statement, Statutory requirements (paras 5.169–5.175)	Detailed instructions, Appoint informed site supervisor (paras 5.232–5.233)	Site supervision, Approved changes (para 5.274)	Quality checks, Maintenance information (paras 5.307–5.308)	Evaluate building fabric quality, AEDET Evolution, ASPECT spatial/functional quality assessments (paras 5.378–5.379)
04. Flood risk and SuDS	Flood risk, PPS25, Development restrictions, Water management & SuDS objectives (paras 5.33–5.38)	Flood risk assessment (FRA), BREEAM, Water management & SuDS, Land take, Climate change implications (paras 5.100–5.105)	Flood risk mitigation, Pollution control, Water management/ SuDS design & specification (paras 5.176–5.178)	BREEAM evidence, CEMP Water management & emergency response plan (paras 5.234–5.237)	Surface water management & pollution control, CEMP SuDS (construction) (paras 5.275–5.277)	Commissioning of water management systems, Building User Manual, Flood response (paras 5.309–5.310)	Increase permeability, Updated flood issues, Climate change (paras 5.380–5.381)
05. Future-proofing	Strategic service & planning requirements, Flexibility & adaptability (para 5.39)	Masterplanning for future change, Flexibility & longevity, Climate change adaptation (paras 5.106–5.110)	Flexibility hierarchy, Adaptable spaces, Future reclamation, Maintenance requirements, Climate change adaptation (paras 5.179–5.184)	Contractors/ site team awareness, Design changes (paras 5.238–5.239)	Site supervision (para 5.278)	Future-proofing information (strategic to detail), As built drawings (paras 5.311–5.312)	Evaluate failure of future-proofing strategy, Building demountability (paras 5.382–5.383)
06. Health and well-being	Healthy lifestyles, AEDET Evolution & ASPECT, BREEAM (para 5.40)	Opportunities and constraints, AEDET Evolution, ASPECT, BREEAM (paras 5.111–5.113)	AEDET Evolution, ASPECT, BREEAM, Views & outdoor space (paras 5.185–5.189)	BREEAM daylight calculations & evidence, Landscape detailing, CEMP low impact policy (paras 5.240–5.242)	Impact mitigation, Monitoring, CEMP (para 5.279)	Acoustics testing, Lighting commissioning (paras 5.313–5.315)	Healthy lifestyles & cleaner environment, Environmental management plan (paras 5.384–5.385)
07. Energy and carbon emissions	NHS energy targets, BREEAM target, planning requirements (paras 5.41–5.44)	Energy demand & supply, BREEAM, Feasibility study (paras 5.114–5.117)	Energy-efficient design, Low-carbon and renewable energy (paras 5.190–5.197)	Tender/contractor clarifications, BREEAM evidence, CEMP (paras 5.243–5.245)	Energy monitoring from transport & equipment, EA Carbon Calculator (paras 5.280–5.281)	Commissioning of energy-consuming systems (paras 5.316–5.318)	Embodied energy, Reuse of energy generation equipment (paras 5.386–5.388)
08. Transport	Site accessibility, Good Corporate Citizen, Transport plan, Travel Plan (paras 5.45–5.49)	Planning & LHA dialogue, Traffic assessments (paras 5.118–5.121)	Travel plan framework, Walkable distances, Cycling paths (paras 5.198–5.203)	Design Travel Plan objectives, BREEAM evidence (paras 5.246–5.248)	Reduce transport to & from site, CEMP Transport Management Plan (paras 5.282–5.285)	Travel Plan, Transport management (paras 5.319–5.320)	Accessibility & sustainable transport, Site transport management (paras 5.389–5.390)
09. Water use	Water conservation during construction & operation, Targets & KPIs (paras 5.50–5.51)	Water efficiency, Water consumption during construction (paras 5.122–5.125)	Water fittings/appliances detail & specification, Statutory requirements (paras 5.204–5.205)	Tender/contractor clarifications, CEMP water use policy (paras 5.249–5.251)	Water consumption monitoring, Rainwater recycling, CEMP (para 5.284)	Commissioning, Building User Manual, Monitoring requirements (para 5.321)	Environmental management plan, Rainwater recycling (paras 5.391–5.392)
10. Materials	Refurbishment & reuse, Local sourcing, Recycled content, Low pollution (paras 5.52–5.58)	Materials audit, Local sourcing, Recycled content, Longevity (paras 5.126–5.132)	Material properties, Supply chain, Sustainable specification, BREEAM (paras 5.206–5.210)	Sustainable materials specification, CEMP materials policy (paras 5.252–5.254)	Delivery and storage, Construction efficiency, CEMP Site supervision (paras 5.285–5.287)	Maintenance information, Building User Manual (paras 5.322–5.323)	ICE Demolition Protocol, SMART Audit (paras 5.393–5.394)
11. Waste	SWMP, Zero net waste, Targets & KPIs (paras 5.59–5.64)	Waste hierarchy, SWMP, Energy from waste (paras 5.133–5.142)	Storage & access requirements, Waste monitoring (paras 5.211–5.213)	Waste targets, CEMP site waste management (paras 5.255–5.257)	Site Waste Management Plan, CEMP, BREEAM (paras 5.288–5.289)	Commission waste equipment, Building User Manual (paras 5.324–5.325)	Demolition Waste Management Plan, CE Demolition Protocol (paras 5.395–5.396)
12. Land use and ecology	Brownfield land, Ecological protection, enhancement & management objectives (paras 5.65–5.67)	Ecology & tree surveys, PPS9, Environment Agency, Appropriate Assessment, BREEAM, Pre-CEMP (paras 5.143–5.149)	Ecological enhancement, External consultation, Siting of buildings, SuDS/ Green roofs/ Living walls (paras 5.214–5.218)	BREEAM evidence, Legislative compliance, Management Plan, CEMP protection & supervision (paras 5.258–5.259)	Ecology protection and specialised site surveillance, CEMP, BREEAM (paras 5.290–5.292)	Management Plan, Appoint qualified ecologist (paras 5.326–5.327)	Ecological enhancement, Ecology & tree surveys (paras 5.397–5.399)
13. Pollution	Low pollution targets & KPIs (Nitrogen oxides, GWP, VOCs) (paras 5.68–5.69)	Clarify targets and KPIs, Guidance on specification and evidence (para 5.150)	Low pollution procurement objectives & guidance (para 5.219)	Evidence & clarifications, BREEAM, CEMP pollution policy (paras 5.260–5.261)	Pollution control and monitoring, CEMP (para 5.293)	Pollution policy, Building User Manual (para 5.328)	Environmental management plan (para 5.400)

Note: The allocation of tasks to individual columns is not rigid. Some tasks will span more than one project stage.

- 5.14 It should be demonstrated from the outset (for example in the SOC) that sustainability is key to the development proposed, by clarifying objectives, aims and key performance indicators (KPIs) for the issues described in ‘Recommended action – a-01 Community’.
- 5.15 Aims, objectives and KPIs are not finite and, if the proposal is approved, should be explored, detailed and improved at the next stage of development, the “scoping” stage, through an option appraisal study that sets out the design brief and business case.

Recommended action – a-01 Community

- 5.16 An SSDP/SOC should investigate opportunities for the local community. Ongoing public consultation with patients, service users, carers and wider stakeholders within the community should form an integral part of the planning process. Such a consultation process can help healthcare organisations to ensure that they meet the needs of their local communities.
- 5.17 By working in partnership with local government, other public services and community-based organisations, healthcare organisations can find new ways to deliver better healthcare, for example through exercise referral programmes and mutual volunteering initiatives such as “time banks”. This can help to promote social cohesion and wellbeing.
- 5.18 Since healthcare facilities are often located within existing communities, they can contribute to health in ways that go well beyond their clinical functions, by helping to provide resources such as sports and arts facilities, meeting rooms, cafés and restaurants.
- 5.19 Facilities can be further developed to:
- complement the core social and healthcare services;
 - improve accessibility by all travel models, taking into account users’ needs and the opportunities and limitations of different social groups;
 - provide a focal point for the local community;
 - fill gaps that may be present in the local healthcare or social economy;
 - provide opportunities to improve the skills of local people;
 - make the building more attractive and a caring, healing environment for users;
 - improve the affordability of the project.

Methodologies and tools:

- BREEAM Healthcare;
- the Good Corporate Citizen self-assessment test;
- the Prince’s Foundation’s “Enquiry by Design” planning tool.

Recommended action – a-02 Local environment

- 5.20 At this stage, matters of concern with respect to the local environment relate to the suitability of the location – namely, accessibility and the quality of the land that is proposed for development.
- 5.21 Transport flows and accessibility are key issues for all developments. Adequate walking and cycling networks, safe access, and the provision of a good level of public transport are crucial factors.
- 5.22 The Institution of Highways & Transportation (IHT) gives guidance on acceptable locational and accessible transport infrastructure (‘Guidelines for planning for public transport in developments’).
- 5.23 The introduction of new transport nodes for larger development proposals could be of benefit to a currently under-served part of the community, therefore turning an identified constraint into an opportunity.
- 5.24 The other main issue with respect to the choice of location is the type of land to be built on and its quality.
- 5.25 The reuse of existing buildings or use of brownfield land is encouraged as part of a national objective to develop more sustainably (see CLG’s Planning Policy Statement 1 – ‘Delivering sustainable development’).
- 5.26 Before acquiring land, the project lead should check with the local authority that planning consent for the required use will be granted.
- 5.27 Early on in the process, it is advisable for project managers to make themselves familiar with their local authority’s planning policy and development objectives by speaking to planning officers (planners) and studying the local authority’s unitary development plan (UDP).
- 5.28 Once planners have an understanding of the site-related requirements for health and social care buildings, they can often assist in helping to find a suitable site. This may be a mixed-use development,

which may assist with integrating the building into the locality and making it affordable.

- 5.29 Contractors should also commit to mitigating the impact of construction works on the local environment by signing up to:
- an effective SWMP; and
 - the “considerate constructors’ scheme” (CCS)
- and by preparing a construction environmental management plan (CEMP).

Recommended action – a-03 Design quality

- 5.30 Tools such as Inspiring Design Excellence and Achievements (IDEAs), A Staff and Patient Environment Calibration Tool (ASPECT) and Achieving Excellence Design Evaluation Toolkit (AEDET Evolution) specify design criteria that can help to achieve the level of quality required by healthcare environments. They assist designers at the outline stage and throughout the evolution of the design process.
- 5.31 AEDET Evolution assessment criteria are used to evaluate design requirements at the early stages and are referred to throughout the design process to identify design strengths and weaknesses. In refurbishment projects, the same criteria can be used to identify opportunities for design improvement.
- 5.32 ASPECT focuses on design aspects that can impact on the levels of satisfaction shown by staff and patients, the health outcomes of patients and the performance of staff.

After a SOC has been established, a design review workshop is encouraged to ensure that all design options are considered/explored as early as possible, in order to achieve an eventual optimum design solution.

See also the NHS Design Review Panel guidance on the Department of Health website.

Recommended action – a-04 Flood risk and SuDS

- 5.33 When locating a new development, the susceptibility of the site to flooding will affect planning requirements. For guidance, refer to the Environment Agency’s “flood map” website.
- 5.34 Development on sites that are at high (greater than 1-in-75 chance of flooding in one year) and medium (between 1-in-200 and 1-in-75) risk of

flooding is discouraged, and the location of a new development should take this into consideration.

- 5.35 CLG’s Planning Policy Statement 25 – ‘Development and flood risk’ uses a “spatial planning system” to ensure that developments are directed away from high-risk areas and ensures that surface water drainage systems for new developments do not increase flood risk. Approved Document H of the Building Regulations (‘Drainage and waste disposal’) also encourages the use of sustainable drainage methods.
- 5.36 Developments should be designed in such a way that peak run-off rates and annual volumes of run-off are no worse than the existing conditions for the site. Surface water should be managed on-site using a sustainable drainage system (SuDS).
- 5.37 The concept behind SuDS is to mimic natural hydrological and hydrogeological cycles. A project lead/contractor should not aggravate or damage the existing conditions for a site and should have in place a surface water management strategy, ideally including SuDS.
- 5.38 A detailed flood risk assessment identifies the risks and implications and proposes mitigation measures.

Recommended action – a-05 Future-proofing

- 5.39 The development proposal should be forward-looking by addressing future service and planning requirements. From the outset (for example at the SOC stage), there should be clear commitment to this objective of flexibility and adaptability, giving broad descriptions on how the building will prepare for future needs and changes in terms of its size, function and environmental context. Additionally, future-proofing needs to take account of the government’s strategic aims and objectives as well as legislative requirements.

Recommended action – a-06 Health and well-being

- 5.40 All developments should ensure that lighting, noise levels, internal pollution levels, external views etc comply with regulatory requirements and achieve the appropriate criteria specified using IDEAs, ASPECT, AEDET Evolution and BREEAM Healthcare. A new/refurbished development can also commit to providing facilities and spaces that encourage healthy lifestyles such as outdoor spaces, cycle facilities and safe links to pedestrian paths.

Recommended action – a-07 Energy and carbon emissions

- 5.41 The Government set the following energy-efficiency targets for all NHS trusts (these are further expanded and explained in Health Technical Memorandum 07-02 – ‘Encode’):
- reduce levels of primary energy consumption by 15% or 0.15 million tonnes of carbon emissions from a base year of 1999/2000 to March 2010;
 - achieve 35–55 GJ/100 m³ energy performance for all new capital developments and major redevelopments/refurbishments and 55–65 GJ/100 m³ for existing facilities.
- 5.42 In the case of an individual development, there should always be a clear commitment from the outset (for example at the SOC stage) to:
- contribute to the above targets through a high level of credits from BREEAM Healthcare in design and specification; and
 - reduce and monitor the building’s use of energy.
- 5.43 The baseline requirement will be influenced by the local planning body’s energy and carbon strategy (contained in, for example, a supplementary planning document (SPD) for sustainable construction), and will encourage the introduction of renewable energy sources.
- 5.44 At this stage it may be difficult to establish an exact energy/carbon efficiency level for the development, but a commitment is required for an options appraisal at the scoping stage (if an approval is granted) which should determine feasible operational levels and associated KPIs.

