Department of
Health, Social Services
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AN ROINN
Sláinte, Seirbhísí Sóisialta
agus Sábháilteachta Poiblí

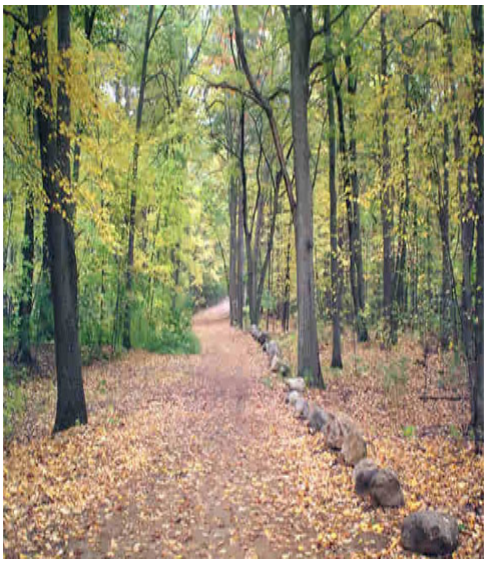
MÀNNYSTRIE O
Poustie, Resydènter Heisin
an Fowk Siccar




SUSTAINABLE DEVELOPMENT DESIGN BRIEF

Version 6

Volume 1 – Best Practice




Health Estates Investment Group
Estates Directorate
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Sustainable Development Design Brief

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1. The production of the foundation document by White Young Green

2. The review and comment by the Carbon Trust in the Foundation document

3. The review and comment by Building Design Partnership on the Foundation document

4. The review and comment by Queens University Belfast, University of Ulster and the Belfast Harbour Commission on Version 5

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SUSTAINABLE DEVELOPMENT

Introduction

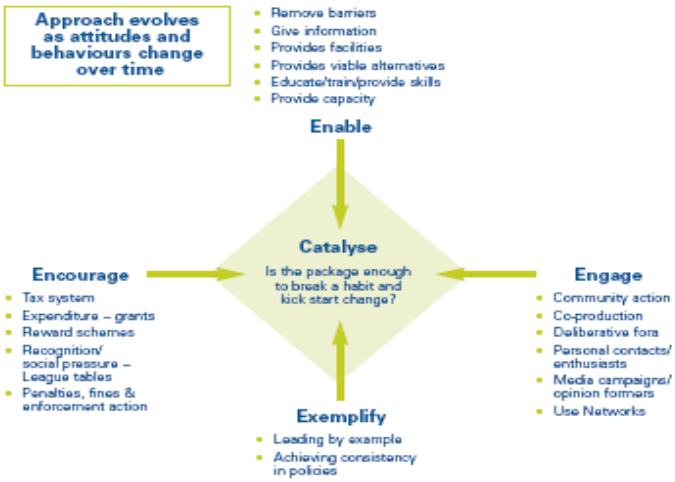
This design brief is a tool to be used by all involved in Health and Social Care capital projects, enabling change by removing barriers, providing information and capacity building. By engaging with the industry, encouraging change, and exemplifying best practice, HEIG Investment Group (HEIG) seeks to promote the provision of truly sustainable healthcare facilities in Northern Ireland for future generations.

Health Estates Investment Group (HEIG) is committed to the delivery of sustainable buildings in accordance with international, national and local sustainable development policies:

Sustainable development is “development that meets the need of the present without compromising the ability of future generations to meet their own needs”.

As champion for sustainable development within the health and social care sector, HEIG seeks to promote new standards of sustainable development and advance best practice alongside the highest standards of design, environmental sustainability and construction.

HEIG recognises that capital development projects have the potential to impact on socio economic and environmental conditions both locally and globally and therefore support the need to deliver sustainable construction through adoption of the Behaviour Change Model introduced in the UK Sustainable Development Strategy, shown below.



The design brief identifies a number of central themes for the integration of sustainable development principles and practices viz:

Section 1.	Management	-	BREEAM	4
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The brief is designed to allow reporting and monitoring of design proposals, contract documentation and construction practice against the highest sustainable development standards. The document is structured in two parts:

Volume 1 A guide to sustainable development in practice which identifies opportunities and targets for the integration of sustainable development principles and practices.

Volume 2 Reporting pro-formas against each of the identified central themes for sustainable development. These will be completed by the Design Team Leader and returned to the HEIG Project Manager at each project review stage. The review stages are listed below:

Sustainability Brief Report

Table showing the alignment of stages with work stages

CIM Stage	Title	RIBA Work Stage	Sustainability Brief	HEIG Project Review
Stage 0	Outline Business Case	A and B	Sustainability Report I	Project Review I
Stage 1	Concept and Design Development	C and D	Sustainability Report II and III	Project Review II and III
Stage 2	Final Design	E, F and G	Sustainability Report IV	Project review IV
Stage 3	Tender Action and Mobilisation	H and J		
Stage 4	Construction	K		
Stage 5	Technical Commissioning	L	Sustainability Report V	Project Review V
Stage 6	Post Completion	L	Sustainability Report VI	
Stage 7	Operational Commissioning			
Stage 8	Post Project Evaluation			

Volume 1 - Sustainable Design Guidance

This guide to sustainable development in practice aims to address some of the core issues faced within the health and social care capital works programme by identifying opportunities for integration of sustainable development principles and practices. The guide is designed to cover many procurement routes and therefore covers issues e.g. site location and utilisation that will not be appropriate to specific capital projects. Design teams are therefore required to address the themes that are particular to the commissioned project although opportunities outside of their direct control can and should be highlighted through the reporting process.

1.0 MANAGEMENT

1.1 Community involvement and identity

The Northern Ireland Sustainable Development Strategy recognises as a priority the need for regeneration and to build sustainable communities with objectives centred on economic well-being, attractive, healthy, high quality environments and greater community engagement and civic leadership. Hospital and healthcare facilities are very much community buildings and seek to bring facilities and services into the heart of communities.

In terms of contributing to the neighbourhood the development must contribute to the enhancement of the urban design of the area and the civil pride of the citizens living and working in it.

The DHSSPS highlights that effective public engagement can help create a better understanding of the complexities in managing health and social services. Working with individuals and communities is the best way of ensuring a truly person-centred service that is developed in line with sustainable principles.

With this in mind a key measure in the design of HEIG developments will be to stimulate consultation and raise aspirations of the project. The development of schemes must involve extensive staff, patient and community consultation with the aim of delivering a building that responds effectively to the needs of patients and carers, developing a sense of ownership and trust. Pro-active engagement is highly important for the sustainability of any project in order to secure the wider community's commitment. Sites can thereby be transformed into places of civic value and help all those involved (including HEIG, development teams and the community) to build a better understanding of design quality. Public consultation workshops could develop good design guides which reflect the community's aspirations for their new facilities.

As well as being consulted at the initial concept and design stage, involve local residents and communities in ongoing consultations and updates on the development throughout the construction and development of the community project.

		Recognize and encourage flexibility in the design to enable the building to be used as a shared facility with the community. Ensure that these facilities can be accessed without comprising the safety of the building and its occupants. Carry out briefing sessions on how the design has changed as a result of consultations. Send information packs detailing the proposals and developments of the scheme to homes in the local community to target those who may not be able to attend consultation meetings and workshops. BREEAM requires public consultation to be carried out prior to construction and for the findings of public consultation to be taken into account in the final design. Involve the public in the design and development of the project; the views of potential users of the projects are to be sought, recorded and taken into account. Use community partnerships in the construction of the project, formed with local councils, groups and business e.g. Woodland Trust, Arts Care etc. In addition provide evidence that demonstrates that changes to the design and/or action has been taken as a result of the above consultation process.
1.2	**Management**	The management of a building project from design stage through construction to completion and operational phase is an important HEIG requirement. <u>Publication of Building Information</u> To support community relations the design team are required to publicise information about the development via the internet, newsletters, site visits, presentations.
1.3	**NI Building Regulations**	In order to meet the necessary BREEAM rating for healthcare projects in Northern Ireland, exceeding the Building Regulations (Northern Ireland) 2005 requirements will be necessary. Key sustainability factors within the Building Regulations (NI) 2005 include:

Part F – Conservation of fuel and power

- Much more complex energy building model – SAP 2005.
- Air pressure testing required for most new dwelling types and commercial buildings.
- Certification and commissioning of services.
- Information to end users.
- Control of low energy lighting, internal and external (fixed to the building).
- Most cases SEDBUK type A or B heating boilers.
- New focus on build quality and variations from design.
- Non- domestic buildings calculated using complex SBEM energy model.
- Air pressure test of commercial buildings.
- Consequential improvements to buildings over 1000 m².

Part L – Combustion appliances and fuel storage systems

- Control of oil tanks, to reduce likelihood of fire.
- Control of oil tanks, to prevent pollution of water.
- Applications required for re-opening of flues.
- Smoke testing and certification of flues / hearths.
- Increased ventilation requirements to combustion appliances.

Part R – Access to and use of buildings

- Applies to all non domestic – including change of use and extensions.
- Loss of exemptions for small buildings or upper levels.
- Ease of opening doors, internal and external.
- Colour (LRV) contrasts, ramps, handrails, doors, handles etc.
- Lift required to all commercial buildings.
- Footpaths and routes between buildings now control tolerances and surfaces.
- Control signage and way finding.
- Additional requirements for facilities.

1.4 Design for social wellbeing

The protection of natural resources and environmental enhancement are seen as an important contributor to enhancing health and well-being. A healthy environment is inextricably connected to the health of the population. At an operational level, recent research has established positive links between patient interaction with the natural environment and health outcomes. The protection of natural resources and environmental enhancement in the development of capital projects is therefore encouraged through the application of BREEAM.

It is also an aspiration of HEIG to incorporate artworks and colour that would contribute to the well being of the building users and assist recovery. Buildings should help lift the spirits of all those who are treated at, visit and work in hospitals. This should involve the appointment of an arts-coordinator or preparation of an arts policy and strategy. Provide spaces in the public realm where possible i.e. public performance spaces, sitting areas and walks through the site. To provide an appropriate and available supply of drinking water to staff, visitors and patients, supply drinking water through chilled mains fed water dispensers throughout the day at convenient points around the buildings.

Outdoor Space

Outdoor amenity space should be provided that is easily accessible by building occupants. The space should, as a minimum, comply with Building Regulations Part R. Examples of outdoor amenity spaces include; an outdoor landscaped area, balcony or terrace, where occupants may sit outside in a group and socialise.

Infection Control

Ensure infection control measures have been taken into account and endorsed by the chief executive from the early design stages.

- Confirm that the NHS Estate's Health Facilities Note 30, Infection control in the built environment – Design and Planning has been, and will be, complied with from RIBA stage B to stage L of the design and construction process.
- Provide a dedicated storage space for the purpose of segregating waste.

		The size of the space allocated must be adequate to accommodate the likely amount of recyclable, hazardous and non-hazardous waste. The waste storage is clearly labelled and in line with the recommendations set in the HTM 07-01: Safe management of healthcare waste. ▪ The decisions taken to minimise infections have been formally discussed and approved by the Chief Executive.
1.5	**Considerate Constructors Scheme (CCS)**	One of the GCCG *Sustainability Action Plan* themes is to "respect for people and their local environment". Respect for people is at the heart of the social responsibility dimension of sustainable construction. The *Considerate Constructors' Scheme (CCS)* embodies the respect for people and their local environment in its code of practice. To ensure the construction phase of the development is undertaken in a socially considerate and accountable manner, register all schemes with the Considerate Constructor Scheme, in accordance with the requirements of the Sustainable Construction Group Guidance Note 5. Commit to going significantly beyond best practice site management principles by achieving 36 or more points out of a possible 40 for the scheme and achieving a BREEAM Exemplary level credit. Health & Safety not only plays a part of the Considerate Constructors scheme but is a vital element of construction management. The NI Build Safe Initiative has been developed under the auspices of the Construction Industry Forum for Northern Ireland (CIFNI). The BUILDSAFE-NI initiative seeks significant improvements in the application and management of health and safety in the construction industry in Northern Ireland so as to ensure risks are controlled and the number of accidents reduced. Government client commitments : • Require all contractors on works contracts of value less than the Procurement Regulation threshold to be registered with Safe T Cert: or equivalent. • Require, as a condition of contract, that all operatives working on government construction projects possess a Construction Skills register (CSR) card or equivalent.

		The Design Team and Main Contractor must enable the Government Construction Clients to discharge their monitoring duties under the CDM Regulations 2007 by assessing Consultants, Main Contractors and their supply chains via office audits and site inspections. Construction site must be managed in an environmentally sound manner in terms of resource use, energy consumption, waste management and pollution, including the following. ▪ Monitor, report and set targets for CO_2 or energy arising from site activities; ▪ Monitor, report and set targets for CO_2 or energy arising from transport to and from site; ▪ Monitor, report and set targets for water consumption arising from site activities; ▪ Monitor construction waste on site; ▪ Sort and recycle construction waste; ▪ Adopt best practice policies in respect of air (dust) pollution arising from the site; ▪ Adopt best practice policies in respect of water (ground and surface) pollution occurring on the site. ▪ Produce environmental materials policy and use for sourcing of construction materials to be utilised on site ▪ Ensure all site construction timber is sustainably sourced.
1.6	**Meeting a specified BREEAM for Healthcare rating**	In order to build in a sustainable manner, it is necessary to minimise any negative impacts. The main impacts attributed to the construction of individual buildings are: ▪ Energy in use; ▪ Embodied energy and main environmental impacts of building materials; ▪ Water consumption; ▪ Health and wellbeing of occupants: indoor air quality/day lighting/noise; ▪ Transport and access impacts of occupants and users;

		▪ Pollution to air (CO_2, SOx and NOx), ozone depletion. The Government Construction Client Group's (GCCG) Sustainability Action Plan firmly encourages embedding sustainability through assessment schemes such as the Building Research Establishment's Environmental Assessment Method (BREEAM). BREEAM is now widely accepted in the UK as representing best practice in addressing the effects of buildings on the global; and local environments, whilst producing a healthy and comfortable indoor environment. Buildings assessed using BREEAM are assessed and rated according to performance (as Fail, Pass, Good, Very Good or Excellent). The GCCG Sustainability Action Plan has established a requirement that 100% of all new buildings will be subject to a BREEAM Assessment or equivalent with a ratings outcome of 'at least' very good for refurbishments and excellent for new builds. The principles of BREEAM for Healthcare have been encompassed within this Design Brief, and it is required that specific assessments will be conducted for all developments, using Volume 2 of this Design Brief to demonstrate compliance with the NI Sustainability Action Plan.
1.7	**Equity and Participation**	The proposed buildings, spaces and access to the site will be designed to fulfil the needs of disabled people. Develop an Access Statement to demonstrate that the access requirements of disabled people have been fully considered and demonstrate how they intend to be met.
1.8		<u>Construction Sites Environmental Management System</u> Develop an Environmental Management System for the building. The structure of the EMS must be in compliance with British Standard 8555 2003 or equivalent. Ensure the EMS has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and completed phase audits one to four, as defined in BS8555. In addition ensure the EMS is third party certified, to ISO14001/EMAS or equivalent standard.

		Environmental Policies and Responsibility Develop and implement a formal environmental policy and environmental purchasing policy which has endorsement from senior management level. In addition demonstrate that environmental responsibilities have been allocated to an appropriate named individual.
1.9	**Building User Guide**	Building user guide Provide a simple building user guide to cover information relevant to both the non-technical building manager and the staff on the operation and environmental performance of the building. Information covered will include building services, emergency data, energy and environmental strategy, water use, transport facilities, materials and waste, re-fit/re-arrangement considerations, reporting provision, training and any relevant links or references.
1.10	**Design Flexibility**	To ensure long term sustainability of new developments, buildings should be designed with flexibility in mind allowing conversion of inner floor space through rearrangement of internal walls and partitions as required. It is expected that, in order for buildings and spaces to be adaptable and flexible at moderate cost, 75% of spaces within a design should be capable of being adapted to projected uses through for example, adoption of appropriate structural grids, adequate floor to floor heights and suitable engineering infrastructure layouts.
1.11		Building user education Facilitate the structured and systematic provision of training that enables building users to understand and operate the building efficiently. Ensure training is provided to the building occupants on the appropriate use of building controls and procedures to maintain efficient building operation and minimise operational environmental impacts (scope of the training is based on the content of a Building User Guide, to be carried out with relevant occupants within the first 12 months after completion).

1.12 **Measures taken to reduce the opportunity for crime**

A key commitment of the DHSSPS is 'Sustainable Communities'. The DHSSPS will work in partnership to achieve improvements in health and reduction in neighbourhood crime and antisocial behaviour by developing and implementing a "Cleaner, Safer, Greener Communities" agenda.

Ensure the project team has consulted with the Architectural Liaison Officer (ALO) or the Crime Reduction Design Adviser (CRDA) and produce a security strategy covering both internal and external security measures and procedures.

Design building and spaces using *Secured by Design - Hospitals* Principles wherever possible, to create attractive, safe and secure environments in which to work and stay. The provision of secure access points and secure car parks provide a significant deterrent from crime. Ensure the car park has been designed in accordance with the *PARK MARK Safer Parking* assessment guidance with a commitment to apply for the Safer Parking Award within three months of occupation.

Carefully plan the design of street lighting and lighting within the development to provide the appropriate type and amount of lighting throughout the development.

1.13

<u>Ease of maintenance</u>

Specifications for the building and its services/systems and landscaping must consider ease and efficiency of maintenance.

1. The checklist 'design guidance to maintainable buildings', outlined in Appendix 2 A1 of CIBSE guide to ownership, operation and maintenance of building services is used during the design and the design team confirm that the items identified in the feasibility, outline proposal, system design and detailed design stages within the document have been addressed.

2. A critical appraisal has been completed at the feasibility stage, covering the maintenance implications for different design options. This includes

		service life planning in accordance with ISO 15686 Buildings and constructed assets - Service life planning Part 1. 3. A maintenance strategy has been developed from the critical appraisal and formulated at the design stage and relevant to the design being assessed. The maintenance strategy should cover the extent to which maintenance can be designed out and how support systems can be built into the installation to facilitate efficient and cost-effective operation and maintenance. 4. Storage space has been provided for cleaning and maintenance equipment in line with appropriate Health Building Notes and Health Technical Memorandum as appropriate. This must be evenly distributed throughout the site/building and as a minimum storage should be provided on each floor. 5. A management plan for the landscaping is included in the maintenance strategy.
1.14	**Life Cycle Costing**	Life cycle costing of the development should be considered in the design and specification of healthcare projects. Demonstrate that a Life Cycle Cost (LCC) analysis based on a feasibility study proposal has been undertaken on the building design at a strategic level and system level. Demonstrate the results of the feasibility study and consideration of LCC have been implemented. 1. LCC carried out based on a feasibility study proposals during RIBA Work Stages B and C. The model is updated during Stages D and E to ensure relevance. The life cycle costs covered in the feasibility study are analysed in the following stages: ▪ Construction ▪ Operation - includes as a minimum utilities ▪ Maintenance – includes as a minimum planned maintenance,

replacements and repairs, cleaning, management costs

- End of life

2. A LCC period of 25 or 30 AND 60 years, shown in real, discounted and non-discounted cash flow terms. The feasibility study demonstrates that at least two of the following issues have been analysed at a strategic and system level, comparing alternative options:

   - Structure
   - Envelope
   - Services
   - Finishes and that the chosen solution best meets performance requirements for the built asset.

3. The options with the lowest discounted LCC over the period is preferred, assuming that their selection results in at least one of the following:

   - The lowest building energy consumption over the operational life span of the building
   - A reduction in maintenance requirement/frequency
   - Prolonged replacement intervals of services infrastructure/systems or building fabric
   - Dismantling and recycling or re-use of building components.

The decision for materials specified in a development should be based on the ease of maintenance required during the operational phase of the building and ultimate potential for re-use at demolition stage. CIRIA C607 – Design for deconstruction – addresses the opportunities for designing buildings in which materials can later be recycled or reclaimed during construction. A minimum of 50% of materials specified must have a reuse value, whilst at least 50% of demolition materials generated must be reused or recycled. Projects must meet the whole life costing requirements of BS ISO 15686 and whole life standards to be established.

1.15

Good Corporate Citizen

Demonstrate that the Good Corporate Citizen model has been used to assess the development and that there is a commitment to continue to use the model to re-assess the development regularly. More information on this model can be found by accessing the following link: www.corporatecitizen.nhs.uk.