Recommended action – a-08 Transport

- 5.45 New or extended buildings should address site accessibility and sustainable transport considerations. This should be encapsulated in a robust transport plan.

The Good Corporate Citizen self-assessment test can help organisations to manage transport issues in ways that benefit communities, support local economies and help protect the environment (see the corporate citizen website).

- 5.46 Sustainable transport is about encouraging walking, cycling and the use of public transport and about making sure that pollution and carbon-dioxide emissions are minimised.

- 5.47 There is scope at this early stage to embrace wide area transport plans as envisaged by the local highway authority and to understand opportunities and obligations with respect to transport and travel.
- 5.48 Healthcare organisations should produce a travel plan, which is a package of site-specific initiatives aimed at improving accessibility and the availability and choice of travel modes to and from a development. It should also aim to promote practices or policies that reduce the need for travel.
- 5.49 Co-location of primary, community, acute health and social care services is important in terms of reducing the transport needs of patients, and hence the polluting effects of vehicles.

Recommended action – a-09 Water use

- 5.50 Healthcare organisations should demonstrate a commitment to reducing and monitoring the use of potable water.
- 5.51 They should also monitor and commit to reducing use and wastage of potable water during construction. This can be achieved by ensuring adequate provision of meters and submeters.

Recommended action – a-10 Materials

- 5.52 The choice of location for the proposed development can have a considerable influence on the consumption of resources and the impact of construction materials on the environment.
- 5.53 Early consideration should be given to opportunities for refurbishment and reuse as opposed to new build. All developments should try to optimise the potential of existing resources on site.
- 5.54 A project lead should commit to requiring a remediation and/or demolition statement and to a presumption to retain existing buildings and reuse materials where possible (see English Partnerships’ (2007a) ‘Quality standards: delivering quality places’).
- 5.55 The local sourcing of raw and reclaimed materials can also be beneficial. Locating a development close to a sustainable forest or quarry can reduce the carbon footprint of the construction process.
- 5.56 In line with sustainable procurement objectives, healthcare organisations can invest considerably in the local economy and community – and thereby contribute to regeneration – by buying from a mix

of small, medium and large businesses and social enterprises.

5.57 Choosing the right materials can lead to a reduction in harmful environmental impacts. For example:

- it can lead to reduced waste generation;
- the need to transport goods can be minimised;
- it can reduce carbon emissions and other pollutants.

5.58 Examples of ways of achieving this are by specifying:

- materials with high environmental ratings (for example, limiting the options to environmental ratings between A+ and C, as rated by BRE's 'Green guide to specification');
- materials with higher than average recycled content; and
- materials that do not harm health and the environment (for example low global warming potential (GWP) insulation and low volatile organic compounds (VOC) coatings (that is, paints)).

NHS Wales Shared Services Partnership – Facilities Services (NWSSP-FS) has already agreed a KPI and a minimum standard of 15% in its framework contract for major projects, and WRAP is supporting DH in providing guidance and support to health developments.

Recommended action – a-11 Waste

5.59 A commitment is required to reduce waste from the construction and operational phases of any development. The design should ensure that the siting of waste receptacles is taken into account (to comply with legislation and segregation issues).

5.60 A project lead should commit to the preparation of an SWMP in accordance with the Site Waste Management Plans Regulations 2008 and BERR's 'Strategy for sustainable construction' with the aim of reducing waste during construction and managing waste efficiently to reduce the impact on the community and environment, and to cut costs.

5.61 For waste generated during the building's operational phase, the LPA should be consulted to find out about current and future waste collection, segregation and reduction strategies. A KPI for a

proposed development should tie in with this approach.

5.62 The project lead should commit to the required infrastructure (in particular, storage and access needs) to support a waste segregation and a reduction procedure.

5.63 KPIs will be explored in the next stage when the feasibility of various options is analysed.

5.64 A useful tool is SMARTWaste, which helps to calculate performance indicators.

Recommended action – a-12 Land use and ecology

5.65 The reuse of existing buildings and development on brownfield land are preferred to development on greenfield land.

5.66 Although greenfield land is naturally likely to have more ecological value than land that is already developed, brownfield land may support features of biodiversity value (such as the presence of bats in existing buildings).

5.67 Legislation requires project leads/contractors to commit to producing a biodiversity action plan (BAP) that involves:

- an investigation of the ecological value of the proposed site;
- protecting existing ecology;
- enhancing biodiversity; and
- setting a management plan for maintenance and monitoring.

Engaging or partnering with local wildlife groups could be beneficial.

Recommended action – a-13 Pollution

5.68 Pollution policy, especially because of its direct implications in human health and the environment, should be set at this early stage. The project lead should commit to specifying systems and materials that do not pollute by way of their application and operational processes, notably nitrogen oxides in heating systems, GWP from insulation products and VOCs from coatings.

5.69 Reducing pollution from vehicles should be addressed by commitment to a travel plan (see 'Recommended action – a-08 Transport').

Scoping (b)

Many of the tasks and activities listed under the scoping and procurement stages overlap and can be regarded as a continuum rather than specific to an individual stage. Thus project teams will need to determine when to apply these activities in these stages so as to best enhance the sustainability credentials of their scheme.

- 5.70 With the strategic context and vision agreed, a capital procurement plan should now be prepared.
- 5.71 The choice of procurement route is based on the type of development and available funding.
- 5.72 Financial models are essential for determining whole-life costing calculations, value for money, affordability and budgetary requirements (both capital and revenue).
- 5.73 The formal approval of any scheme will be subject to a prescribed business case process or similar.
- 5.74 The type of business case needed for any particular project will depend on the following:
 - the capital procurement route that will most probably be used;
 - the size of the project being considered;
 - the advice of the lead trust.
- 5.75 The development of a business case should give all interested stakeholders a clear view of:
 - what the project will involve;
 - how much it will cost;
 - how it will be funded;
 - the proposed timetable; and
 - what services the new building will be able to deliver.
- 5.76 An outline business case should:
 - describe the business outcomes and service/works requirements in a way that is unambiguous;
 - outline the total project scope;
 - specify requirements in terms of outcome, based on “what” rather than “how”;
 - include information on availability of site;
 - include financial projections;
 - show initial concept designs;
 - calculate site-specific outline costings; and
 - identify sources of funding.

See the Office of Government Commerce’s (OGC) website for further guidance on what an outline business case should include.

- 5.77 Moving the project from the feasibility stage to the detailed project briefing stage involves a considerable change in the scope and scale of information to be gathered and decisions to be made. Other stakeholders and organisations may need to be involved in the process in order to provide specialist knowledge and to ensure support for the proposals from the outset.
- 5.78 A detailed assessment should be undertaken to investigate sustainability options and to verify requirements and key performance indicators (KPIs) with respect to delivery and affordability. All this should be done within the context of community and planning requirements, and should involve discussions with experts such as planners, cost consultants, architects and sustainability consultants.
- 5.79 The results of community and third-party involvement, a thorough site investigation, identified constraints and opportunities, and sustainability assessments should all be incorporated in the design brief. In turn, the brief should inform the type of project team needed and the desired outcomes of the development. A thorough and articulate design brief is a critical part of the design process as it helps develop trust and understanding between the client and designer and serves as an essential point of reference for both parties.

Commitment

- 5.80 At the scoping stage, it is important to verify the aims, objectives and mechanisms (that is, KPIs) for sustainable development and to integrate these into the design brief.
- 5.81 Site investigation and community engagement are required to inform an option appraisal, which

assesses opportunities and constraints in terms of costs and deliverability.

5.82 A team of experts, including a BREEAM Healthcare assessor, should:

- carry out a site investigation for the different disciplines of site- and community-related factors (such as community-wide energy solutions or renewable energy types);
- conduct a feasibility study to establish the aims, objectives and KPIs in order to verify sustainability factors.

5.83 Feasibility studies covering any option appraisal for the proposed development should be assessed by considering life-cycle costing (LCC), which includes:

- the cost of design and construction;
- the long-term operational and maintenance costs; and
- the costs associated with disposal.

5.84 The LCC study should be for a period of 25 to 30 years (as applicable – but ideally up to 60 years), and should be shown in real, discounted and non-discounted cash-flow terms.

5.85 A programme for delivering the project should be established from the outset. Initially this should be a “broad-brush” bar chart which should develop over time to include all aspects of the project, as well as timescales for project procurement, commissioning and occupation.

Recommended action – b-01 Community

5.86 This is the stage at which a decision should be made about how to involve the community and other third parties that are affected/interested in the proposed development.

5.87 Partnerships between healthcare organisations and third-party organisations can lead to facilities that are better designed to meet users’ needs (see the National Strategic Partnership Forum’s (2007) ‘Making partnerships work: examples of good practice’).

5.88 The Prince’s Foundation’s “Enquiry by Design” planning tool encourages workshops that explore key issues, test initial concepts and develop a vision. These workshops should take place throughout the development of the design up to the final presentation. The structure of this process can be tailored to the requirements of local development frameworks (LDFs) and area action plans (AAPs).

5.89 At this stage, the community and third-party organisations can flag up key issues and help develop a vision that is then locked into the design brief and sustainability statement for further development following procurement. The issues identified at this stage may become part of conditions attached to planning permission (such as a requirement for a community centre or shared facilities in the area or an improvement to public transport services).

5.90 All facilities need to be physically accessible to all. The design brief should include an inclusive design strategy including AAPs for any existing buildings (see English Partnerships’ (2007b) ‘Guidance note: inclusive design’).

5.91 CABE’s (2006) ‘The principles of inclusive design’ suggests that successful designs should be:

- inclusive, so that everyone can use them safely, easily and with dignity;
- responsive, taking account of what people need and want;
- flexible, so that different people can use them in different ways;
- convenient, so that everyone can use them without too much effort or separation;
- accommodating, for all people, regardless of age, gender, mobility, ethnicity or circumstances;
- welcoming, with no disabling barriers that might exclude some people; and
- realistic, offering more than one solution to help balance everyone’s needs and recognising that one solution may not work for all.

Recommended action – b-02 Local environment

5.92 A baseline investigation should be undertaken at this stage to find out about the local environment and to identify opportunities and constraints for development.

5.93 For this, it is important to undertake a site appraisal. This should have input from a multidisciplinary environmental team. CLG/ CABE’s (2000) ‘By design – urban design in the planning system: towards better practice’ includes the type of assessments that should be considered:

- planning context (current policies, applications and consents);
- strategic context (links to the wider area and relationships to surrounding development);

- local and immediate context (adjacent land uses and links to the area or site);
- site and statistics (size, proportions, boundary definition);
- site and area characteristics (contours, ecology, landscape, hydrology, ground conditions, crime pattern analysis);
- site and area infrastructure (roads, services, utilities);
- statutory constraints (listed buildings, tree preservation orders);
- development feasibility, including an assessment of market demand;
- important structuring elements such as axes, historic routes, watersheds and main points of site access;
- a site's/area's capacity for development.

5.94 Outline and full planning applications will normally be required during the development process, although responsibility for these and exactly where they occur in the development process will vary, depending on the procurement route selected.

5.95 Any Section 106 conditions (of the Town and Country Planning Act 1990) attached to a planning permission may also add to the opportunities and constraints, such as a requirement to respect the local environment/area.

5.96 The baseline investigation may reveal a requirement for preparatory works and additional cost implications such as contaminated-land remediation works, a protected species or an opportunity to reclaim material from existing structures. This should be factored into the budget when the business case is put together. A costed risk assessment should therefore be completed and mitigation measures identified.

5.97 The baseline investigation should also inform an outline construction environmental management plan (CEMP), which should be developed by the site contractor. A CEMP should identify potential impacts, performance objectives, management actions and strategies, performance indicators and monitoring aspects for a number of factors in a construction site. The contractor should submit the CEMP to the LPA before commencing construction work.

Recommended action – b-03 Design quality

5.98 All trusts and PCTs embarking on new developments, whether they are refurbishment or new-build projects, should appoint a design champion to their board of directors.

5.99 The design brief should specify the expected design quality standards, referring to assessment methods such as AEDET Evolution and ASPECT. It should include information on principles and standards, the strategy for growth and change, and explain how to update operational briefing information, room data sheets and accommodation schedules.

At this stage, and prior to OBC submission, a design review is encouraged to ensure that the optimum design solution is included in the preferred option.

See also the NHS Design Review Panel guidance on the Department of Health website.

Recommended action – b-04 Flood risk and SuDS

5.100 A flood risk assessment outlines the main flood risks to a development site and presents recommendations for mitigating measures to reduce the impact of flooding to the site and surrounding area. It helps to establish the nature and scale of the existing risk, and how this may change over time or as a result of any flood risk management measures. The Environment Agency continually monitors present water levels and develops models from this data to predict the course and severity of future floods.

5.101 Siting developments in areas of low flood risk (less than 1 in 1000 years risk of flooding) and specifying measures to minimise the risk of localised flooding is credited by BREEAM Healthcare.

5.102 A surface water management strategy should include a commitment to uphold water quality and to control the pollution of natural watercourses and the ground table. Biodiversity objectives could also be included (for example the creation of a range of wet habitats in conjunction with a SuDS scheme).

5.103 Features of a basic SuDS design include porous pavements, swales, ponds, wetlands, infiltration trenches and filter drains. Designs are dependent on site-specific factors, as run-off rates are a result of rainfall and local climatic and ground conditions, which vary considerably throughout

the UK. Project lead/ contractors should focus on a design that achieves simple drainage and flood control and also takes into consideration improvements to biodiversity, local land use, the requirements of the local community and measures to prevent pollution of surface run-off.