1.16 **Public Procurement**

A revised Public Procurement Policy for Northern Ireland was launched by the Minister of Finance and Personnel in the Assembly in May 2002 and sets out 12 guiding principles which govern the administration of public procurement.

At the heart of their procurement strategy are the following principles:

- Engage key procurement decision-makers;
- Ensure system allows consideration of whole life costs—that recognise the value of in-use and end of life savings from more sustainable solutions—when making decisions;
- Encourage consideration of wider cost-benefit analysis—to factor in the value of sustainable products and services to the business in terms of image, reputation or brand—when making decisions;
- Include sustainability requirements in standard service level (or similar) agreements for service procurement as contracts are renewed or retendered;
- Consider sustainability issues when deciding specifications for purchasing materials and equipment.

1.17 **HEIG Sustainable Procurement**

Sustainable procurement is the processes by which a client can procure and deliver projects that best promote sustainable development while still achieving optimum whole life value for money.

HEIG seek to incorporate sustainable procurement principles at each key decision-making stage, as defined within the Office of Government Commerce(OGC) 'Achieving Excellence' Suite of procurement guides and *Equality of Opportunity and Sustainable Development in Public Sector Procurement* guidance from the Equality Commission for Northern Ireland (EQNI) and the Central Procurement Directorate (CPD):

i. Business justification
ii. Project brief and Procurement Process
iii. Design brief
iv. Construction process
v. Operation and management
vi. Disposal and re-use.

These documents will assist HEIG in the procurement of capital project services, ensuring sustainable development is central to the delivery of the development.

It is expected that the principles of both the OGC guidance and the EQNI/CPD guidance are incorporated into the management of the design development process, construction stage and (where applicable) operation and maintenance phase.

1.18 Specification

In the specification and procurement of materials and equipment, sustainability criteria must be incorporated, together with functionality, appearance, usability, etc. Specific opportunities exist, as discussed previously :

- Use of 'A' grade materials
- Application of whole-life costing techniques to large scale equipment and sets of electrical equipment (with electrical loads in excess of 10kW)
- Encourage the selection of viable building services options based on their CO_2 emissions over the course of the building's lifecycle.
- Incorporation of products with recycled content
- Procurement of energy efficient electrical equipment in conjunction with OGC's Sustainability Mandatory Standards Government Buying Standards – (formally Quick Wins) and Energy Consumption Guide 72.

<u>Provision of energy efficient equipment</u>

Ensure that the procurement of office and domestic scale equipment is carried out in accordance with current best practice guidance. Check that

		office equipment, white goods, supplementary electric heating, portable medical equipment and small power have been or will be procured in accordance with OGC's Sustainability Mandatory Standards – 'Quick Wins' (CPD Guidance note 04 /04) and Energy Consumption Guide 72, Energy consumption in hospitals. In addition demonstrate that the procurement of large scale equipment and sets of electrical equipment are the result of a whole life cost analysis. This is to include the embodied and operational impacts for each option, taking into consideration the replacement intervals; the assumption of a 60 year building design life; for each piece of equipment at least two options should be considered and the option is specified that demonstrates the better performance in terms of lower energy consumption/CO_2 emissions over the building life cycle.
1.19	**GC Works Social, Environmental and Economic Supplementary Conditions**	The GC Works suite of contracts, used for all Health and Social Care Capital Developments in Northern Ireland, have been amended to incorporate a series of Supplementary Conditions that when implemented will enhance the social, environmental and economic wellbeing of the Northern Ireland Public. All those involved in the procurement process of Health and Social Care Capital Developments should familiarise themselves with and adhere to these Supplementary Conditions.
1.20	**Economic Wellbeing**	One of the guiding principles of both the UK and Northern Ireland Sustainable development strategies is to ensure 'a Strong, Healthy and Just Society'. This involves "Meeting the diverse needs of all people in existing and future communities, promoting personal well-being, social cohesion and inclusion, and creating equal opportunity for all". 'Sustainable Communities' in one of the priority areas for immediate action of both strategic documents. The Northern Ireland Sustainability Implementation Plan has cited 'Sustainable Communities' as one of its three key themes for progress. The Investment Strategy for Northern Ireland (ISNI) 2008-2018 sets out the framework within which the Northern Ireland Executive will create the 21st century infrastructure needed to grow the economy, to support positive social change, enhance the environment and environment and help to deliver better public services.

		The NI Executive through the ISNI have sought to encourage infrastructure to: • Help grow a dynamic and innovative economy; • Help deliver modern, high quality and efficient public services; • Help promote tolerance, inclusion, equality of opportunity and the desirability of good relations; • Promote regional balance in future development; and • Tackle areas of social disadvantage. Health Estates HEIG seek to fulfil these aims through ensuring the Design teams and Main Contractors comply with this section of the Sustainable Development Design Brief.
1.21	**Encouraging the establishment of local partners**	The Main Contractor must publish the opportunities available within their supply chain on their website and / or where appropriate in the local press. The Main Contractor must supply the Project Manager with details and web links to information published on the Main Contractor's website for inclusion in the ISNI tracking database. The Main Contractor must comply with the Code of Practice for Government Construction Clients and their supply chains.
1.22	**Management Encouraging prompt payment to suppliers – sub contractors**	The Main Contractor must provide written evidence in the form prescribed to confirm the timeliness of payments to his key suppliers / sub contractors. The general management of a building from design stage through construction to completion and operational phase is an important Health Estates requirement.
1.23	**Equity and Participation Encouraging training and**	The Main Contractor must submit prior to the commencement of the works an Employment Plan setting out the following:

skills development to build a sustainable industry

- general policy on recruitment, training and retention of employees;
- Proposal for recruitment and retention of employees for project Government Construction Client.

The Main Contractor must recruit one long-term unemployed person, either directly or through the supply chain for each £5 million of project value. (Long-term unemployed is defined as people who have been unemployed for at lease 3 months.)

The proposed buildings, spaces and access to the site will be designed to fulfil the needs of disabled people. Develop an Access Statement to demonstrate that the access requirements of disabled people have been fully considered and demonstrate how they intend to be met. The Main Contractor must recruit one apprentice, either directly or through the supply chain, for each £2 million of project value.

The Main Contractor must report quarterly during the duration of the contract to the Project Manager giving the following information:

- The number of apprentices (and their names) taken on at start of contract;
- Details of their trade or profession;
- Date they joined company;
- Date they departed company (if applicable);
- Number of days each apprentice was on site;
- Schedule of training identified for each apprentice;
- Schedule of training attended/attained by each apprentice; and
- Whether they are currently retained in employment.

1.24	**Local Procurement**	HEIG recognise the benefit of the sustainable procurement of local products and services. By procuring sustainably, the Department seek to support the development of local economies, leading to potential reduction of social and economic deprivation, which in turn may assist people to enjoy healthier lifestyles. Procurement is dealt with in more detail in Section 9 below.
1.25	**Supply Chain**	The sustainability of a development will be dependent not only on the lead partners but on the entire supply chain engaged in the process, through from design, construction and operation. The evaluation of the capabilities of suppliers and manufactures of products and services to be evaluated based on corporate level commitment (e.g. operating an accredited environmental management system to ISO 14001/BS8555/EMAS) and products / services supplied. Give preference to suppliers who can provide life-cycle assessment (LCA) & include this requirement in pre-qualification of preferred suppliers and manufactures

2.0 Health and Wellbeing

2.1 Acoustic Performance, Internal Air Pollution and Air Quality

For most spaces in hospitals, the critical effects of noise are on sleep disturbance, annoyance and communication interference, including interference with warning signals.

The ambient noise levels and airborne and impact sound insulation levels must achieve those recommended in HTM 08-01 Part A. In addition the reverberation times must be compliant with those recommended in HTM 08-01 Part B.

The LAmax of sound events during the night should not exceed 40 dB indoors. For wardrooms in hospitals, the guideline values indoors are 30 dB LAeq, together with 40 dB LAmax during the night. During the day and evening the guideline value indoors is 30 dB LAeq. The maximum level should be measured with the instrument set at "Fast".

Since patients have less ability to cope with stress, the equivalent sound pressure level should not exceed 35 dB LAeq in most rooms in which patients are being treated or observed. Particular attention should be given to the sound pressure levels in intensive care units and operating theatres. Sound inside incubators may result in health problems, including sleep disturbance, and may lead to hearing impairment in neonates. Guideline values for sound pressure levels in incubators must await future research.

A large potential for noise generation will be realised during the construction phase building projects. Works must be undertaken in accordance with BS 5228, as per The Control of Noise (Codes of Practice for Construction and Open Sites) Order (Northern Ireland) 2002.

Buildings will be designed in accordance with Part G of the Building Regulations (Northern Ireland) 2005, in terms of minimizing noise between buildings and within buildings, whilst limiting breakout noise to ensure privacy within healthcare consultation and treatment areas.

Carry out a pre-completion environmental noise assessment by a suitably qualified acoustician to demonstrate compliance with guidance as well as a study of noise levels required by HTM 08-01 Part B.

During the operational phase the main noise potential will be related to building services plant and traffic movements. The building services plant must be selected and located to ensure most effective noise attenuation.

The following noise requirements are also to be met:

- To demonstrate the acoustic performance of the development meets the necessary standards for its intended function show that the building design achieves indoor ambient noise levels in unoccupied spaces in accordance with BS8233:1999.
- To demonstrate the acoustic performance of the development meets the necessary standards specification as set out in HTM 08-01Part A.
- Demonstrate that sources of noise from the development do not give rise to the likelihood of complaints from existing noise sensitive premises and amenity or wildlife areas that are within the locality of the site.
- Carry out post construction testing to ensure that the acoustic performance of the building is in accordance with the acoustic design specification as set out in HTM 08-01Part B

Internal Air Pollution

Take steps to reduce the risk of health associated with indoor air quality. Ensure air intakes serving occupied areas avoid major sources of external pollution and recirculation of exhaust air. Subject to physical restrictions from the available site ensure that if the building is air-conditioned or mixed-mode the location of air intakes/outlets are over 10m apart to minimise recirculation and intakes are over 20m from sources of external pollution. Similarly for naturally-ventilated buildings ensure openable windows/ventilators are over 10m from sources of external pollution (i.e. roads (including site roads), car parks, other extracts or pollution sources).

Indoor Air quality

For mechanical ventilated spaces, it is required to have CO_2 or air quality sensors monitors linked to the ventilation system that will adjust the air

		intake to maintain adequate levels of CO_2. For naturally ventilated spaces, it is required to have CO_2 or air quality sensors monitors linked to an alert system or linked to a control system that can adjust the air intake to maintain adequate levels of CO_2.
2.2	**Microbial Contamination**	Design and maintain the building's services to minimise the risk of waterborne and airborne legionella contamination thereby avoiding risk of legionellosis. All water and HVAC (heating, ventilation and air-conditioning) systems to be designed to meet the requirements of HSE Approved Code of Practice (ACoP) and Guidance, L8, "Legionnaires disease; the control of legionella bacteria in water systems", 2000 and specify either steam humidification or no humidification.
2.3	**Maximum day lighting**	Introducing natural light into buildings saves energy and also creates an attractive environment which improves the well being of patients. The daylight within a room will be influenced by: • The size and area of windows in relation to the room. • The depth of reveals, and presence of overhangs and other external obstructions. • The light transmittance of the glass. • How bright internal surfaces and finishes are. Designs must aim, as far as is reasonably possible, to maximize the amount of natural daylight used in the internal spaces, thus reducing the amount of artificial lighting required to produce the necessary lighting levels. Project teams are directed to the guidance in CIBSE Lighting Guide 10 Daylighting and window design. It is expected that: • at least 80% by floor area of the staff and public areas have an average daylight factor of 2% or more • at least 80% by floor area of the occupied patient's area (dayrooms, wards) has an average daylight factor of 3% or more • daylight provision has been designed in accordance with CIBSE Lighting Guide 10, BS8206 and the BRE Site Layout Guide

Where possible at least 80% of the floor areas (for the building spaces/room identified for the BREEAM HEA 1 Credits) has an average daily light factor of 3% in multi-storey buildings and 4% in single storey buildings.

As part of the building modeling requirement for Daylighting carry out light surveys and studies to ensure the optimum amount of natural light is entering buildings. The results of these could be used to show compliance with the requirements for average daylight factors. This is to demonstrate improved quality of day lighting for building users. The standard daylight factor formula outlined in CIBSE LG10 must be used.

Glare Control

Whilst natural daylight is a preferred lighting solution with the added benefits to productivity, well-being and general ambience, this must also be carefully controlled to avoid unnecessary glare and solar heat gain. Ensure an occupant controlled glare control system (e.g. internal or external blinds) is fitted. This applies to areas where computer workstations will be located, close work will be undertaken or visual aids will be used (such as projectors) and bedded areas. Fit all east, south and west facades with solar shading, where practicable.

Other measures to consider include:

- The use of high level windows.
- The integration of Sun pipes to provide natural lighting to all areas, even internal rooms.
- Roof lights which can also be used to introduce daylight to windowless areas.
- North-lights which have traditionally been used to introduce daylight into buildings without introducing solar gains. The south facing element of a north light can also provide a possible location for renewables such as Photovoltaic cells.
- Atria, courtyard and concourse areas and glazed streets are useful ways of introducing daylight and can be used for social spaces, the nature of such environments giving lasting impressions to users.

		View Out To allow for optimum view out ensure that all workstations/desks have a view out and are within a 7m radius to windows and at least 80% by floor area of public spaces have a view out and are within a 10m radius to windows. In addition aim for at least 80% by floor area of public spaces to have a view out and be within a 10m radius of windows. For staff areas which for security or observation purposes must be centrally located, and areas where occupancy is likely to be transient, compliance is achieved if 'borrowed' light is provided (e.g. light shelves, roof lights, translucent partitions).
2.4	**Hazardous substances**	Information on the presence of hazardous materials must be available for staff and contractors. The following materials to be recorded in the Health and Safety File: ▪ Asbestos; ▪ Lead pipe work; ▪ Lead based paints; ▪ Urea formaldehyde in foam insulation; ▪ Controlled substances such as refrigerants; ▪ HCFCs/CFCs/HFCs blown foams such as insulants. Asbestos is a known carcinogen. The use of asbestos is now tightly controlled in all new building activity. The main area where it can still be found is in lift brake pads. Materials such as paints and furnishings can produce emissions, primarily formaldehyde and VOC's (Volatile Organic Compounds, can affect indoor air quality. Products with a low-VOC content meant for indoor use have been positively correlated with better indoor air quality. Using products with low VOC's is especially important for chemically sensitive individuals. Minimise the use of VOC's when specifying finishes and fittings with justification provided for all decisions made. Set a low VOC emissions target of 0.3-7.99%. Ensure at least 80% of all paints and varnishes used for internal purposes demonstrate that they have either a European Eco-label or achieve an 'A or

		A+' rating from the BRE Green Guide To Specification. In addition all indoor paints and varnishes should comply with the CPD 'Quick wins' guidance note 04 / 04: VOC content not to exceed- Wall paints: 30 g/l Other paints: 250 g/l All other products: 180 g/l
2.5	**Health Impact Assessment**	A Health Impact Assessment (HIA) is a combination of procedures, methods and tools by which a project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population. The importance of an HIA has been identified by many, including Department of Health (Draft Guidance on the Health in Strategic Environmental Assessment 2007), The Institute of Public Health in Ireland (Health Impacts of the Built Environment a review 2006), and The Royal Town Planning Institute (Delivering Healthy Communities – RTPI Good Practice Note 5, 2009). Ideally an HIA should be carried out prospectively, i.e. while the project is being developed, so that HIA recommendations have the potential to influence the design and operation of the project. It is recommended that project teams carry out an HIA for their project at stage 1 and that the outcomes of the assessment are continually reviewed throughout subsequent stages of the project. Guidance on how to carry out an HIA for a project " Health Impact Assessment Guidance – Institute of Public Health Ireland 2009 is available at: http://www.publichealth.ie/publications/healthimpactsassessmentguidance2009

3.0 Energy

3.1 Design Concepts

Designs submitted for approval will need to demonstrate every effort has been made to arrive at a low carbon solution through integrated design team working from the concept/site planning stage through to the detailed design, specification, construction and commissioning stages.

The whole team, including the Client, have a contribution to make and therefore the final design will be as a result of several iterations over the design stages.

The design needs to involve all possible passive solutions to minimise energy demands throughout the construction process, the anticipated useful life and the eventual demolition of the facility. Issues such as control of infection, embedded energy and ease of monitoring demands are expected to be discussed at design charettes* initiated at the very earliest stages of the project inception.

[*A design charettes is an intensive hands-on workshop that brings together people from different disciplines and backgrounds to explore design options]

Examples of Passive solutions would be:

- Orientation
- Maximising natural lighting
- Maximising natural ventilation in non medical areas
- Implementing thermal mass
- Adopting appropriate construction methods & materials.

3.2 Modelling

Northern Ireland Building Regulations have recently completed an amendment to Part F: Conservation of Fuel and Power, which came into operation in November 2006. This amendment will require higher thermal standards, the effect of which will be to reduce carbon emissions by up to 40% in the buildings to which the new regulations will apply. The methods of satisfying these requirements vary with the size of the project and for larger buildings dynamic modelling is the preferred solution. Designers will be asked to show how they have dealt with issues such as orientation, solar

		shading, building thermal mass and the suitability and extent of both natural daylight and ventilation.
3.3	**Whole-Life Costing**	Each system incorporated into the design will require whole life costing spreadsheets to be provided to demonstrate value for money. Health Care facilities tend to be energy hungry and therefore the design will need to be integrated from inception and seek to arrive at a solution that provides a safe, comfortable and quality environment.
3.4	**Active Solutions**	Consider active measures only after all passive solutions have been exhausted. There are many active low carbon solutions currently available to the designer but not all are appropriate due to particular site constraints. The choices made therefore need to be specific and justified. Designers will need to demonstrate the reasons why decisions have been taken in relation to all of the major systems to be installed and some of these issues are described below.
3.5	**Heating**	Many of the issues mentioned earlier will help minimise the heating demand and it is important to show the anticipated installed loadings and revenue consequences. The energy source will be particular to the location but decisions on fuel choice, use of CHP, ground source or water loops, labyrinth pre-heating, flue gas heat transfer technologies and the medium for distribution are all areas to be tabulated. Solar panels may be appropriate in some cases to supplement the main heating source and the extent available should be shown. Where gas fired boilers are provided, they shall be fully condensing, fully modulating and shall have low NOx emissions. Where gas boilers are used, they should be set up to operate to their maximum efficiency through the use of direct boiler weather compensation. All heating system circulation pumps shall achieve a Europump Class A energy rating, shall be of the permanent magnet variable speed type and shall be set to reduce speed to meet the actual circuit loads.

3.6 Thermal Comfort and Climate Change

Assess thermal comfort at design stage, use this to evaluate appropriate servicing options and demonstrate appropriate thermal comfort levels are achieved. Complete feasibility studies aimed at optimising thermal comfort, meet the thermal comfort requirements set out in CIBSE Guide A. The thermal modelling to be carried out using software compliant with CIBSE AM11. Internal temperatures in patient areas should not exceed 28 º C dry bulb for more than 50 hours per year.

In addition to thermal modelling using current data in CIBSE Guide A for outside temperatures, design teams should model thermal comfort levels to assess what climate change adaptation measures may be necessary at 15, 30 and 50 years from the projected handover date of the project using the UKCP09 interactive data base of climate projections developed by the UK Climate Impacts Partnership (UKCIP).

3.7 Cooling

Cooling in today's building is often the largest single electrical load and therefore evaluation of the design in this system will be of particular interest. The designer will need to show diligence in relation to the extent and type of equipment used. The building fabric, ground source water and loops, the use of CHP in conjunction with absorption plant and the extent and sophistication of ventilation designs will all influence the eventual choice and these need to be clearly recorded.

A system of free cooling should be integrated where possible, replacing conventional mechanical cooling systems, whilst also achieving thermal comfort within the building(s). Any of the following should be integrated:

- Night-time Cooling
- Ground coupled air Cooling
- Labyrinth air Cooling
- Displacement ventilation
- Ground Water Cooling
- Surface Water Cooling
- Evaporative cooling, direct or indirect
- Desiccant dehumidification and evaporative cooling, using waste heat
- Absorption cooling, using waste heat

3.8 Ventilation

The quantity of air needed for ventilation will be determined by the Room Data Sheets but the compliance with both the control of infection issues, noise and the external environment may dictate the application in all areas.