- 5.104** An option appraisal should demonstrate the cost and environmental implications of using SuDS, green roofs, permeable surfaces etc.
- 5.105** The feasibility of water management proposals should therefore be assessed in the context of predicted changes to local climatic patterns.

Recommended action – b-05 Future-proofing

- 5.106** The design brief should identify future plans for change. They should be indicated clearly and visually from a strategic level down to the detailed level.
- 5.107** Perceived change should go beyond the boundary of the development and should draw upon local planning objectives and amenities. In addition, planned preventive maintenance should be identified for the continued efficient sustainable running of the building through its life-cycle (see [Chapter 8, 'Future-proofing of healthcare buildings'](#)).
- 5.108** Whatever the longevity of a building, flexibility in design is important; therefore adaptability should be planned in at every level of design and detail. A hierarchy of flexibility should be created, based on:
- service-requirement patterns;
 - activities;
 - useful life; and
 - accessibility criteria.
- 5.109** Other considerations include durability, long-term suitability, opportunities for reclaiming construction materials and accessibility for maintenance and upgrade needs. The whole-life costing of a development maps out projected maintenance and replacement intervals, thus highlighting accessibility and longevity objectives for the design brief.
- 5.110** Changes in climatic patterns will have an impact on internal environments (overheating), the expected function of materials (such as increased expansion and contraction patterns or increased moisture levels due to rain), flood issues, biodiversity and landscape maintenance strategies

etc. The brief should clearly require evidence that the building is prepared for climate change in accordance with the latest reports by the UK Climate Impacts Programme (UKCIP), or similar.

Recommended action – b-06 Health and well-being

- 5.111** The design brief should emphasise the role of the development in improving the health and wellbeing of the users and community.
- 5.112** The baseline investigation should identify areas for improvement – such as sources of local noise and vibration, air quality, overshadowing and wind microclimate impacts – which can be developed into strategies and assessed for feasibility.
- 5.113** The preferred option should be described in the brief together with key requirements and KPIs using IDEAs, ASPECT, AEDET Evolution and BREEAM Healthcare.

Recommended action – b-07 Energy and carbon emissions

- 5.114** An energy and carbon emissions options appraisal starts with an exercise to determine the expected energy demand of the proposed development. This should be used as a baseline from which the various options to reduce energy demand and carbon emissions are assessed on a case-specific scenario with respect to:
- patterns of use;
 - security of provision;
 - opportunities for renewable energy sources;
 - community energy solutions/district heating schemes;
 - deliverability; and
 - long-term costs.
- 5.115** The design brief should encourage techniques such as passive solar heating, natural ventilation and natural lighting, which aim to reduce the need for artificial heating, cooling and lighting. Mechanical solutions should be limited to core areas (for example sanitary facilities, dirty utilities and those rooms where clinical or functional requirements have specific environmental needs).
- 5.116** Building services engineers should specify technology that is energy-efficient (for example heat-recovery systems).

5.117 Grant opportunities for renewable energy are available through:

- BERR's microgeneration strategy;
- the Low Carbon Buildings Programme;
- Defra's biomass energy scheme.

Recommended action – b-08 Transport

5.118 The local highway authority and planning authority should be consulted to provide information about projected transport developments.

5.119 Transport assessments (TA) and transport statements (TS) address the potential implications of a development on the entire transport system, including the public transport system, the strategic road network (SRN) and local highways and footways.

5.120 TAs and TSs enable highway authorities and contractors to assess whether any highway and access improvements, in relation to all modes of transport, are likely to be needed as a result of new or modified developments and, if so, the nature of those improvements.

5.121 The findings should be included in the design brief that informs the travel plan framework.

Recommended action – b-09 Water use

5.122 The baseline water-use requirements for the proposed development should be calculated. Strategies for reduction should then be explored with respect to sustainability, deliverability and costs.

5.123 The design brief should specify the use of water-efficient and leak-detection fittings, as well as covering the recycling opportunities of greywater and rainwater. Accordingly, the likely yield of rainwater or greywater systems should be determined.

Opportunities for using greywater and rainwater in the healthcare environment are explained more fully in Health Technical Memorandum 07-04 – 'Water management and water efficiency – best practice advice for the healthcare sector'.

5.124 There should be sufficient storage for the anticipated demand on the system.

5.125 All non-domestic buildings should be metered by water companies. The project lead should also put into place a requirement for monitoring of water use during construction work. This should form

part of the water management strategy, which identifies the aims and KPIs for the specific development.

Recommended action – b-10 Materials

5.126 When it is not feasible to retain existing site buildings and structures, pre-demolition audits are recommended to identify the volumes of on-site waste that a contractor can reuse, recycle or recover prior to starting works. Tools such as BRE's SMARTAudit help to:

- identify markets for recycled or recovered material;
- identify the reclamation and reuse potential (both on-site and off-site);
- value the demolition material in terms of costs and environmental qualification.

5.127 An understanding of land and building contamination at this stage will determine whether materials and/or structures on site can be reclaimed. Contaminated materials and structures to be reused should undergo on-site or off-site treatment, which will impact on the feasibility study and budget.

5.128 If materials cannot be reclaimed from site, there may be reclamation sites in the locality.

5.129 The sourcing of construction materials and labour is important as it affects opportunities in the labour/skills market, regeneration and transportation distances, and can contribute to the local economy. Early negotiations with supply chains will establish a link between these opportunities and the preferred design brief.

5.130 BRE's (2002) 'Green guide to specification' rates a range of possible construction composites for the main parts of the building fabric using a rating methodology that takes account of whole-life environmental impacts.

Note

The updated edition of the 'Green guide to specification' uses overall ratings between A+ and E.

5.131 BREEAM Healthcare gives credits for the responsible sourcing of materials. This ties in with the NHS sustainable procurement agenda for:

- the (socially and environmentally) responsible sourcing of raw materials;
- manufacturing processes; and

- the specifying of materials with high recycled content and low pollution indicators (see ‘Recommended action – b-13 Pollution’).

5.132 The suitability of materials is based on functional requirements such as insulation values, durability, maintenance, their low carbon impact and future reusability.

Recommended action – b-11 Waste

5.133 Early collaboration between the project team and the supply chain to design out waste should improve construction efficiency.

5.134 The overarching principle for managing waste is based on the waste hierarchy. This dictates that waste is managed – the first aim being prevention. Waste should be reused or recycled before being used as a source of energy. Final disposal of waste in a landfill site is the lowest priority in the waste hierarchy. It is recommended that this approach be sought in the design brief.

5.135 The amount of waste that goes to landfill can be reduced by reclaiming materials from site and specifying recycled content.

5.136 SWMPs contribute to a greater reduction of waste from construction.

5.137 The availability and accessibility of landfill, alternative technology treatment plant, incineration facilities and recycling services all impact on the waste management strategy and aims/objectives for minimising waste.

5.138 Waste storage areas should be adequate and suitable for purpose and should include ward-level stores, bulk storage areas, refrigerated storage, and composting and compacting facilities. They should have enough storage and access capacity to match the proposed frequency of internal and external collection.

5.139 Waste segregation and management is covered in Health Technical Memorandum 07-01 – ‘Safe management of healthcare waste’; Health Technical Memorandum 07-05 – ‘The treatment, recovery, recycling and safe disposal of waste electrical and electronic equipment’; and Health Technical Memorandum 07-06 – ‘Disposal of pharmaceutical waste in community pharmacies’.

5.140 BREEAM Healthcare gives credits for dedicated storage spaces that cater for recyclable materials, provided they:

- are compliant with Health Technical Memorandum 07-01; and

- are clearly labelled for recycling.

5.141 BREEAM Healthcare also gives the minimum requirements for the internal storage of recyclable materials.

5.142 Discussion with the local authority may reveal an energy-from-waste scheme in the locality, which should be considered in the option appraisal for both waste and energy in operation.

Recommended action – b-12 Land use and ecology

5.143 A qualified ecologist should be commissioned at the beginning of the site investigation stage to undertake a detailed investigation of the site’s biodiversity plan, taking into account seasonal constraints.

5.144 Planning, construction, development and regeneration should have minimal impact on biodiversity and enhance it wherever possible. Regional and local BAPs are required for species and habitats that are under threat and in decline. The European Union has now made the further commitment to halt biodiversity loss by 2010 (see CLG’s Planning Policy Statement 9 – ‘Biodiversity and geological conservation’).

5.145 The Environment Agency should be consulted for advice about obligations, required consents, information that needs to be provided, protection and enhancement opportunities.

5.146 An “appropriate assessment” under Regulation 48(1) of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) may be required in respect of any plan or project which:

- either alone or in combination with other plans or projects would be likely to have a significant effect on a European site; and
- is not directly connected with the management of the site for nature conservation.

Note

“Appropriate assessment” is required by law for all European sites (Regulation 48).

A European site is any classified special protection area (SPA) and any special area of conservation (SAC). Appropriate assessment is also required for potential SPAs, candidate SACs and listed Ramsar sites (a European designation which protects wetlands) for the purpose of considering development proposals affecting them (see CLG’s Planning Policy Statement 9 – ‘Biodiversity and geological conservation’).

5.147 BREEAM Healthcare credits:

- the use of land of low ecological value;
- the protection of ecological features during construction work;
- the mitigation of ecological impact by the proposed development;
- the enhancement of existing features of ecological value; and
- long-term ecological management.

The design brief should clearly set out these objectives.

5.148 A tree condition survey and evaluation is carried out based upon a topographical survey, whose details should be agreed with an arboriculturalist and landscape architect. Following the tree survey, it is recommended that a tree constraints plan (TCP) be prepared by the arboriculturalist, which should be used later to assist with site layout.

Should trees of significance be retained and potentially affected by the scheme, an arboriculturalist should be consulted to carry out an arboricultural implications assessment (AIA), which will inform the landscape and visual impact assessment (LVIA) and the provision of arboricultural method statements (AMS).

5.149 The outline CEMP should clearly set out works to be undertaken in accordance with an approved ecological/landscape management plan for the protection of features of ecological value as identified in the baseline assessment.

Recommended action – b-13 Pollution

5.150 The design brief should clarify the low pollution specification objectives determined in the previous stage, including guidance on labelling systems and certificates as evidence of compliance with the development's requirements.

b. scoping

c. procurement

Procurement (c)

Many of the tasks and activities listed under the scoping and procurement stages overlap and can be regarded as a continuum rather than specific to an individual stage. Thus project teams will need to determine when to apply these activities in these stages so as to best enhance the sustainability credentials of their scheme.

5.151 Depending on the procurement and contract routes being followed, project briefing documents can be used in two ways to procure new premises:

- to further develop the detailed design brief; or
- in a tender situation, to bring designers on board.

5.152 The project team should formally test the project to ensure that it accords with local and national policy and that it is affordable. The full business case (FBC), or equivalent, confirms that each of the criteria approved from the outline business case have been met.

5.153 Once the OBC has been approved, the project lead should ensure that the following are taken to completion in the FBC:

- availability of site;
- financial projections;

- site-specific outline costings;
- security of the site;
- planning application;
- detailed design;
- sources of funding.

5.154 The project team should have the required expertise; this will be determined by site-specific constraints and opportunities together with sustainability needs.

5.155 The designs are developed iteratively up to the planning submission stage and then amended further for the tendering process and to support works on site.

Procurement routes

Guidance on:

- primary care commissioning can be found at: <http://www.pcc-cic.org.uk/>
- public-private partnerships such as private finance initiatives (PFI) and NHS Local Improvement Finance Trust (LIFT) schemes can be found at: <http://www.dh.gov.uk/en/Procurementandproposals/Publicprivatepartnership/index.htm>

Procurement routes

Guidance on:

ProCure21+ (a procurement method for publicly-funded NHS capital schemes) can be found here:

<http://www.pcc-cic.org.uk/>

capital investment schemes and procurement routes in Scotland can be found here: <http://www.pfcu.scot.nhs.uk/Guidance/SEHD/SEHD.html>

Note

Wales uses a framework system of three supply chains for major projects over £5 million (called the “Designed for life building for Wales framework”) and third-party contractors for primary care schemes. Both these systems have different stages from those used in NHS capital schemes in England.

Commitment

- 5.156 When putting together a project team for a sustainable development scheme, it is important that the right skills and range of expertise are on board and that sustainable development (and other scheme) objectives are communicated clearly.
- 5.157 Any potential gaps in skills and experience should be identified and any misunderstandings clarified before a contractual agreement or procurement decision is made.
- 5.158 An environmental designer/engineer and a certified BREEAM Healthcare assessor should be consulted to help to achieve the aims and objectives established in the brief.
- 5.159 The project lead should commit to ensuring that the team works together towards the sustainability goals and that, as the work develops, it is continuously cross-checked against sustainability objectives.
- 5.160 It is crucial that the goals are known and sought from the outline design stages and are not considered too late in the design process when they become harder to achieve.

Recommended action – c-01 Community

- 5.161 An outline design should show the location of, and access to, community facilities and amenities that need to be provided, as described in the committed design brief.

- 5.162 It is recommended that a design champion and/or access consultant be involved at this stage to develop an inclusive design strategy for the project, including “access action plans” for any existing buildings. The proposed strategy should continue to develop at the various design stages and should be outlined in the design and access statement that accompanies the outline planning application.
- 5.163 Other occupants and partner service agencies should be involved at different stages of the design development, in particular for feedback when concepts of their vision are being tested up to the final designs.