Decisions regarding the extent and type of cooling and the use of natural ventilation need to be included within the design and available for discussion during Stage 1.

Mechanical ventilation shall incorporate heat recovery with an efficiency of at least 70% and shall be set to operate only when there is a net energy benefit or carbon dioxide levels fall below an appropriate limit. All mechanical ventilation systems shall achieve an energy performance of less than 1.5 W/l/s

Ventilation rates

In order to maintain a healthy indoor environment HE requires the provision of specific adequate fresh air rates. Each space within the development will be required to achieve recommended minimum fresh air rates. Provide fresh air in line with CIBSE Guide B2 'Ventilation and air-conditioning' recommendations.

All clinical areas must comply with the requirements of HTM 03-01, *Specialised ventilation for healthcare premises*

3.9 Air-Tightness

Building an air tight construction can reduce unplanned heat loss resulting from air leakage through buildings. Measures include: ensuring sufficient laps on vapour barriers, sealing around services and other penetrations, sealing at the junctions between components and careful detailing to avoid unwanted air paths.

The Chartered Institute of Building Service Engineers' Technical Memorandum 23 (CIBSE TM23[1]) sets out good and best practice air tightness standards. Achieve an air permeability index of no more than 3.5$m^3/h/m^2$ at 50 Pa in naturally ventilated spaces and 2.0$m^3/h/m^2$ in air conditioned spaces.

[1] Testing Buildings for Air Leakage – TM23: 2000. CIBSE. ISBN 1 903287 103

3.10 Systems Control

It is often the case that good design is negated by poor installation and lack of commissioning and this is particularly important with the mechanical installation.

The proposals are required to show how the systems will be quality controlled during construction and then through the commissioning period.

Efficient Heating Controls

A heating system must have controls that enable it to be run efficiently. Provide thermal controls to allow for independent adjustment of heating/cooling systems to reflect different load requirements. Design the heating/cooling system to allow for independent occupant thermal control in all separate rooms and areas within a building. Thermal zoning to allow for separate occupant control to be made of perimeter areas and the central zone. Individual room heating control shall be provided for all rooms in a manner that reduces both boiler and pump energy when heating is not required. Low water content heat emitters shall be used where practical to maximise the heating systems response time. The provision of locally occupant regulated thermal controls placed around the building perimeter and to internal areas would comply. Where a BMS is employed confirm the level of adjustment available.

Good practice guidance on efficient heating controls for different types of non-residential buildings is available from the Carbon Trust[2].

Sub-metering

Systems metering for through life evaluation of the energy consumption for major plant and departments must be shown within the design.

Provide energy sub-metering to facilitate monitoring of energy use. Ensure there is direct sub-metering of substantive energy uses within the building:

- Space Heating
- Humidification Plant

[2] The Carbon Trust www.carbontrust.co.uk

- Cooling Plant
- Fans (major)
- Lighting and Small Power (lighting and small power can be on the same sub-meter where supplies are taken at each floor/department)
- Other major energy consuming items where appropriate.

Specify sub-meters covering all potential tenancy areas within the building. Provide sub-meters covering all areas with high energy loads within the building on a departmental scale, covering the following areas (where present) at a minimum:

- Operating department
- X-ray department
- Radiotherapy department
- Pathology department
- Dialysis department
- Medical physics
- Mortuary and post-mortem department
- Rehabilitation, when including hydrotherapy pools
- Central Sterile Suppliers Department (or equivalent)
- Process areas e.g. commercial scale kitchens and laundries
- IT rooms
- Pharmacy department
- Tenancy areas

The sub-metering of energy and water will be monitored with the installation of a Building Management System (BMS). This BMS system shall be under the estates officer's control and shall be capable of monitoring and controlling the following:

- End users energy consumption.
- Sub metering to each floor/zone – all services
- Mains water usage metering.
- Oil and gas consumption and content remaining.

- Plant operating hours.
- Control of individual zones heating.
- Optimisation of heating system with weather compensation.
- Time based control of main extract ventilation installations.
- Run and Fault indication from all major items of plant.

The team will be expected to demonstrate the application of an audit trail to validate the anticipated test and commissioning results.

3.11 Lighting

Quality is paramount in this discipline and the facility can be enhanced or depleted by design decisions. Energy use for lighting can be reduced by maximising the use of daylight (whilst avoiding excessive solar gain), installing efficient lighting systems and providing smart controls. Introducing natural light into buildings saves energy and also creates an attractive environmental which improves the well being of building occupants. Maximising the use of day lighting and designing for daylight is described in detail in section 4.7 below. An average daylight factor of at least 3% shall be achieved in all ward, office, or other occupied spaces

<u>Energy Efficient Lighting System</u>

Some basic rules to achieve energy-efficient lighting are:

- Design for adequate but not excessive levels of lighting
- Use the most efficient light source that is suitable for the task
- Employ the most efficient luminaries appropriate for the situation
- Ensure that the room surfaces are light coloured and reflect light well
- Use the minimum number of luminaires that will achieve the target illuminance and meet the project brief

Install high frequency ballasts on all fluorescent and compact fluorescent lamps. Design lighting in line with best practice for suitability and visual comfort. To do this specify all internal and external lighting, where relevant,

in accordance with the appropriate maintained illuminance levels (in lux) recommended by CIBSE:

- For principal functional areas and ancillary areas specify illuminance (lux) levels in accordance with Part Two of the CIBSE Code for Lighting 2002 and it's 2004 Addendum & CIBSE Lighting Guide 2, Hospitals and Healthcare Buildings 1989 & its 1999 & 2003 addenda.
- For areas where computer screens are regularly used, the lighting design must comply with CIBSE Lighting Guide 7 'Lighting for offices'.
- For external lighting lux levels must be specified in accordance with CIBSE Lighting Guide 6 'The outdoor environment'.

External Lighting

Specify energy efficient light fittings for external luminaries and where all light fittings are controlled for the presence of daylight. Ensure:

- All external lighting for the building, access ways and pathways have an efficacy of at least 50 luminaire-lumens/circuit-Watt;
- All external lighting for to car parking area and associated roads have an efficacy of at least 70 luminaire-lumens/circuit-Watt;
- All external flood lighting has an efficacy of at least 70 luminaire-lumens/circuit-Watt;
- All external sign lighting with a bulb efficacy of >25watt has an efficacy of at least 70 luminaire-lumens/circuit-Watt;
- All external sign lighting with a bulb efficacy of <25watt has an efficacy of at least 50 luminaire-lumens/circuit-Watt;
- Light fittings are controlled through a time switch or daylight sensor to allow for daylight control.

Reduction of night time light pollution

Ensure night-time lighting is concentrated in the appropriate areas and that upward lighting is minimised, reducing unnecessary, light pollution, energy consumption and nuisance to neighbouring properties. To demonstrate

compliance specify that external lighting design is in compliance with Table 1 (and its accompanying notes) of the ILE Guidance notes for the reduction of obtrusive light, 2005. All external lighting (except for safety and security lighting) must be automatically switched off between 2300 and 0700. This can be achieved by providing a timer for all external lighting set to the appropriate hours.

Efficient Lighting Controls & Zoning

Day lighting design will only be effective if auxiliary lighting is controlled to be used only when needed.

- **Zoning:** Design lighting controls so that small groups of lights can be controlled individually. Control perimeter lighting separately to core lighting so that lights can be switched off when there is adequate daylight.
- **Motion / Absence Detection:** Provide absence detection to rooms that are used intermittently.
- **Daylight Sensors:** Use daylight sensors and timed switches to prevent internal and external lighting being left on unnecessarily.

Lighting in all occupied areas must be zoned to allow separate control e.g. consider zoning lighting for four or less hospital beds, circulation areas and separate zoning for beds and facilities adjacent to windows/atria and other areas. For teaching/seminar/lecture rooms zoning to allow different levels for teacher/lecturer and students/attendees. Alternatively lighting control strategies that provide at least two controlled circuits for every 4m of room depth from an external window and a zone width of no more than 10m will be acceptable

- The energy consumption in use of lighting installations shall comply with the 'Quick Wins' guidance note 04/04 published by CPD:

- Light Bulbs (single ended) Compact fluorescent – EU Energy Label class A

		• Pin based – EU Energy Label class A / B. Light Bulbs (double ended) 'Short Life' – EU Energy Label class A; 'Long Life' – EU Energy Label class A.
3.12	**Commissioning**	It is often the case that good design is negated by poor installation and lack of commissioning and this is particularly important with the mechanical installation. The proposals are required to show how the systems will be quality controlled during construction and then through the commissioning period. The team will be expected to demonstrate the application of an audit trail to validate the anticipated test and commissioning results. Carry out building services commissioning in a coordinated and comprehensive manner, thus ensuring optimum performance under actual occupancy conditions. Appoint an appropriate project team member to monitor commissioning on behalf of HE to ensure commissioning will be carried out in line with current Building Regulations and (where applicable), best practice. In addition include in the tender documents that it must be demonstrated that seasonal commissioning will be carried out during the first year of occupation, post construction (or post fit out).
3.13	**Energy Consumption & CO_2 Emissions**	Achieve a maximum energy in use of between 35-55Gj/100m^3/annum. The design needs to provide calculations giving anticipated energy inputs (Gj/M3/annum) and CO_2 emissions (Kg/M^2/annum). Targets for energy consumption and carbon emissions have been established according to building type, as laid out in the Health Technical Memorandum 07-02: EnCO_2de – Making energy work in Healthcare (2006). The values should be inclusive of Wind Turbine generation and Photovoltaic generation if appropriate to the design. BREEAM awards up to 15 credits for buildings that are designed to minimise the CO_2 emissions associated with their operational energy consumption as

measured by comparing the building's CO_2 index (EPC Rating), taken from the Energy Performance Certificate (EPC) with benchmarks given in BREEAM Healthcare Section 6.0 Energy. The maximum credits are awarded where the building demonstrates a CO_2 Index (EPC Rating) of Zero for new build and 15 for refurbishment projects. Project teams should achieve a minimum of 12 BREEAM Credits

Building Services Whole Life Performance

The project team to carry out quantitative analysis of the life cycle energy consumption for at least two viable design options, that have been developed using an integrated design process with the building fabric, for each of the following services, and they have specified the option that has the lower CO_2 emissions over a 60 year building life cycle.