Recommended action – c-02 Local environment

- 5.164 Information from the baseline investigation should be used to mitigate the development’s impact on the local environment. The proposed development should not be designed in isolation but in the context of its built, social and natural environment.
- 5.165 A screening process should be carried out, which assesses a scheme with respect to how it will impact on the environment. The screening process should be developed in discussion with bodies such as the Environment Agency and English Heritage, who will form an opinion on whether a full environmental impact assessment (EIA) will be required.
- 5.166 In terms of a development’s impact on the surrounding environment, the site factors that should be considered include:
 - land quality;
 - townscape and visual implications;
 - cultural heritage;
 - traffic and transport;
 - flood risk;
 - ecology;
 - air quality;
 - odour;
 - noise;
 - vibration;
 - socioeconomics and community effects;
 - wind; and
 - overshadowing.

5.167 An EIA is a procedure that should be followed for certain types of project before they can be given “development consent”. It enables environmental factors to be given due weight, along with economic or social factors, when planning applications are being considered. From the project lead’s point of view, preparing an environmental statement in parallel with the project design will provide a useful framework within which environmental considerations and design development can interact. Taking these steps is likely to make the formal planning approval stages run more smoothly (see CLG’s (2001) ‘Environmental impact assessment: a guide to procedures’).

5.168 The environmental statement’s purpose is to provide information to the public and other interested parties about the proposed measures to enhance the environment and to mitigate any negative impacts by the proposed development.

Recommended action – c-03 Design quality

5.169 AEDET Evolution assists designers in determining and managing their design requirements from initial proposals through to post-project evaluation. It is used as a benchmarking tool and is part of the process for ProCure21, PFI, LIFT and conventionally-procured schemes.

5.170 AEDET Evolution evaluates a design by posing a series of clear, non-technical statements, encompassing the three key areas of impact, build quality and functionality.

5.171 ASPECT deals with the way the healthcare environment can impact on the levels of satisfaction shown by staff and patients, in particular the health outcomes of patients and the performance of staff.

5.172 It can be used as a stand-alone tool or it can be used to support AEDET Evolution to provide a more comprehensive evaluation of the design.

5.173 Although both toolkits should be used to set a minimum score which all developments are expected to achieve, a sustainable development should aim for a maximum practically-achievable score subject to the usual affordability and value-for-money constraints for all the assessment criteria.

5.174 If planning application is needed, a design and access statement is now required to accompany this application. A design and access statement

explains the design thinking and helps local authorities to understand the likely effect of any development proposals (see CABE’s (2007) ‘Design and access statements: how to write, read and use them’). Planning authorities will expect project leads to commission competent design professionals when preparing planning applications.

5.175 All development proposals should conform to statutory approvals, Building Regulations and statutory undertakings.

At this stage, and prior to FBC submission, a design review is encouraged to ensure that an optimum final design solution is taken forward.

Recommended action – c-04 Flood risk and SuDS

5.176 A flood risk assessment outlines the mitigation measures needed to reduce the associated risks. Mitigation measures should be developed with the project team at an early stage to ensure that design and engineering works are included in the design scope and integrated with the overall design proposal.

5.177 Areas at high risk from pollution such as car parks, waste disposal facilities and plant areas should be treated or protected using oil separators or filtration systems to prevent pollution of natural watercourses from surface water run-off.

5.178 Specialised advice may be required for water management systems such as SuDS for both design detailing and specification for procurement.

Recommended action – c-05 Future-proofing

5.179 The flexibility and preparedness of a design proposal should be demonstrated graphically in such a way that it can be referred to in the future when changes are planned.

5.180 A hierarchy of core, movable and less essential parts is helpful in demonstrating future-proofing. For example, the core structure should last 60 years; engineering services should have a 15- to 25-year lifespan (depending on size and complexity of facility); and the internal layout should be sufficiently flexible to meet anticipated service changes every two or three years.

5.181 Consideration should be given to planned preventive maintenance schedules for windows, heating and cladding renewals halfway through service life. The building fabric should be specified

and procured in such a way that future reclamation of materials is simplified.

5.182 Rooms within a building should be of a generic rather than bespoke design. This will facilitate a room's change of use from one function to another in the future. Bespoke solutions are only encouraged insofar as they do not hinder a reconfiguration of space and function. Generic multi-purpose spaces are far more likely to be successful in the long term than bespoke specialised designs. This approach is not intended to hinder innovation, but redirects creative energy towards a future-proof solution.

5.183 Circulation and service infrastructure should be planned strategically in such a way that they continue to serve various rearrangements of the building's use and form.

5.184 Future-proofing also emphasises the need to demonstrate that regular and long-term maintenance is unhindered and that the building is prepared to respond to climate change.

Recommended action – c-06 Health and well-being

5.185 The project team needs to show evidence that health and well-being criteria for IDEAs, ASPECT, AEDET Evolution and BREEAM Healthcare are being achieved.

5.186 ASPECT includes criteria such as patient privacy and environmental control, views and outdoor spaces.

5.187 BREEAM Healthcare includes daylight calculations based on finalised drawings. The assessment credits developments with a large percentage of patient, staff and public areas that have a view of the sky or of an outdoor environment, as well as the provision of an accessible outdoor space for use by the building's occupants.

5.188 The requirement, provision and access to quality outdoor space are important elements of a healing and working environment. Research has shown that access to, and views of, a landscaped environment can contribute significantly to the healing process.

5.189 A variety of outdoor spaces should be included within the grounds of the facility – some that offer a relative amount of privacy, others that allow more social interaction. They should include:

- ease of access, with or without assistance, to a variety of outdoor spaces;

- ease of access along paths that link different types of space and event;
- healing/therapeutic opportunities (for example “green gyms”, which have proved beneficial to patient treatment/recovery rates);
- visual stimulation from and within the outdoor area, such as long-distance views, water features etc;
- biodiversity features such as plants and planting groups and the wildlife they support.

Recommended action – c-07 Energy and carbon emissions

5.190 An energy-efficient design strategy to reduce the demand of artificial means of heating, cooling, ventilation and lighting should be developed and tested throughout the design development with the help of specialised advisers.

5.191 The most important influencing factors in the design of the external building fabric are high insulation, airtightness, shading, and avoidance of thermal bridging. The building form, orientation, external elements and aperture size, location and function will also be influential in reducing the base energy demand.

5.192 Owing to the high energy demand in health and social care buildings, it is recommended that any additional heating, cooling, ventilation and lighting requirements, as well as appliances/equipment (such as for offices and catering areas), are specified as energy-efficient/low carbon footprint types.

5.193 Low-carbon and renewable energy systems should be used. Early feasibility studies should indicate the best options for supplying the estimated energy demand by these means.

5.194 In larger healthcare buildings that require an independent energy generation system, CHP is recommended. Good quality CHP is exempt from the climate change levy (CCL), which reduces the payback period and increases the cost savings. The installation of CHP alone should, in most cases, be sufficient to reduce the organisation's emissions in line with national mandatory targets.

5.195 Community groups and public- and non-profit-sector applicants can make a claim under Phase 2 of the Low Carbon Buildings Programme (LCBP2) for up to 50% of the costs (limited to a maximum of up to £1 million in grant funds per site and a maximum of three eligible technologies)

of installing approved microgeneration technologies, namely:

- solar photovoltaics;
- solar thermal hot water;
- wind turbines;
- ground-source heat pumps;
- automated wood pellet stoves;
- wood-fuelled boiler systems.

The Low Carbon Buildings Programme is managed for BERR by BRE. It is part of the Environmental Transformation Fund (ETF), a joint BERR/Defra fund to bring forward the demonstration and deployment of carbon energy and energy efficiency technologies.

Health Technical Memorandum 07-02 provides guidance on the options available for renewable and low carbon generation, as well as for energy-efficient systems.

- 5.196** If an energy services company (ESCO) is required for management of energy generated on site, maintenance and operation, discussions should start at an early stage in order to ensure that the design satisfies their requirements. What distinguishes these companies from the traditional energy consultants or equipment suppliers is that they can also finance or arrange financing for the operation, and their remuneration is directly tied to the energy savings achieved.

See the Joint Research Centre's (JRC) website on energy service companies.

- 5.197** BREEAM Healthcare gives credits for the submetering of substantial energy use within a building to enable better monitoring of energy use. It is recommended that, as a minimum, space heating, cooling plant, any humidification plant, major fans and lighting are submetered, and likewise small power on separate floors or departments.

Recommended action – c-08 Transport

- 5.198** The travel plan framework (developed with the project team and reflected in design proposals) should bring about the better use of public transport, improved accessibility, improved movement around the site and opportunities for physical activities such as walking and cycling, taking into account security and safety.

- 5.199** A travel plan uses the information derived from a transport assessment to ensure compliance with planning and development control requirements. It will influence the design of access and routes to accommodate pedestrians, cyclists, cars and delivery vehicles. It will also indicate additional spatial requirements such as cycle storage facilities and the maximum car-parking spaces recommended.

- 5.200** For the location of new developments, the Institution of Highways & Transportation's (IHT) 'Guidelines for planning for public transport in developments' recommends a walking distance of 400 m from the nearest bus stop and 800 m from the nearest railway station (200 m from the nearest bus stop in city centres). These distances can be used to determine the location of new public transport links to serve a new development or improve an existing one. In larger complexes, they can be used to determine the need for internal (environmentally friendly) transport linkages and to ensure that core services and amenities are within a comfortable walking distance.

- 5.201** BREEAM Healthcare credits projects based on their proximity to a public transport node and good public-transport service frequency (relative to the facility's opening hours).

- 5.202** The creation or improvement of cycle paths and pedestrian links to and from a facility will not only encourage cleaner modes of transportation by the local community, but, if integrated with a wide-area transport scheme, will contribute to improving users' lifestyles, air quality and health and well-being.

- 5.203** Traffic-calming measures make for safer environments and could be used to discourage through traffic in residential neighbourhoods. Note: access of emergency vehicles must not be impeded or cause discomfort to those injured or ill.

For guidance on the design of residential streets, see DfT/CLG's 'Manual for streets'.

Health Technical Memorandum 07-03 identifies best practice in developing travel plans and providing adequate transport and car-parking for NHS trusts in England.

Recommended action – c-09 Water use

- 5.204** Water fittings and equipment recommended in the feasibility study should be detailed and specified accordingly at this stage.

- 5.205 When considering the installation of water-efficient fixtures and fittings, they must comply with the Water Supply (Water Fittings) Regulations 1999, which make provision for preventing the contamination, waste, misuse, undue consumption and erroneous measurement of water supplied by a water undertaker. Products approved by the Water Regulations Advisory Scheme (WRAS) and listed in the Water Fittings and Materials Directory (WRAS, 2006) should be considered.

Recommended action – c-10 Materials

- 5.206 Materials should all be selected within the parameters set at the options appraisal stage.
- 5.207 The design team should have a clear understanding of the characteristics and potential uses of available materials, in particular reclaimed and locally sourced raw materials.
- 5.208 When considering the desired longevity and performance of the construction, the durability of materials and climate change impacts will influence the choice of materials.
- 5.209 The description of materials in bills of quantities should include the sustainability requirements targeted by the development, such as:
- certified timber from sustainable sources;
 - carbon impact;
 - a required recycled content by value; and
 - insulation with low GWP.
- 5.210 These factors are covered by BREEAM Healthcare, although further improvement should be sought in the specification of materials, in particular because of cost-neutral opportunities in this field.

Recommended action – c-11 Waste

- 5.211 The design proposal should address waste storage and access requirements. This should tie in with waste management plans and waste collection schemes.

- 5.212 Partnership working with the local authority or waste disposal contractor should be explored to monitor the weight of waste and recyclables produced. The most efficient method of weighing collected materials is by wheeled bins fitted with electronic chips, which enable the property to be identified.
- 5.213 Publicising the results of waste minimisation and recycling efforts may be a useful method of encouraging improvements in waste management, and may be included as part of a contract or service level agreement.

Recommended action – c-12 Land use and ecology

- 5.214 At this stage, outline proposals should show how a site's biodiversity can be incorporated within the design and how it can be enhanced. Ecological enhancements should be integrated into the scheme design rather than treated as separate.
- 5.215 Schemes should be designed in consultation with Natural England, the Environment Agency (where appropriate) and the county ecologist (where appropriate).
- 5.216 Buildings should be sited in ways that minimise disruption to existing ecosystems and should be designed in ways that minimise ecological footprints.
- 5.217 An intention to increase the biodiversity on site could be integrated with design proposals for a SuDS, outdoor space design, green roofs and living walls.
- 5.218 In collaboration with ecologists, the proposed measures should form part of the project team's design brief to ensure that they serve their intended purpose.

Recommended action – c-13 Pollution

- 5.219 The contractor should specify materials and systems that minimise levels of pollution.

Commitment (d)

- 5.220 The commitment stage marks the signing off of finalised information which enables works to proceed on site. This includes information required for planning approval, the outcome of the tendering process, sustainability accreditation, site mobilisation and sustainable site activity.
- 5.221 It is a critical step for ensuring that sustainability objectives sought out and committed to at the earlier stages are reflected in the information produced for signing off.

- 5.222 Preparing for the construction phase includes involving new members of the project team, who should be made aware of the intended outcome of the development.
- 5.223 For low-impact site activity, this phase includes the signing off of key documentation such as the CEMP and the SWMP as well as good practice commitments such as the “considerate constructors’ scheme” (CCS) in agreement with the preferred site contractor.

Commitment

- 5.224 The project lead should ensure that signed-off drawings and details of the proposed development continue to achieve the committed sustainability objectives. This should include a completed BREEAM Healthcare assessment and other evidence of pre-determined KPIs that may be required.
- 5.225 Once a development permit is granted, the procurement specification should outline the sustainability requirements and KPIs clearly. Discussions during the tendering process should focus on prioritising and clarifying these objectives.
- 5.226 Before site mobilisation, the contractor should sign up to the CCS and, before work starts, should also submit the construction-phase CEMP to the LPA.
- 5.227 The following section, “**Construction (e)**”, describes the CCS and CEMP objectives in more detail.

Recommended action – d-01 Community

- 5.228 To reduce environmental impact from construction activity, the contractor should register the site with the CCS in agreement with the preferred site contractor. Sites that register with the scheme are monitored against a “code of considerate practice”, which is designed to encourage best practice beyond statutory requirements. The main areas of concern fall into three main categories:
- the environment;
 - the workforce; and
 - the general public.

They each cover issues such as cleanliness, respectfulness, safety and good neighbourliness.

- 5.229 BREEAM Healthcare credits developments that comply with the CCS and acquire formal CCS certification. An additional credit is awarded if the evidence provided demonstrates a commitment to go significantly beyond best-practice site-management principles.

Recommended action – d-02 Local environment

- 5.230 By submitting a CEMP, the site contractor has committed to reducing the impact of site activity on the local and wider environment.
- 5.231 A CEMP should identify potential impacts, performance objectives, management actions and strategies, performance indicators and monitoring aspects for a number of environmental factors, including hazardous substances, noise and vibration, odours, visual impact and ecological impact.

Recommended action – d-03 Design quality

- 5.232 When signing off drawings for building works and services, the project lead should ensure that they are sufficiently and thoroughly detailed for use by contractors and workers on site. Additional information and updates may be required to respond to changes required by contractors, but these should always be carried out within the parameters of sustainability objectives and commitments.
- 5.233 It is recommended that a site manager is appointed with overall responsibility for site management and for ensuring quality of construction and installation, especially where construction work will affect the environment and the environmental performance of the building. The appointed person should have a thorough knowledge of the sustainability objectives and the relevant details.

Recommended action – d-04 Flood risk and SuDS

- 5.234 The final drawings should illustrate any flood mitigation measures and/or SuDS, including any necessary calculations and engineering details that may be required for the proposed arrangement.
- 5.235 The BREEAM Healthcare assessor will require evidence of any flood risk assessments, mitigation measures to minimise the risk of localised flooding, and measures to prevent the pollution of watercourses.
- 5.236 The CEMP should describe a methodology to prevent uncontrolled discharge of water, the site’s

drainage system, consents required for discharge of water to existing sewer systems or surface water, and a water testing regime for water treatment and monitoring prior to discharge.

- 5.237 In addition, it should include an emergency preparedness plan in response to flood risk on site and measures that should be implemented to prevent any uncontrolled discharge to the ground/groundwater. No discharge to groundwater can be made without appropriate consent from the Environment Agency.

Recommended action – d-05 Future-proofing

- 5.238 The objective to ensure that the development is future-proofed should be made clear to all contractors at the procurement stage in order to avoid site works and alterations.
- 5.239 The site manager should ensure that important details that affect the longevity and maintenance of the development are adhered to or are altered/developed within informed constraints.

Recommended action – d-06 Health and well-being

- 5.240 The BREEAM Healthcare assessment should be finalised at this stage.

The health and well-being section of BREEAM Healthcare requires daylight calculations and evidence of lighting specification (glare and flicker control and lighting levels) and design (zones and controls), thermal comfort and control, acoustic performance, contamination control, safety, air quality and low internal pollution levels.

- 5.241 Outdoor spaces should be designed to reflect the principles highlighted in ‘**Recommended action – c-06 Health and well-being**’ with respect to accessibility and design quality. Designs should be sufficiently detailed to provide clear instructions to the contractors and ensure that the landscape is maintainable.
- 5.242 The CEMP should outline measures to mitigate the impact of construction activities such as dust and mud, hazardous substances, pollutant gases, noise and vibration.

Recommended action – d-07 Energy and carbon emissions

- 5.243 At the tendering stage, the project’s energy/carbon advisers should specify the correct systems and

equipment required for the chosen strategy. They should also engage with potential contractors and users before the project lead makes any procurement commitments.

- 5.244 The BREEAM Healthcare assessor should gather any relevant information and KPIs to complete the assessment at this stage. Part of the evidence should be supplied by engineering and architectural drawings and calculations before sign-off, and other information should be verified by the tender specification, requiring evidence from suppliers.
- 5.245 The CEMP should describe the KPIs and methods needed for monitoring and reporting on carbon-dioxide emissions arising from site activities.

Recommended action – d-08 Transport

- 5.246 Any signed-off drawings should accommodate the travel plan’s objectives.
- 5.247 The BREEAM Healthcare assessor will require evidence about cyclist facilities, pedestrian and cyclist safety, car-parking capacity, travel information space/s and delivery/waste accessibility.
- 5.248 During construction, the site contractor should have a strategy for minimising site deliveries and off-site disposal, and have in place traffic management plans to reduce local traffic impacts (to be agreed with highway authorities). This should be described in a detailed CEMP.

Recommended action – d-09 Water use

- 5.249 Clarification should be sought during the tendering process – and before any contractual commitments have been made by the project lead – that water-efficient fittings and systems have been specified.
- 5.250 The BREEAM Healthcare assessor will need evidence that sustainability objectives have been achieved up to this stage of the development. He/she will seek evidence on the implementation of a water strategy and the specification of:
- water-efficient fittings;
 - leak-detection systems/devices;
 - automatic water-supply shut-off systems;
 - water recycling strategies; and
 - irrigation systems.

- 5.251 Specified requirements, KPIs and a methodology for monitoring and reporting on water consumption during construction should be included by the site contractor in the CEMP before site mobilisation.

Recommended action – d-10 Materials

- 5.252 The BREEAM Healthcare assessor should gather evidence about the materials, finishes and hard landscaping with respect to their environmental rating and design robustness. Evidence of responsible sourcing should be collated from contractors and suppliers.
- 5.253 Design details may need to be amended in accordance with procured construction systems and specific material properties, but should always be within the sustainability parameters committed to by the project lead. (For example, are off-site preformed materials a sustainable cost-effective procurement solution?)
- 5.254 The CEMP should also commit to the responsible sourcing, and the low environmental impact, of materials to be used on site during construction (for example certified timber).

Recommended action – d-11 Waste

- 5.255 The drawings and tender documents should ensure that there is adequate provision for storage areas, access routes and systems related to waste segregation and waste reduction. Before sign-off,

any technical and design issues should be clarified in tender negotiations.

- 5.256 The BREEAM Healthcare assessment requires evidence of storage for recyclable waste, compost and compacting plant.
- 5.257 As part of the CEMP, an SWMP must be prepared before the site mobilisation stage in accordance with the Site Waste Management Plans Regulations 2008.

Recommended action – d-12 Land use and ecology

- 5.258 Design details and site instructions should reflect the ecologist's recommendations for enhancements to the site's ecology during works. This will be required as evidence for the BREEAM assessment and to comply with relevant legislation.
- 5.259 The CEMP should describe work to be undertaken in accordance with an approved ecological/landscape management plan for the protection of features of ecological value as identified in the baseline assessment.

Recommended action – d-13 Pollution

- 5.260 The BREEAM Healthcare assessor will require evidence of measures to reduce the potential for pollution.
- 5.261 Methodologies for mitigation of pollution arising from site activity are an important part of the CEMP, as described in section e-02 "Local environment".

Construction (e)

- 5.262 This is the stage between site mobilisation and handover of the building.
- 5.263 The key activities during this phase are site management, regular monitoring and reporting in accordance with the methodology set out in the CEMP and SWMP, commitment to the CCS, and site issues associated with design quality and sustainability.

Commitment

- 5.264 The contractor should commit to ensuring that site activity causes minimum disruption for the community and environment. This can be achieved by submitting the CCS and CEMP report before the site mobilisation stage.
- 5.265 The contractor should manage the construction site against the CCS code of practice and as described in the CEMP. The contractor should aim for the higher levels of CCS compliance.
- 5.266 Changes to the design and any instructions issued by the design and engineering team, which may be required during the course of site works, should be approved by the project lead or an appointed representative. Such alterations should not impact on the sustainability objectives committed to by the contractor.
- 5.267 To manage the complex activities and obligations of a construction site, the contractor should appoint a site manager as a key point of reference

and to supervise construction quality and good practice.

Recommended action – e-01 Community

5.268 All considerate-constructor-scheme-registered sites are given a score indicating the level of performance they have reached against the code of considerate practice. A score of 3 indicates compliance with the scheme; scores of 4 “High level beyond compliance” or 5 “Excellent measures taken” should be sought (visit the CCS website for further information).

5.269 Registered sites are monitored by an experienced industry professional to assess their performance against the eight-point code of considerate practice, which includes the categories:

- **Considerate:** all work is to be carried out with positive consideration to the needs of traders and businesses, site personnel, visitors and the general public. Special attention is to be given to the needs of those with sight, hearing and mobility difficulties.
- **Environment:** be aware of the environmental impact of the healthcare site and minimise as far as possible the effects of noise, light and air pollution. Efforts should be made to select and use local resources wherever possible. Attention should be paid to waste management. Reuse and recycle materials where possible.
- **Cleanliness:** the working site is to be kept clean and in good order at all times. Site facilities, offices, toilets and drying rooms should always be maintained to a good standard. Surplus materials and rubbish should not be allowed to accumulate on the site or spill over into the surroundings. Dirt and dust from construction operations should be kept to a minimum.
- **Good neighbour:** general information regarding the scheme should be provided for all neighbours affected by the work. Full and regular communication with neighbours, including adjacent residents, traders and businesses, regarding programming and site activities should be maintained from pre-start to completion.
- **Respectful:** respectable and safe standards of dress should be maintained at all times. Lewd or derogatory behaviour and language should not be tolerated. Pride in the management and

appearance of the site and the surrounding environment is to be shown at all times. Operatives should receive training on how to deal with the general public.

- **Safe:** construction operations and site vehicle movements are to be carried out with care and consideration for the safety of site personnel, visitors and the general public. No building activity should be a safety risk to others.
- **Responsible:** ensure that everyone associated with the site understands, implements and complies with this code.
- **Accountable:** the CCS poster is to be displayed where clearly visible to the general public. A site’s contact details should be obvious to anyone affected by its activities.

Recommended action – e-02 Local environment

5.270 In addition to the CCS, site activity should be monitored for its impact on the local environment through the CEMP.

5.271 The CEMP should consider the following:

- archaeology;
- contaminated land;
- contamination of surface water;
- contamination of groundwater;
- flooding;
- dust and mud;
- energy and carbon-dioxide emissions;
- hazardous substances;
- hoardings;
- local community;
- liaison with client or indirect client due to live site;
- lighting;
- litter;
- noise and vibration;
- odours/vapours/gases/smoke;
- regulators and special interest groups;
- transport;
- visual impacts;
- waste management;

- water consumption;
- wildlife/ecology/biodiversity/habitat/flora and fauna;
- security; and
- material resources.

5.272 A CEMP should also include:

- key environmental aspects identified by a thorough site investigation;
- requirements identified by a sustainability assessment;
- requirements in relation to the reuse of demolition materials and other site-won (reclaimed) materials;
- requirements related to credit achievements in the BREEAM assessment;
- a suggested approach to the assessment of construction-phase environmental risks; and
- items to be included in the environmental management plan (to be prepared for the construction phase of the project).

5.273 BREEAM Healthcare credits construction sites that are managed in an environmentally sound manner in terms of resource use, energy consumption, waste management and pollution.

Recommended action – e-03 Design quality

5.274 The appointed site manager and/or site architect are responsible for supervising works on site and making sure that enough detail is provided, the detail is clear and the works are carried out in accordance with design and engineering instructions. If amendments to these instructions are required during construction, they should not compromise sustainability.

Recommended action – e-04 Flood risk and SuDS

5.275 A surface water management plan should be used to manage pollution from the construction site. This forms part of the full CEMP.

5.276 CIRIA's C532 – 'Control of water pollution from construction sites: guidance for consultants and contractors' focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence. Pollutants include suspended solids, oil, chemicals, cement, cleaning materials and paints.

5.277 Wherever possible, the project lead/contractor should install SuDS at the outset of a project to deal with construction site run-off. The SuDS may be retained or modified, as required, as a permanent surface-water treatment facility.

Recommended action – e-05 Future-proofing

5.278 Any changes to site instructions should remain within the intended future-proofing objectives for the building.

Recommended action – e-06 Health and well-being

5.279 Some issues that may affect human health and mitigation methodologies (as described in the CEMP) could include:

- **dust and mud:** work methods should be such as to minimise dust emissions, as far as reasonably practical (for example by damping down with water and maintenance of access roads). Vehicles leaving the site should be wheel-washed and open loads should be covered;
- **hazardous substances:** there should be a monitoring regime for the storage, treatment and transportation of hazardous substances;
- **site hoardings:** hoardings should be reused as much as possible. There should also be a strategy when using hoardings for the purpose of public and on-site safety and of screening the site to reduce visual impact;
- **lighting:** there should be a strategy for ensuring that site lighting does not inconvenience neighbours (and does not disrupt the site's ecology);
- **noise and vibration:** working hours should be restricted so as not to be a cause of nuisance to the neighbourhood (this may need to be agreed with the local authority). Seasonal sensitivities with respect to the site's ecology should be taken into consideration (for example the location of the site's activities with respect to woodland during the bird-breeding season). Noisy or vibrating site activities should be located as far as possible from noise-sensitive areas (hospitals, places of worship, schools etc). Plant should be maintained and fitted with effective silencers, where possible;

- **odours/vapours/gases/smoke:** work methods to minimise odours, vapours and gases should be adopted.

Recommended action – e-07 Energy and carbon emissions

- 5.280 The CEMP should outline ways to monitor and reduce energy generated by site activities (for example switching off plant that is not in use).
- 5.281 The Environment Agency has created a carbon calculator that calculates the embodied carbon dioxide of materials plus the carbon dioxide associated with their transportation. It also considers personal travel, site energy use and waste management. (Visit the Environment Agency's website.)