- General lighting (fittings, control gear, lighting controls)
- Heating and Hot water (boilers, distribution systems, controls)
- Mechanical ventilation (system & controls)
- Air conditioning (system & controls), including the chiller of cooling source where this is being provided as part of the scheme.

3.14 Renewable Energy

The Northern Irleand Promotion of the Use of Energy from Renewable Sources Regulations imposes a duty on Northern Ireland Departments to take such steps as they consider necessary appropriate to ensure that public buildings fulfill an exemplary role in the use of renewable energy.

Whilst currently, The Building Regulations do not include a specific requirement to include renewable energy systems in buildings, they will bring about a situation where achieving the required reductions without including renewables will be technically and financially challenging. If not included, equivalent energy savings will have to be achieved through other conventional energy efficiency measures; so, renewables must be considered to be the path of least cost/resistance.

Renewable & low emission energy

Address the reduction of atmospheric pollution by encouraging locally

generated renewable or low emission energy to supply a significant proportion of the building's energy demand. BREEAM awards up to three credits are available for the installation of renewable or low emission energy as follows:

One credit: Undertake a feasibility study considering renewable and low emission energy has been carried out and the results implemented.

Two credits: Achieve the first credit to carry out a feasibility study and ensure that 10% of total energy demand for the building/development is supplied from **local** renewable or low emission energy, sources.

Three credits: Achieve the first credit to carry out a feasibility study and ensure that 15% of total energy demand for the building/development is supplied from **local** renewable or low emission energy, sources.

The feasibility study is undertaken to establish the most appropriate renewable or low emission energy source for the building/development. This study must cover as a minimum:

a. Payback
b. Land use
c. Local planning requirements
d. Noise
e. Whole life cost/life cycle impact of the potential specification in terms of carbon emissions.
f. Any available grants.
g. All technologies appropriate to the site and energy demand of the development.
h. Reasons for excluding other technologies.

As a minimum requirement design teams shall specify a renewable and/or low emission energy technology for the building/development in line with the recommendations of the feasibility. The feasibility study must be carried out at RIBA stage C (outline proposals).

For the second and third credits design teams may specify a 'local' renewable and/or low emission energy technology for the building/development that provides at least 10%/15% of the total energy demand (kWh) for that building/development, in line with the recommendations of the above feasibility study. Figures used for calculations of the percentage of energy provided by renewables are to be based on the output from a Building Regulations compliant energy model.

The following renewable/low emission energy technologies are among those recognised for these BREEAM credits:

Planning Policies on Renewable Energy and Passive Solar Design

This Planning Policy Statement, PPS 18 'Renewable Energy' sets out the Department of the Environments planning policy for development that generates energy from renewable resources and that requires the submission of a planning application. In addition the PPS encourages the integration of renewable energy technology and greater application of the principles of Passive Solar Design in the design, siting and layout of new development.

The document 'Wind Energy Development in Northern Ireland's Landscapes' (SPG), published by the Northern Ireland Environment Agency identifies landscape characteristics that may be sensitive to wind turbine development. This document provides supplementary planning guidance on the landscape and visual analysis process, and the indicative type of development that may be appropriate. The SPG will be taken into account in assessing all wind turbine proposals.

Passive Solar Design

Passive Solar Design (PSD) refers to the use of solar energy for the heating and cooling of buildings. Using this approach, the building itself or some part of it will take advantage of the natural energy in materials and air created by exposure to the sun. PSD needs to be considered at the design stage as it provides effectively a one-off opportunity to save energy during

the lifetime of a building, generally at no cost. In modern housing the potential to save up to 20-25% of heating and lighting energy can be accrued by the application of PSD principles.

Optimising use of natural heat and light through PSD can displace energy which would otherwise have been generated from fossil fuel sources. Solar heated air and wind can also be used in natural ventilation or cooling systems. Planning decisions on site selection, road access arrangements, building orientation and spacing and landscape design can all influence the ability of new development to employ PSD techniques effectively. PSD can be used in conjunction with other efficiency measures including increasing insulation, double glazing, draught proofing, use of energy efficient appliances and fittings, efficient heating controls and condensing boilers to meet requirements set out in Building Regulations.

Further information and best practice guidance on PSD is set out in the *Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy'*. Attention is also drawn to the Energy Saving Trust publication (GIR27) Passive Solar Estate Layout – General Information Report 27 (1997). This document can be accessed through the Energy Saving Trust's website: www.energysavingtrust.org.uk.

Renewable/zero emission energy technologies:

Solar Technologies

The use of the solar energy to generate heat or electricity with in a building e.g. photovoltaic cells and/or solar water heating panels. Solar thermal water heating systems should be considered for all healthcare buildings with an area of more than 3,000m^2 that contain ward spaces, and should be designed to meet at least 50% of the hot water service load except where discounted on agreed grounds that the building has a particularly low water usage, or if heating of hot water is provided by an alternative renewable source such as biomass heating or CHP.

Solar – Photovoltaic's (PV)

- May not be economically viable.

- Propose small scale PV to power toilet extract fans, corridor lighting, etc.

Solar – Water Heating

- Will be viable. Need to locate collectors on a roof, wall or at ground level in a Southerly direction.
- Provide water pre-heating for whole facility and particularly the kitchen/catering wing.

Wind Power

- Consider small scale wind turbine for a specific function.
- Consider wind catchers to drive stack effect.

Water (technologies under this heading can be considered renewable or zero emission energy where any energy used for any pumps is generated from any other 'renewable' sources stated here)

- Small Scale Hydro Power
- Tidal Power
- Wave Power

Other:

- Fuel Cells using hydrogen generated from any of the above 'renewable' sources
- Heat pumps powered by energy generated from any of the above

		'renewable' sources **Low emission energy technologies:** <u>Geo-thermal</u> The use of ground source water for heating or cooling in either open or closed loop systems. At a few metres below ground levels, the Earth temperature remains relatively constant; this thermal mass can be utilized to provide heat energy using either buried coils in the ground or geothermal ground piles. • Ground source heat pumps • Water source heat pumps • Air source heat pumps <u>Biomass</u> (often considered carbon neutral this is not a zero emission fuel) The use of renewable and sustainable bio-fuel sources, such as wood pellets, short rotation coppice, to produce heating or power which would otherwise require a fossil fuel source. <u>Combined Heat and Power</u> ▪ Biomass CHP
3.15	**Government Buying Standards (formally Quick Wins)**	Design teams shall ensure that specifications of larger plant comply with the Government Buying Standards (formally 'Quick Wins') guidance given in CPD guidance note 04 / 04.

4.0 Transport

4.1 General

Transport is responsible for environmental, social and economic impacts. Locally, it results in noise, air and water pollution and congestion, and it can either prevent or provide access. Globally, transport is a major user of fossil fuel and contributes significantly to global warming. Lack of access has significant implications too, by isolating certain sections of the society and lowering their quality of life.

Transport emissions are now the second largest source of carbon dioxide emissions, amounting to approximately 27% of the total Northern Ireland CO_2 emissions in 2003. This figure is likely to increase further as road traffic continues to grow and emissions from other sources decline. Although there is considerable opportunity to research, develop and use more efficient vehicles and cleaner fuels, technology alone cannot deliver sufficient emissions savings in time. Changes in travel behaviour through factors such as land use planning are also necessary to deliver effective reductions in the Northern Ireland carbon footprint.

Planning Policy

Government policy and guidance promotes better integration between planning and transport, and also between different transport modes. The key aims are to promote accessibility to jobs, shopping, leisure facilities, and services by public transport, walking and cycling, encouraging more sustainable transport choices and ultimately reduce the need to travel.

Planning Policy Statement 3 (PPS 3), 'Access, Movement and Parking' provides strategic policy guidance on the integration of transportation and land use and translates these issues into operational policies. This seeks to locate and design new developments in such a way as to ensure accessibility by means of walking, cycling and public transport thereby reducing reliance on the private car.

Planning Policy Statement 13 (PPS 13) "Transportation and Land Use" aims to assist in the implementation of the Northern Ireland's Regional Development Strategy (RDS) to guide the integration of transportation and

land use. The need to integrate land use and transportation is a key objective in delivering the transportation vision as set out in the RDS: "to have a modern, sustainable, safe transportation system which benefits society, the economy and the environment and which actively contributes to social inclusion and everyone's quality of life".

Northern Ireland's 'First Steps Towards Sustainability' suggests through the Northern Ireland Regional Transportation Strategy (RTS) 2002/2012, a strategic move away from a transport system that is dominated by car use. The RTS is being progressed by three Transport Plans: the Belfast Metropolitan Transport Plan, the Regional Strategic Network Transport Plan and the Sub-Regional Transport Plan. These Transport Plans propose investing in more balanced and integrated transport systems in which walking, cycling and public transport will be more viable and attractive options.

Effective transport management is essential to minimise the negative environmental impact of healthcare related transport. Ambulances, patients, visitors, staff, suppliers, contractors arriving and leaving from healthcare facilities can all lead to congestion, pollution and increased numbers of road traffic accidents.

An excellent transport infrastructure serving hospitals and health and social care facilities is a major consideration in the development and planning of their location and operation. Integrate sustainable travel options for each site into the design process in order to serve all stakeholders.

In accordance with BREEAM criteria, each development should have a Green Travel Plan which sets out the transport choices available to staff and visitors of buildings and help encourage sustainable modes of travel such as cycling and walking and public transport options.

Travel Information Space

Provide a dedicated space within the development for provision of up-to-date public transport information.

4.2	**Transport Assessment**	A Transport Assessment should be developed to cover all modes of transport from a person-trip perspective, with the emphasis on walking, cycling and public transport. This differs from the previous Traffic Impact Assessments which generally concentrated on accommodating car trips (to ensure that the traffic impacts associated with a new development would be accommodated) and gave only limited attention to accessibility by non-car modes. A wider range of options to deal with the transport impacts of a development should therefore be considered rather than simply increasing highway capacity to meet forecast demand.
4.3	**Green Travel Plan**	Each development should have a Green Travel Plan that has been developed and tailored to the specific needs of the building users and which sets out the transport choices available to staff and visitors of buildings and help encourage sustainable modes of travel such as cycling and walking and public transport options. It is expected that all projects should achieve Tra 5 Credit: Travel Plan, in BREEAM Healthcare
4.4	**Public Transport**	*'Walking Northern Ireland, an Action Plan'* states that car ownership levels are growing faster in Northern Ireland than in Great Britain and the amount of motorised travel is growing at a rate of 3% per annum. Reducing the need for patients, staff and visitors to use a private car, by providing attractive and practical alternative modes of transport, has the potential to reduce transport related carbon emissions, which are a major contributor to climate change. The Institute of Highways and Transportation's *'Guidelines for Planning for Public Transport in Developments' states that:* *"New Developments should be located so that public transport trips involve a walking distance of less than 400m from the nearest bus stop".* *Travelwise 160* The Department for Regional Development is promoting a "Travelwise" scheme across the Northern Ireland Civil Service, encouraging staff to rely

less on private cars and make greater use of more environmentally friendly modes of travel.