Recommended action – e-08 Transport

- 5.282 Local sourcing of materials, off-site construction and waste management will help to reduce haulage to and from a construction site. Site-generated transport should be monitored throughout the construction phase in accordance with the methodology described in the CEMP.
- 5.283 The CEMP should also include a construction traffic management plan (TMP), which is a strategy to control the movement of vehicles, pedestrians and plant that are present on the site. This should be drawn out in a plan showing routes, storage areas, structures, parking, emergency access and exits etc for different phases of the development. The benefits of a TMP are more efficient movement and work progress and pedestrian/workforce safety.

Recommended action – e-09 Water use

- 5.284 Water consumption during construction should be metered, and the CEMP should describe what measures should be put in place to make sure that water is not wasted. There may also be opportunities to recycle rainwater for secondary uses such as cleaning and spraying (for damping down dust).

Recommended action – e-10 Materials

- 5.285 The carbon footprint left by the transportation and delivery of materials should be monitored. The results of the contractor's statement of construction efficiency, off-site assembly and local sourcing should be compared with industry benchmarks.

- 5.286 The CEMP should describe how delivered materials should be:

- stored in accordance with suppliers' recommendations;
- protected against risk of damage or loss/misdirection; and
- stored in such a way that they do not impact on the local community and environment.

- 5.287 The skills and technique of assembly should be supervised to ensure that the quality and performance objectives of the design are achieved.

Recommended action – e-11 Waste

- 5.288 A SWMP forms part of the CEMP and consists of the following nine stages:
- Allocate a waste champion to be responsible for the SWMP.
 - Record the types and quantities of waste that will be produced during the project.
 - Allocate a waste management option.
 - Allocate waste management sites and ensure Duty of Care is being met.

Note

The Duty of Care is set out in section 34 of the Environmental Protection Act 1990 and associated regulations. The duty applies to any person who produces, imports, carries, keeps, treats or disposes of controlled waste.

- Organise SWMP training for in-house and trade contractors.
- Agree SWMPs with main contractors.
- Plan for efficient materials and waste handling and set KPIs for each waste type/stream.
- Measure quantities and types of waste produced and compare against agreed parameters.
- Monitor the implementation of the SWMP and update as necessary.

- 5.289 SMARTWaste is a SWMP tool to help the industry to meet forthcoming legislation and improve waste management. SWMPs provide a structure for systematic waste management at all stages of a project's delivery. They can have a significant impact on the amount of waste the

construction industry produces and on how it is subsequently managed.

Recommended action – e-12 Land use and ecology

- 5.290 Construction sites can harm natural habitats. The CEMP should describe how ecological features will be protected. Therefore, an ecology specialist should be appointed to supervise the works on site.
- 5.291 BRE and CIRIA have developed a set of complementary biodiversity indicators that allow the impact of construction projects on biodiversity to be measured (see CIRIA's (2003) 'Biodiversity indicators for construction projects'). CIRIA has

also published a number of guidance documents (C650 – 'Environmental good practice on site' and C503 – 'Environmental good practice: working on site') on how to avoid causing harm to wildlife during construction.

- 5.292 These indicators are used by BREEAM Healthcare, which also credits the protection of ecological features during construction.

Recommended action – e-13 Pollution

- 5.293 Methods for controlling and reducing pollution from construction activities are described in the CEMP.

Post-construction (f)

- 5.294 The main objective of this stage is to prepare the building and users for occupation.
- 5.295 The building should undergo a commissioning process in accordance with regulatory requirements and contractual obligations. This is to ensure that the building and equipment is functioning as intended. Seasonal and annual commissioning is also recommended.
- 5.296 At this stage, the project lead/contractor should complete a building user manual and hand it over to the estates/facilities and operational managers.
- 5.297 End-users will have a significant impact on the building's carbon footprint, water consumption and waste produced. For this reason, staff should receive training on the building's operations and the systems put in place to reduce its impact on the environment. This should be carried out at the pre-occupation stage and regularly thereafter for new staff.
- 5.298 Information about sustainable travel arrangements and signs that give information on the efficient use of electrical equipment should be displayed publicly for visitors.

Commitment

- 5.299 The aim of the commissioning stage is to ensure optimum performance of the building under occupancy conditions prior to handover. Commissioning should be monitored by an appropriate team member (appointed at an earlier stage) for compliance with current Building Regulations and with the building's intended

performance as specified by the technical design team.

- 5.300 The building user manual is a simple guide that covers information relevant to staff, occupants, tenants and non-technical building managers on the operation and performance of the building. It should contain the following information as a minimum:

- building services information;
- emergency information;
- energy use and environmental strategy;
- water use;
- transport facilities;
- materials and waste policy;
- re-fit and rearrangement considerations;
- reporting provision;
- training.

- 5.301 The project lead should appoint an estates/facilities manager and ensure that all staff are informed about the building design and performance prior to occupation.

- 5.302 It should be the estates/facilities manager's role to disseminate the building user manual and update it, when required.

Recommended action – f-01 Community

- 5.303 Visitor and patient areas, as well as shared community facilities, should have proper signage with information that goes beyond safety and

access. Information may be required to support such objectives as energy and water conservation and waste recycling.

5.304 Controls for internal environmental conditions (such as light switches and space-heating controls) should be unambiguous and accessible to authorised users.

5.305 A document to describe the location, access to, and use (especially by those with special needs) of shared facilities should be provided to all parties involved in the consultation exercise.

Recommended action – f-02 Local environment

5.306 The transition from construction site to operational building may have both positive and negative impacts on the local environment. The project lead should:

- establish a final landscape management plan and outline the procedures for monitoring and evaluating the management plan;
- explore and support local employment opportunities;
- seek the inclusion of the local community in the opening and use of the new development.

Recommended action – f-03 Design quality

5.307 Design quality is assessed as part of the agreed quality assurance process.

5.308 Any maintenance information that pertains to safeguarding the intended longevity and sustainability of the building should be made available to the project lead/ estates manager.

Recommended action – f-04 Flood risk and SuDS

5.309 Any engineered works in relation to flood mitigation, including pollution filtration installations and SuDS, should be checked before the development becomes operational.

5.310 The building user manual should provide information to the estates manager about flood mitigation measures, the emergency flood response plan and the maintenance requirements of water management systems such as drains and SuDS.

Recommended action – f-05 Future-proofing

5.311 All design intentions for future-proofing the development should be made available to the project lead/estates manager.

5.312 Project designers and engineers are obliged to make available as-built drawings at handover.

Recommended action – f-06 Health and well-being

5.313 Sound insulation tests should be in accordance with BS EN ISO 140-4 and BS EN ISO 140-7. Tests should be carried out by a body accredited by the United Kingdom Accreditation Service (UKAS) or the Association of Noise Consultants (ANC).

5.314 Airborne and impact sound insulation, indoor ambient noise levels and reverberation times should comply with recommended performance benchmarks for each type of noise-sensitive space as set out in Health Technical Memorandum 08-01 – ‘Acoustics’. Remedial work should be carried out if performance standards are not met. Health Technical Memorandum 08-01 sets out a programme of acoustic performance testing.

5.315 All lighting installations and their corresponding control systems should form part of the commissioning works to be carried out post-completion. Tests should be performed on auxiliary systems such as daylight and passive infrared (PIR) sensors, glare and flicker control, sun pipes etc.

Recommended action – f-07 Energy and carbon emissions

5.316 Most of the equipment tested during the commissioning process will relate to the building's energy consumption during operation. This is therefore a critical step for ensuring that the energy performance is satisfactory and fine-tuned to its optimum efficiency and that the building is prepared for occupancy and monitoring.

5.317 Airtightness tests (mandatory for non-domestic buildings) can be used to identify air-leakage points, which can lead to increased heat losses and therefore increased heating requirements.

5.318 BREEAM Healthcare credits developments that recognise and encourage an appropriate level of building services commissioning that is carried out in a coordinated and comprehensive manner to ensure optimum performance of the building under occupancy conditions.

Recommended action – f-08 Transport

5.319 The travel plan should be completed and signed off before occupancy. It should be tailored to the

unique characteristics of the site location and may include both physical and behavioural measures to increase travel choice and reduce reliance on single-occupancy car travel.

5.320 Travel plans can:

- reduce on-site parking congestion;
- improve accessibility of a site by all modes of transport;
- reduce the cost of commercial travel for a business;
- support staff retention and recruitment through improved accessibility; and
- promote the corporate social responsibility (CSR) credentials of an organisation.

Recommended action – f-09 Water use

5.321 Water systems should also be commissioned and described in the building user manual. Commissioning should reduce the likelihood of wastage and leaks during operation.

Recommended action – f-10 Materials

5.322 Information on how to best maintain the building fabric should be passed on to the project lead/ estates manager at handover.

5.323 The building user manual should include the environmental policy on materials, with particular regard to sustainable procurement, to ensure good

practice in operational and maintenance purchasing requirements.

Recommended action – f-11 Waste

5.324 Systems relating to the waste strategy, such as wheeled bins with electronic chips and compactors, should be commissioned at this stage.

5.325 The waste policy should form part of the building user manual in order to inform the estates manager about the intended waste management strategy and the operation of systems installed to support the strategy.

Recommended action – f-12 Land use and ecology

5.326 The landscape and wildlife management plan should be passed on to the estates manager or the person appointed with the responsibility of maintaining and monitoring the site's biodiversity during the operational phase.

5.327 The management plan should take into account the effects of climate change (for example extreme weather conditions such as drought, storms and heavy rainfall).

Recommended action – f-13 Pollution

5.328 The building user manual should emphasise the adopted pollution prevention policy so that procurement of materials and systems during operation is in line with sustainable objectives.

Operation (g)

5.329 At this stage, the key activities relating to sustainability include management, monitoring, reporting and post-project evaluation.

5.330 The project lead should develop a programme for monitoring the different aspects of the building which were intended to influence its sustainability performance. Monitoring could be in the form of user surveys, meter readings and third-party surveying. A philosophy of continuous improvement should be adopted.

5.331 For private procurement routes (for example LIFT and PFI), responsibility for facilities management

may rest with the project company for the term of the lease.

Commitment

5.332 Once a sustainable building is ready to receive staff and visitors, the users' behaviour will determine whether the facility is truly sustainable.

5.333 The project lead should appoint a person with responsibility for maintaining sustainability.

5.334 The Good Corporate Citizen self-assessment test should be used to assess and improve operational behaviour in key areas such as transport,

procurement, facilities management, employment and skills, and community engagement.

5.335 After a month of occupation, the estates/facilities manager is encouraged to commission a BREEAM Healthcare “existing buildings” assessment. A pre-assessment estimator is used to identify issues and improve the sustainability of the building and operations.

5.336 After a year of occupation, an “operational stage” BREEAM Healthcare assessment is required not only to verify the intended performance but also for formal design and procurement certification. (BREEAM Healthcare credits contractors that appoint an appropriate team member to carry out seasonal commissioning during the first year of occupation.)

Recommended action – g-01 Community

5.337 Healthcare organisations can help to improve the health of local people, promote social cohesion and regeneration, and tackle health inequalities. The management board should conduct community surveys to assess whether the facilities are serving their intended purpose.

Recommended action – g-02 Local environment

5.338 Neighbourhood surveys should be used to identify any problems caused by the presence of a healthcare/social care facility which are impacting on the local environment and community’s health and well-being, such as traffic congestion and noise. This information can then be used to instigate improvements to the facility throughout its operation.

Recommended action – g-03 Design quality

5.339 User surveys should also be conducted to gauge the success of a design using the principles in AEDET Evolution and ASPECT against user perception and maintenance issues.

Assessments can also be made through existing programmes such as CABI’s “healthy hospitals” campaign, which commissioned research to look at nurses’ opinions of their working environment, illustrating how the quality of hospital environments impacts on hospital staff, patients and visitors.

Recommended action – g-04 Flood risk and SuDS

5.340 Estates/facilities and operational managers should assess the effectiveness of water management systems, rainwater harvesting systems, SuDS etc and monitor any local flooding problems in order to introduce mitigation measures where necessary.

Recommended action – g-05 Future-proofing

5.341 The healthcare organisation should regularly assess the building’s adaptability to future needs and change and whether it is conducive to ease of maintenance. The findings could be used as a learning resource for future developments.

Recommended action – g-06 Health and well-being

5.342 In addition to the BREEAM Healthcare “existing buildings” assessment, issues relating to health and well-being can also be assessed against ASPECT’s criteria with respect to user perception (staff and visitors) through surveys.

5.343 A healing environment should be continuously improved through such assessments; users and visitors are the most valuable source of information.

Some of the results drawn from surveys about hospital environments in CABI’s “healthy hospital” campaign include the following:

- 32% of the people surveyed prioritised space;
- 22% talked about light;
- 16% talked about the need for fresh air;
- 16% picked cleanliness as an important factor;
- 12% talked about a warm, friendly atmosphere;
- 11% wanted to see colour;
- 10% wanted more gardens;
- 9% wanted more privacy;
- 5% wanted more use of technology;
- 5% were concerned about noise levels.

Recommended action – g-07 Energy and carbon emissions

5.344 Occupants should be asked about their satisfaction with their internal environment in terms of thermal comfort, fresh air and ease of control using standard surveys such as the PROBE (post-

occupancy review of buildings and their engineering) questionnaire, or similar. Temperature, lighting and humidity levels within different parts of a building can be measured throughout a year to compare data to occupant feedback.

PROBE was a research project that ran from 1995 to 2002 under the Partners in Innovation scheme.

- 5.345 The performance of low-carbon and renewable-energy generation systems should be monitored and reported as a learning resource for future projects.
- 5.346 Seasonal commissioning is credited by the BREEAM assessment method and can help estates/facilities and operational managers fine-tune energy-consuming systems and equipment to their optimum performance.