Ensure the site entrance of a development is in close proximity to transport nodes with a good service frequency e.g. maximum credits are achievable when bus stops are located ≤400m from the entrance to the building when bus frequencies of operation are ≤5min or ≤100m from the entrance to the building when bus frequencies of operation are ≥5min ≤10min.

4.5 Parking

Northern Ireland relies more heavily on the private car than many other parts of the United Kingdom. Some 80% of the work force travels by car compared with 71% in the United Kingdom as a whole.

Whilst public transport infrastructure and travel plans provide an opportunity to encourage the use of alternative transport, it is recognised that there is a need to create a balance between this and private car use. A sufficient number of parking spaces to ensure patients and visitors can easily find a space where necessary is key to the user-friendliness of the development. Further, due to the pattern of working hours associated with the provision of healthcare, many public transport options may not be suitable, resulting in the private car being the most preferred, and often the only mode of transport available.

An effective car parking strategy for developments should provide the opportunity to move away from the traditional view of a 'sea of cars' in front of a building, avoiding a negative visual impact for users entering the site. Methods to reduce the impact of car parking may include screening (by planting or earth banks) or situation (locating car park spaces behind or underneath buildings or in courtyards), integrate parking requirements into the development design, thereby reducing the visual impact of the car parking. Car parking should be limited based on the following criteria:

All projects should comply with current Department of Health and Social Services and Public Safety's policies on car parking and for -

		Small to Medium Developments (e.g. General Practices , Health Centres): - 1 space per 2 no. medical staff - 1 space per 3 no. non medical staff - 2 spaces per treatment room Large Developments (general hospitals): - 1 space per 4 no. staff - 1 space per 4 no. beds - 2 spaces per treatment room - 1 space per 2 no. residential staff beds *Traffic Advisory Leaflet 5/95, Parking for Disabled People* advises that a minimum of 6% of the total capacity of car parking provision should be used for disabled users.
4.6	**Cyclist & Pedestrians**	Despite 1 in 4 adults having access to a bicycle and one third of households having at least one adult who owns a bicycle, just 0.8% cycle to work compared with 3.3% in the United Kingdom. *Planning Policy Statement 3 (PPS 3), Access, Movement and parking* states cycling has *"the potential to substitute for short car trips, particularly those under 5km".* Northern Ireland's Regional Development Strategy (RDS) recognises the need to deal with the adverse impacts associated with car travel and the need to change travel behaviour to reduce reliance on the private car. The RDS seeks to change travel culture and contribute to healthier lifestyles by promoting and giving greater priority to walking. Even though the private car may often be the preferred option for members of staff, especially shift workers, provide specific design measures intended to encourage cycling so that the option is available should members of staff and visitors require to travel by bicycle.

Proposals must provide for a network of safe cycle routes around developments that minimise risk to the cyclist or pedestrian e.g. cycle lanes are a minimum of 1.0m wide (one way cycle lane) or 1.8m wide (two way cycle lane) and footpaths are a minimum of 1.2m wide.

Provide good cycle storage for all developments — the lack of convenient, secure well-lit cycle storage racks in urban and suburban areas is a major barrier to potential cyclists and an inconvenience for existing cyclists. Ensure storage racks are secure, well-lit and weatherproof. The storage space may take up some car parking space but with clever design this can be minimised. Provide cyclist storage facilities for percentage of staff in accordance with the following figures:

- 10% of staff up to 500 PLUS
- 7% of staff in the range of 501-1000 PLUS
- 5% for staff over 1000

AND

Small developments (<5 beds) should account for:

- 1 cycle space per 2 consulting rooms, with a min of 4.

Large developments (>5 beds) should account for:

- 1 cycle space per 10 beds, with a min of 4.

Provide for availability of showers, changing facilities, storage lockers and drying space. In addition provide one shower for every 10 cycle storage racks and lockers at least equal to the number of cycle spaces provided.

The *Institute of Highways and Transportation,* in their document *'Guidelines for Providing Journeys on Foot',* states that *"walking accounts for over a quarter of all journeys and four fifths of journeys less than one mile".*

In order to encourage walking to and within healthcare sites, there is a need for high quality on-site pedestrian facilities. Safe pedestrian pathways and

		routes of a minimum of 1.2m wide are vital. Footpaths, road markings of pedestrian routes, safe crossing points along the main site roads with features such as tactile paving to assist the mobility and visually impaired are recommended. Provision of adequate lighting as per CIBSE lighting guides along with appropriate signage is paramount for the safety of both pedestrian and cyclist onsite.
4.7	**Local Employment**	To enable people to live and work in close proximity to the developments limits the need to travel to work by car. Consider the area of housing within easy access of the development (i.e. within a 1km radius of the development).
4.8	**Provision of local facilities / amenities**	By ensuring the integration of essential facilities into the development design, the need for staff, patients and visitors to travel by car will be reduced, thereby minimising the associated pollution emissions and congestion. Facilities may include a shop selling food including fresh groceries, playground/amenity area, chemist, leisure facilities, restaurant and cash-point machine. Such facilities also help build a community focus for hospitals and healthcare facilities. Alternatively, the site should be within 500m proximity of amenities such as post office, food outlet, pharmacy, cash outlets, etc.

5.0 Water

5.1 Water Management Strategy

Water is one of our most vital natural resources. Not only is it essential to sustain life itself, but it also plays a crucial role in our economic development and social well-being. In conjunction with the guidance in *HTM 07-04 : Water management and water efficiency – best practice advice for the healthcare sector,* there are a variety of benefits to be obtained as a result of efficient water use including:

- Financial/cost savings
  - water conservation and water efficient technology reduces water use and bills
  - water efficient devices can further reduce water use and provide greater savings especially in high use components such as toilet flushing and urinals
  - monitoring of water use helps target areas where cost savings can be made
  - sub-metering certain specific water uses such as landscaping, can provide evidence to gain reductions in sewerage charges
  - SUDS may be cheaper to build than traditional drainage and easier to maintain by on-site staff
  - Efficient plumbing design can reduce heating costs.

- Environment
  - water conservation helps reduce the demand for new water resources, and the need for potentially damaging increases in abstractions
  - SUDS can help in the management of flood risk, the improvement of environmental water quality, and can contribute to increased biological and ecological diversity
  - good plumbing design minimises energy use
  - within the environs, there are increased amenity and wildlife creation benefits.

The water management strategy for healthcare development projects must consider water conservation from an early stage and comprise of at least the following water efficiency and conservation measures:

Sanitary Water Supply Shut-off system: Small water leaks such as dripping taps can result in considerable losses over time. The installation of proximity detection shut-off systems, as required within BREEAM, will prevent such loss by shutting off the water supply to toilets areas when the accommodation is not occupied. This system will prevent the flow of water to taps, WC and urinals during unoccupied periods thus preventing the wastage of water and should hot taps be left running, also the wastage of energy. This system also significantly reduces the risk of water damage due to flooding during unoccupied period. Integrate the P.I.R. sensor control into proximity lighting and urinal flushing control.

Major Leak Detection: To reduce the risk of major water leaks, integrate a leak detection system. This system will be audible when activated, when a continuous flow of water passes through the water meter at a flow rate above a pre-set minimum for a pre-set period of time.

Water Meter: Install water meters (in each building) with a pulsed output to enable connection to a Building Management System for logging of water consumption.

5.2 Reducing Water Consumption/ Demand Reduction Measures

Demand reduction measures are low cost measures and easy to install, and reduce internal water use. The specification of water efficient fittings and low flush toilets are assessed under BREEAM.

For healthcare projects include the following:

- Dual flush WCs with operating instructions on the cistern with an effective flush volume of 4.5-litre flush and lower 4-litre flush. Advanced practice would be to install WCs with even lower flush volumes of 4/2l.
- Flushing controls are suitable for operation by patients with frail or infirm

		hands or activated by electronic sensors. • Electronic sensor taps with a maximum flow rate of 6 litres/min for a water pressure of 0.3MPa on kitchen and bathroom basins that cut down the amount of water used but still provide plenty to wash with. These taps can cut the amount of water used in each basin by a half. • Low flow showers in bathrooms (with a flow rate of less than 9 litres/minute at 3 bar pressure/ 0.3MPa). Power showers with high flow rates must be avoided as these can use more water than a bath. • Select water-efficient models of dishwashers and laundry facilities. The specification of these water efficient fittings should achieve an estimated water consumption of less than 1.5m^3 /person/year. <u>Irrigation Systems</u> To reduce the consumption of potable water for plant and landscape irrigation, specify low-water irrigation systems design to allow planting and landscaping to be irrigated via rainwater or reclaimed water. In line with this, specify native draught tolerant plants as part of any landscaping, to reduce irrigation requirements. Ideally chose external landscape and planting that relies solely on precipitation. Specify low-water irrigation systems design to allow planting and landscaping to be irrigated via rainwater or reclaimed water.
5.3	**Water Metering**	It is expected that at least one BREEAM Control will be outlined and that if feasible and exemplary credit will be achieved for BREEAM Water
5.4	**Rainwater / water recycling**	*Irrigation Systems* A simple, cost effective method of collecting rain water is through the provision of rainwater butts for irrigating plants as a means of climate change adaptation. These collect rainwater from the roof, and so can also help attenuate storm water flows. The development's landscaped areas will require watering and a simple system of rain water butts attached to down-

pipes could be installed.