Recommended action – g-08 Transport

- 5.347 The Good Corporate Citizen self-assessment test includes an assessment on low-emission vehicles, walking and cycling, policies and performance management, transport planning and car-parking management.
- 5.348 With a travel plan in place at project completion, estates/facilities and operational managers should continue to improve and update the plan during occupancy.
- 5.349 Further opportunities to reduce carbon emissions from transport include the provision of a wider range of health and other services within the community, an increase in the amount of information and advice available (for example telephone helplines or authoritative Internet advice such as NHS Direct) without the need to visit healthcare facilities, and replacing petrol- or diesel-powered fleet vehicles with low- or zero-fossil-fuel vehicles.
- 5.350 A transport survey for regular and irregular users to the facility can help inform decisions and provide a baseline against which improvements to the travel plan can be introduced. A survey should assess the modes of transport that staff and visitors use and should identify morning and evening peak hours on the local road network. The survey should identify the volume of vehicular and non-vehicular traffic generated, vehicle occupancy levels and the directions in which staff and visitors are travelling. It should also determine whether:

- public transport information is sufficient;
- any difficulties have been encountered; and
- commitments implemented in the travel plan (such as car sharing or a remote health information service) are achieving their aims to reduce single-occupancy vehicle use, to increase public transport use, and to encourage physical activity such as walking/cycling.

Recommended action – g-09 Water use

- 5.351 Monitoring of water use during occupancy is beneficial for self-assessment and benchmarking.
- 5.352 Regular maintenance of water-related systems and auxiliary equipment, such as meters and leak detection systems, will ensure that wastage does not go unnoticed.
- 5.353 The use of water, as with energy, is dependent on user behaviour. Creating awareness of water conservation among staff and visitors is therefore recommended.

Recommended action – g-10 Materials

- 5.354 The sustainable procurement commitments outlined in the Department of Health/ NHS PASA's 'Procuring for health and sustainability 2012: Sustainable procurement action plan' (Appendices A and B) will continue to apply to all acquisitions in operation.
- 5.355 The Good Corporate Citizen self-assessment test includes questions about ethical training, the tendering process, reducing waste and packaging, healthy food choices, supporting local businesses, innovation, supplier management, and policies and performance management.
- 5.356 Healthcare organisations should collect information on the performance and maintenance of materials and feed this information back to the healthcare sector and construction industry.

Recommended action – g-11 Waste

- 5.357 Surveys should ask whether waste storage and access facilities are sufficient and whether problems have been encountered in the management of waste.
- 5.358 Continuous monitoring of waste using technology such as microchips for weighing segregated waste will help benchmark performance.

Recommended action – g-12 Land use and ecology

- 5.359 A qualified ecologist should be commissioned to monitor the site's biodiversity, assess the effectiveness of ecological enhancements and propose any adjustments that may be required as a consequence of changes to the climate.

Recommended action – g-13 Pollution

- 5.360 The development's low pollution policy should be observed throughout the operation of the facility for all procurement and maintenance requirements.
- 5.361 The internal levels of pollution can also be measured through routine environmental monitoring by third-party quality-control tests.

End of life (h)

- 5.362 Ownership of the property or equipment should remain with the project lead throughout the period of the lease.

A lease is a legal document to show an agreement between the project lead (landlord) and the users of a property or equipment.

- 5.363 This stage defines the end of the healthcare organisation's tenancy agreement, hence implying opportunities for conversion or change of use, or demolition when there is no environmental and financial benefit from reusing the building.
- 5.364 For other procurement routes (for example LIFT), at the end of the lease term (typically 25 years from completion) the default position is that the tenant can "walk away" leaving the project company as freehold owner to dispose of the property by conversion, demolition or otherwise. Alternatively, the tenant may negotiate an extension to the lease or exercise a right to "buy back" the freehold of the property from the project company.

Commitment

- 5.365 This stage marks the point at which the healthcare organisation's management team has made a decision to vacate a facility and is in a position (depending on the procurement route/contractual agreement) to decide whether to decommission, recycle or demolish the building or space that they occupied.
- 5.366 This section assumes that, whichever procurement route is chosen to develop the facility, all opportunities to adapt and refurbish the building to the changing needs of the healthcare sector have been explored and undertaken throughout the life of the building/lease agreement.

- 5.367 Preference should always be given to refurbishment, which could be a better way of reducing long-term carbon-dioxide emissions.
- 5.368 In the first instance, the owner or landlord of a healthcare facility is responsible for evaluating the condition of the estate and investigating opportunities for reuse in response to strategic service and planning requirements. This is done through existing frameworks such as an updated SSDP and through discussions with the LPA.
- 5.369 In addition, the owner of the healthcare facility should make sure that whatever happens to the estate is done in the most sustainable manner possible.
- 5.370 A plan should be produced to mitigate any impact on the community and the environment.

Recommended action – h-01 Community

- 5.371 SSDPs should be updated regularly (preferably annually). Ideally they should be prepared with the participation of local healthcare representatives, community and voluntary groups, and local government. This will identify current and local gaps in healthcare and social care service provisions that may be housed within a reconfigured existing facility.
- 5.372 The vacation of a building is also an opportunity to give something back to the community. Community engagement and discussions with local authorities should take place to identify new uses for public services and facilities (such as for education, housing, recreation and integration).
- 5.373 The Prince's Foundation's "Enquiry by Design" planning tool is recommended for bringing interested parties together to collaborate on a

vision for a vibrant community and influence the final outcome.

- 5.374 If any works are to take place on site, an environmental management plan should describe the measures for minimum impact on the local community.

Recommended action – h-02 Local environment

- 5.375 The LPA should incorporate the estate into a strategic plan for local redevelopment and improvement.

- 5.376 Improvements to the local environment could include:

- enhancing green and open communal spaces to the public and making them accessible;
- introducing play areas (local area for play (LAP), local equipped area for play (LEAP) and neighbourhood equipped area for play (NEAP)).

LAP, LEAP and NEAP are defined in the Fields in Trust's (FIT) 'Planning and design for outdoor sport and play', which gives useful advice on the detailed requirements for different types of children's play space based on the current national thinking reflected in CLG's (2002) Planning Policy Guidance 17 – 'Planning for open space, sport and recreation'.

- "greening" public spaces and introducing green corridors for ecology and safe pedestrian/cycling routes;
- improving public transport services to reduce the use of cars in the area;
- improving the safety of the area using "Secured by Design" principles traffic-calming and well-lit overlooked routes.

Best practice advice on improving urban spaces can be found in CLG/CABE's (2000) 'By design – urban design in the planning system: towards better practice'.

- 5.377 A new environmental management plan should describe the measures that should be taken during site works to mitigate any negative impact on the local environment.

Recommended action – h-03 Design quality

- 5.378 A decision to demolish a building may mean that the materials chosen and maintenance of the fabric were poor; it is valuable to understand why this has happened and what can be improved in future developments.
- 5.379 If the facility is poorly designed in terms of its spatial arrangements and function, it should be ascertained whether there is potential for improvement. AEDET Evolution and ASPECT should be used to understand existing issues. Expert advice could then be sought to propose changes for making good and modernising the facility.

Recommended action – h-04 Flood risk and SuDS

- 5.380 The disposal of an estate can be an opportunity to restore the natural water and hydrogeological cycles of external surfaces.
- 5.381 Increasing the permeability of surfaces can help to address local flooding problems, which may have increased as a consequence of climate change. Updated information about flood issues around the site can be found from the estates/ facilities and operational managers, from the Environment Agency's flood maps and from climate change updates on UKCIP.

Recommended action – h-05 Future-proofing

- 5.382 The decision to demolish a building might point to a failure of the future-proofing strategy. It is therefore worth evaluating why the intended flexibility to growth and change has not been as successful as intended.
- 5.383 If demolition is necessary because of other factors, such as poor maintenance, future-proofing should at least ensure that it is feasible to reclaim construction materials for reuse.

Recommended action – h-06 Health and well-being

- 5.384 When vacating a building, there may be opportunities to improve the local environment by promoting healthier lifestyles and a cleaner atmosphere (see the examples in paragraph 5.375, 'Recommended action – h-02 Local environment').
- 5.385 The new environmental management plan (EMP) should include mitigation measures to reduce the

impact of noise, dust and other forms of pollution that may affect the health and well-being of the community and local environment.

Recommended action – h-07 Energy and carbon emissions

- 5.386 The refurbishment of existing buildings rather than demolition saves embodied energy and makes a valuable contribution to avoiding carbon emissions.
- 5.387 If a decision is made to demolish the building, reclaiming materials will also contribute to savings of embodied energy, in particular if the materials are reused/ stored on the same site or within the locality, thus potentially reducing emissions from transportation.
- 5.388 If the energy to the existing facilities is supplied by low-carbon and renewable energy technology that can continue to serve other buildings in the vicinity, the feasibility of such options should be investigated.

Recommended action – h-08 Transport

- 5.389 The disposal and redevelopment of a vacated site is an opportunity to improve the sustainability of transport in the area (such as by linking existing cycle paths, introducing new pedestrian links or improving connectivity to public transport services).
- 5.390 Site works during demolition or any other form of site works should aim to reduce the number and frequency of vehicles coming to and leaving the site. The intended strategy should be described in the EMP.

Recommended action – h-09 Water use

- 5.391 An environmental management plan for any works to be carried out following a decision to dispose or redevelop the area should describe a methodology for controlling, monitoring and reporting on water consumption.
- 5.392 Existing rainwater systems can be used for cleaning and other uses during site works to reduce the use of potable water.

Recommended action – h-10 Materials

- 5.393 The potential to reclaim construction materials from existing buildings depends on the type of material. WRAP's AggRegain demolition module provides guidance on a methodology for

reclaiming demolition materials. This methodology should be used to structure the demolition waste management plan (see paragraph 5.395, 'Recommended action – 'h-11 Waste'):

- The potential of a building should be assessed for maximum material recovery.
- A demolition bill of quantities (D-BOQ) should be produced, which identifies tonnages and potential applications of materials.
- A demolition recovery index (DRI) should be created from the D-BOQ, providing a quantifiable measure of the potential for recovery of the materials.
- An informed approach to material segregation should be taken, considering the potential impacts of contamination and cost benefits.

- 5.394 A pre-demolition audit can be carried out using BRE's SMARTAudit methodology, which applies a mapping system to identify key demolition products (KDPs) generated from a demolition project (for example timber, concrete, bricks and blocks).

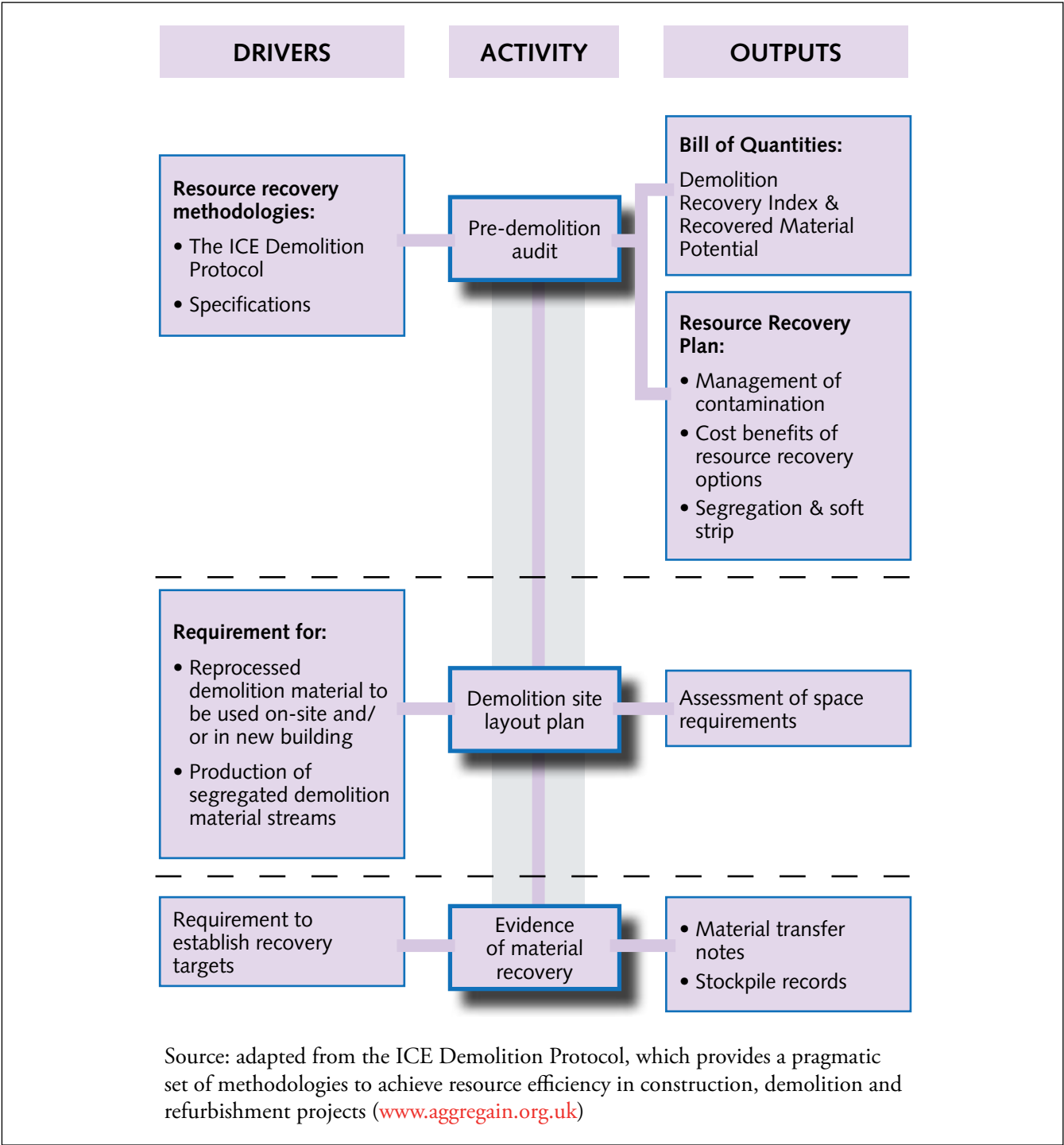
Recommended action – h-11 Waste

- 5.395 A demolition waste management plan (similar to a SWMP) should be prepared as part of the CEMP prior to any works on site. This should have the primary aim of segregating reclamation waste and reducing waste to landfill, and should be based on the ICE demolition protocol with guidance from WRAP's step-by-step demolition module (see paragraph 5.393, 'Recommended action – h-10 Materials' and [Figure 4](#)).
- 5.396 Materials that cannot be salvaged or reused should be recycled whenever possible. There are a large number of organisations throughout the UK taking equipment and preparing it where possible for reuse or alternatively recycling components. The local council should be contacted for advice on the location of local recycling centres.

Recommended action – h-12 Land use and ecology

- 5.397 An opportunity for improvement to the local environment is to ecologically enhance a disposed site.
- 5.398 It is recommended that ecology and tree surveys are carried out or updated by a qualified ecologist and arboriculturalist, similar to the baseline work carried out at the scoping stage of the

Figure 4 Key activities, drivers and outputs involved in the demolition process to achieve best practice



development. Any ecological/landscape management plan used during the estate's operation could be used to update this information.

5.399 The surveys should then be used to inform the work to be carried out to enhance the site following disposal.

Recommended action – h-13 Pollution

5.400 An environment management plan prepared for demolition works should include a methodology for investigating potential sources of air, water and ground pollution and on control measures to be applied during works.

6 Case studies

For further case studies, see [SHINE's website](#): the learning network for sustainable healthcare buildings.

Case study 1 – Breathing Space Centre, Rotherham

An example of an energy-efficient and healthy respiratory centre

Perspective view of the Breathing Space Centre in Rotherham



Context

- 6.1 The Breathing Space Centre is the hub for the largest respiratory rehabilitation programme in the country. The £11 million national pilot, which includes a purpose-built facility on the site of the former Badsley Moor Lane Hospital near the centre of Rotherham, will offer bespoke rehabilitation in a community environment. The project is the result of a partnership between the Coalfields Regeneration Trust (CRT), Rotherham Primary Care Trust (RPCT) and Rotherham Metropolitan Borough Council (RMBC). Around £7 million of the funding came from the Office of the Deputy Prime Minister (ODPM) via the CRT, with the remainder from the PCT.
- 6.2 There was a clear need for a specialist facility in the region. Because Rotherham and South Yorkshire has a history of mining and heavy industry, chronic obstructive pulmonary disease (COPD) is more widespread here, with one in five deaths in South Yorkshire the result of respiratory disease. Rotherham has nearly twice the national average incidence of COPD.
- 6.3 It is anticipated that nearly 1800 people a year will benefit from the Breathing Space Centre: 950 patients will have individually tailored day and residential rehabilitation programmes, and around 800 people will be given education and support for self-management and lifestyle packages.

Implementation – key success factors

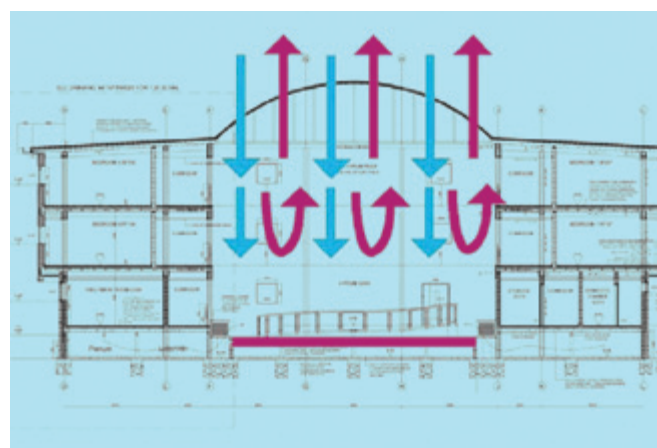
- 6.4 One of the key success factors of this scheme was the clear vision established at the outset. The choice of materials and the heating and ventilation strategy were developed as a direct result of this vision, and this in turn helped to determine the form and construction of the building.
- 6.5 The partnership between the RMBC, RPCT and the CRT was essential to deliver the funding package needed for the Centre. The CRT might not be an immediately obvious partner in a healthcare project, but its aims are in harmony with those of the other project partners, and its support catalysed the funding package. “Breathing Space is a perfect example of how the CRT can drive forward projects targeting local needs and demands which might otherwise not be possible” (Peter McNestry, vice-chair of the CRT).
- 6.6 Full cost and performance data is not yet available for this building, as construction has only recently been completed; further details will be added once cost and post-occupancy data is available.

Sustainability results

- Use of ground-source heat pumps (GSHP) to provide heating and hot water, reducing carbon emissions by 40 tonnes per annum (an estimated 37 tonnes of carbon produced per year by the GSHP by comparison with 77 tonnes for heating with natural gas).
- Solar preheating of hot water provision: the sun’s energy is used as a secondary heating source to preheat the water supplied to a conventional hot water tank.
- Natural ventilation with thermal mass labyrinth: an underground labyrinth is used to preheat the air in spring and autumn and to cool it in summer. Air is extracted via high-level windows, with fan assistance at high external temperatures. In winter, ventilation enters at atrium roof level in a mixing mode.
- Careful materials selection to reduce pollution as well as irritation of respiratory conditions.
- Vapour-permeable external walls to control humidity and remove particulates.
- Hydroscopic internal walls to control humidity.
- Use of thermal mass for energy efficiency.

Costs

- The overall costs of the pilot project, including two years’ running costs, are around £11 million.



Natural ventilation and underfloor heating in winter

Benefits

- This project assists RMBC and RPCT in achieving a number of public healthcare objectives (a priority because of the high levels of respiratory disease in this part of the country).
- It provides support for families and carers of sufferers, enabling them to understand and in turn support the patients better.
- People will be supported in managing their own condition more effectively (resulting in improved quality of life for them, and at the same time reducing the levels of hospitalisation).
- Better outcomes in terms of patient management – enabling people to be treated in a community environment rather than in hospital or being isolated in their own homes.
- Reduction in inappropriate admissions to hospital and reduced lengths of stay when admitted.

Summary

6.7 The key sustainability aspects of this case study are energy efficiency, the heating and ventilation strategy, and the use of healthy materials that would not irritate the respiratory conditions of the

building users. The designers had a clear vision of what they wanted the building to deliver, and this informed the whole scheme throughout the design and construction process.

Case study 2 – Innovate Green Office, Thorpe Park, Leeds



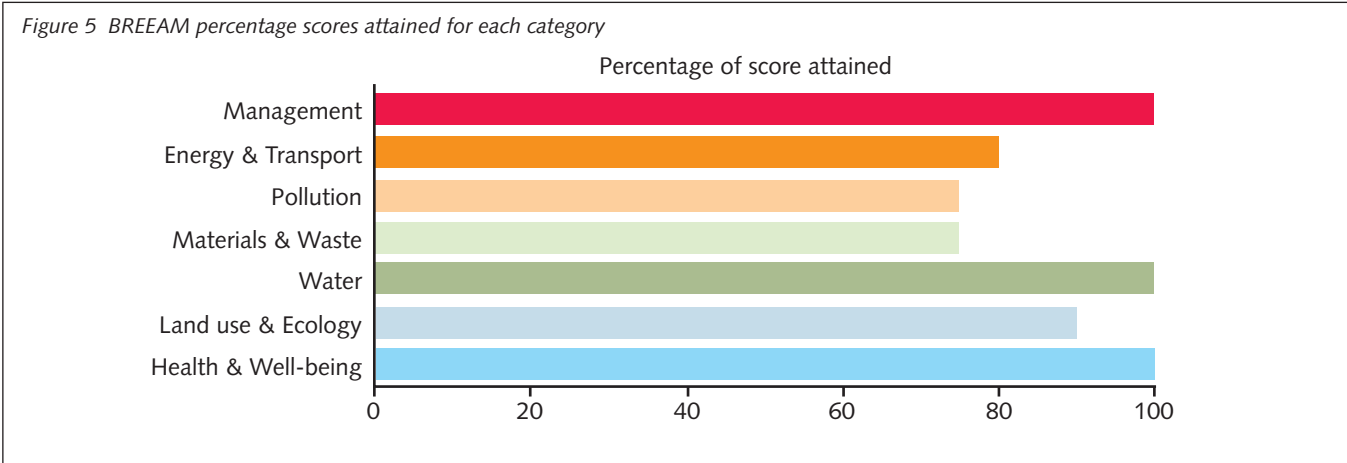
This building has achieved the highest BREEAM rating at the time of writing

6.8 “The formal rating system has allowed us to benchmark the scheme against other existing buildings throughout the country and will be used as a tool to inform future projects within the client’s portfolio. Achieving such a high EXCELLENT rating also gives recognition to the client and their

team, confirming that all their hard work and effort has resulted in a truly sustainable building of which Innovate can be proud.” *Mike Bezzano, Mirus Management Services Ltd.*

About the building

- 6.9 Innovate Green Office at Thorpe Park is a commercial development (4008 m2) that provides office space for small-, medium- and large-sized businesses. The total cost amounted to £6 million.
- 6.10 The site covers approximately one hectare, and the accommodation consists of one three-storey and one two-storey block with a central unheated street atrium.
- 6.11 The University of Leeds has been commissioned to carry out a post-occupancy evaluation study, measuring the building’s performance against its environmental design targets. This crucial part of the design process will allow the project lead to ensure that the most successful aspects of the scheme are integrated within future projects.
- 6.12 With a score of 87.55% under the 2005 BREEAM Offices scheme (assessment completed in October 2006), Innovate Green Office is the highest-ever-scoring BREEAM development to date (taken across all the BREEAM schemes).



Overview of environmental features

6.13 This development benefits from:

- high thermal mass;
- heating and cooling within the building fabric;
- SuDS wastewater filtration and attenuation system;
- daylight sensors to internal lighting;
- absorption chilling;
- condensing boilers;
- combined heat and power;
- rainwater harvesting for WC flushing;
- waterless urinals;
- 100% recycled aggregate and 65–80% recycled cement replacement;
- ecologist's recommendations implemented;
- permeable roads and paving.

The BREEAM assessment

6.14 The development has achieved a BREEAM “excellent” rating – scoring 119 credits out of a possible 139, making a total percentage of 87.55%. The site has gained full credits for the following BREEAM categories:

- management;
- health and well-being;
- water;
- ecology.

6.15 Other categories achieved close to full credits.

Building services

6.16 The development is built of high thermal mass concrete using a Termodeck system. Hollow

channels within the fabric allow for heated or cooled air to be passed through for warming or cooling.

6.17 The development is naturally ventilated, with good daylighting levels throughout. Lighting control has also been zoned using PIR (passive infra-red) detectors.

6.18 A CHP plant backed up by condensing boilers provides the warm air for heating the building and the heat for the ammonia-absorption chillers. Ammonia-absorption chillers were used for their high cooling efficiency and the environmentally-inert behaviour of the gas.

6.19 Water consumption has been kept to a minimum by harvesting rainwater for use in WC flushing. The WCs are vacuum-flush and have a water consumption of only 1.2 litres. Further water savings are made through specifying waterless urinals.

Green strategy

6.20 The innovative fabric design is complemented by the use of a high percentage of recycled aggregate, recycled cement replacement, and the specification of certified timber.

6.21 All run-offs from the site are dealt with using an extensive SuDS, comprising a large wetland area/ balancing pond fed via a lined pond and a new stream/swale.

6.22 All hard landscaping is permeable paving with soakaway drainage, while the water run-off from roofs is harvested for toilet flushing. This combination of water handling effectively results in run-off reduction of 100%.

6.23 Innovative design, good material and services specifications, good handling and use of rainwater and a sympathetic approach to ecological issues have resulted in the BREEAM “excellent” rating.

7 Key background, guidance and reference documents

Please note that this is not an exhaustive list.

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8 Future-proofing of healthcare buildings

Plan for uncertainty – Design for change

- Avoid creating new environments for old services and systems
- Buildings will always have to flex
- Even new buildings need refreshing as they come into use

Optimise investment

- Make best use of resources, people and infrastructure
- Generate a development control plan – dynamic and regularly updated

Invest in quality real estate

- Avoid bespoke solutions that are closely fitted to suit a specific service plan or even to health
- Distinguish between core, movable and non-essential – provide appropriately

Master plan the site

- Look beyond the immediate site boundaries and make best use of local amenities
- Plan layout and infrastructure strategically

Maximise the potential to expand and contract the buildings and recognise that elements of the building have different life-spans

- Structure and vertical circulation – 30–60 years
- Engineering services – 15 years
- Internal layout – 2–3 years

Distinguish between parts of the building

- Group activities with similar technical requirements

Create clear and unobstructed circulation routes

- Avoid cul-de-sacs
- Position key elements with due consideration (for example lifts, stairs)

Design shape and form to change over time

- Use networks of spaces – buffers of hard and soft spaces
- Shell and fit out

Standardise

- Make more universal room sizes
- Make four-bed bays convertible to single rooms

Use space as resource not territory

- Use spaces interchangeably – rooms named by activity not people!
- Make spaces generic rather than bespoke

Long life, loose fit

- Embrace sustainable communities
- Engage with partners and other service providers to optimise the wider community network and infrastructure, ie transport and renewable technologies

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