Pumped/Gravity Rainwater Collection Systems

WC flushing accounts for a significant proportion of water used in buildings. This water is normally supplied from the mains and has been treated to potable standards, an unnecessary and wasteful process. Rainwater can be collected or harvested from roofs and other hard surfaces around buildings. The water quality of collected rainwater depends upon the contaminants picked up from the air and the catchment area. Rainwater is generally low in contaminants so long as catchment surfaces are kept clean and systems to remove the first flush work effectively. Rainwater use systems generally consist of one or more storage tanks, a pump, filtration units (a wide variety of specialist filters is available) and connecting pipework; some systems incorporate disinfection apparatus. There is also likely to be some form of electronic control system. In most cases there will be a connection to the mains water supply so that the system can be supplemented automatically when there is insufficient rainwater or when demand is relatively high.

If a pervious pavement forms part of rainwater use system's catchment, install a suitable oil trap (oil separator) to remove oil and fuel residuals before the water is filtered. After the water has been filtered it may need to be disinfected to kill off microbiological and bacterial contamination. Systems that use rainwater solely for toilet flushing rarely employ disinfection. This practice is well established as being safe so long as good incoming water quality is maintained and the risks of contamination from modifications to catchments and system are prevented.

Rainwater is inherently soft and, provided it is clean, may be used in washing machines (although this will require some modification to the machines); vehicle washing and even for bathing once it has undergone appropriate treatment. Where the rainwater is to be used for drinking, washing and cooking additional treatments are required.

Ireland's weather and rainfall are becoming increasingly variable both

seasonally and geographically. The demand for water tends to be relatively constant and although it is possible to design and construct a rainwater system to meet 100 per cent of water requirements, it is rarely economic to do so where mains water is already provided. The cost is inflated by the need for a large collection tank (or small reservoir) and the space for a large system. A rainwater system is more likely to be optimised to provide useful savings of mains water at a reasonable cost. This assessment will take into account factors such as ready access to the available catchment surfaces, tank size and location, water quality requirements and potential usage.

Implement one of the following subject to clinical risk assessment:

1. A rainwater collection tank sized to collect at least 50% of EITHER:

    a. The total predicted rainwater run off from roof areas (for the period of collection) OR
    b. The total predicted flushing demand.

2. Where waste water from wash hand basins and showers is collected from ≥80% of fittings and recycled to meet (in part) flushing demand within the building(s). Or where waste water collection and storage facilities are sized to meet all flushing demand where demand can be matched by waste water supply.

3. A combination of greywater and rainwater collection that meets at least 50% of EITHER:

    a. Toilet flushing demand OR
    b. Toilet flushing and (where specified) irrigation of planting and landscaping demand.

6.0 Materials

6.1 Use of 'A' grade materials

A reduction in the use of new building materials through the optimisation of existing available resources is critical factors to achieving sustainable design.

Northern Ireland's 'First Steps Towards Sustainability' strategy lists natural resource protection and environmental enhancement as one of the six areas of immediate action. DHSSPS highlights natural resource protection and enhancement as a key focus for its sustainability activities.

In particular, incorporate 'A or A+' rated materials (in accordance with 'The Green Guide to Specification') into specifications for hard landscaping and boundary protection (fences), floor covering, windows, roof, internal wall, external wall and upper floor slab. When using a number of different specifications for each element the proportion of each must be calculated. Greater than 80% of the element's specifications must achieve an "A or A+" rating. With regards to refurbishment works, incorporate a maximum of 20% extra new material.

6.2 High Recycled Content materials

A primary target for sustainable construction is that a minimum of "10% of the materials value of the project should derive from recycled or re-used content". (Ref: Achieving Excellence Guide 11 'Sustainability' and SCG Guidance Note 2).

The Design Team in conjunction with the Main Contractor must report on the recycled/reuse content achieved on the project using suitable standard industry tools e.g. WRAP NW Tool.

Specifying the use of materials with high recycled content greatly increases the efficiency of materials on site. Recycled materials and products with recycled content can, and should, comply with the same industry standards as traditional materials, whilst realising benefits all round.

Recycled plastic products are widely used in mainstream construction products such as damp proof membrane, drainage pipes, ducting and flooring.

Recycled glass is a hard, inert material which can be used in many different ways. Markets include its use as a coarse aggregate substitute for use in road construction, concrete product manufacture or as trench backfill. Another popular use for recycled glass is in fiberglass insulation manufacture where either mixed colour container or flat glass cullet is used offering numerous benefits over virgin materials.

Recycled wood products are made from post-consumer and post-industrial sources. Some products may be made entirely from waste wood or they may contain a proportion of virgin material. One of the uses of recycled wood is in landscape products.

Using recycled aggregate in construction reduces the demand for virgin material.
In order to gain a BREEAM credit, specify the use of crushed aggregate, crushed masonry or alternative aggregates (manufactured from recycled materials) for 'high grade' aggregate uses. Recycled aggregate is where the amount of recycled aggregate specified is over 25% (by weight) of the total 'high grade' aggregate uses.

Recycled aggregates can be;

- Obtained on site,
- Obtained from sites within a 30 km radius,
- Obtained from a recycled, non construction post-consumer/post-industrial by-product source, such as crushed/blown glass pellets, pulverized fuel ash (PFAs,) blast furnace slag, etc.

		'High grade' aggregate uses are considered to be: • Structural frame, • Floor slabs including ground floor slabs, • Asphalt based or similar road surfaces, • Gravel landscaping Site-derived masonry as hardcore under ground floor slabs, site roads and car parking areas.
6.3	**Design Robustness**	To recognise and encourage the protection of exposed parts of the building and landscaping to avoid the need for frequent replacement buildings must be designed for robustness. Protect vulnerable parts of the building such as areas exposed to high pedestrian traffic, vehicular and trolley movements. This is particularly for around Goods Doors/ambulance drop off areas. This will prolong the life of the building and reduce maintenance costs. Protect internal walls with guard rails, doors protected against impact, etc.
6.4	**Sustainable Sourcing**	Sustainable sourcing of materials must be considered within the design development process, and incorporated into specifications. All timber products used (including that used for structural timber, cladding, carcassing, internal joinery and fittings) must be responsibly sourced, utilizing a timber certification scheme. Timber certification schemes such as the Forest Stewardship Council (FSC) or a similar body provide independent assurance that timber has been procured from legal and sustainable sources. For all other materials used, make it a procurement criteria that suppliers used operate in accordance with an accredited environmental management system such as ISO 14001 (the international standard for environmental management systems) / BS 8555 (the British standard for the implementation of phased environmental management systems) / EMAS (the European Environmental Management Assessment Series).

Up to three BREEAM credits are available where up to 80% of the assessed materials in the following building elements are responsibly sourced:

- roof,
- frame,
- walls (external),
- floors (ground, upper),
- foundations,
- doors,
- windows.

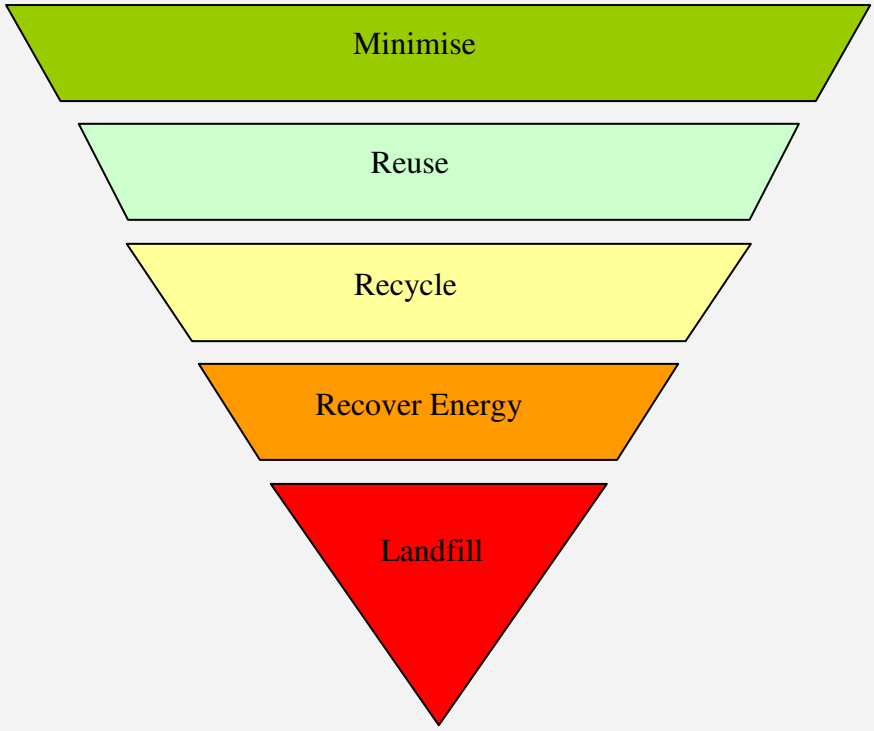
Thermal Insulation, with low embodied environmental impact should be specified. Care should be taken to specify products that have low environmental impact relative to their thermal properties and are responsibly sourced.

7.0 Waste

7.1 Site Waste Management Planning

'Towards Resource Management: The Northern Ireland Waste Management Strategy 2006-2020' places emphasis on waste prevention. It reinforces the need to increase waste recycling and recovery.

The Waste Hierarchy



HEIG is committed to managing waste in accordance with the waste hierarchy, favouring those methods at the top of the hierarchy and avoiding those at the bottom where possible. The hierarchy is a guide to the relative environmental benefits of different options.

A site waste management plan (SWMP) must be developed as set out in the Northern Ireland Sustainable Construction Group Guidance Note 3 and the accompanying Code of Practice for Site Waste Management Plans. It is expected that the target benchmark for resource efficiency shall be such that two BREEAM credits are achieved. The SWMP should include targets for waste reduction and recovery and the use of reused/recycled materials.

During the planning and design stages the NET Waste Tool can be used to predict where the largest quantities of waste will be produced. Actions can then be taken at the early stages to target these areas and reduce waste.

Effective waste management starts with a clear and planned waste strategy, which outlines the methods for dealing with waste at each level of the waste hierarchy. In order to minimise waste on health and social care development sites, it is vital for the contractor to ensure that site engineers, surveyors and planning and procurement experts accurately assess the use of materials and the potential for their re-use and recycling both on and off site.

7.2 Site Waste Minimisation & Resource Efficiency

Poor resource efficiency resulting in over-consumption and wastage of construction resources can arise in a number of ways:

- Developers, clients and designers can be cautious in specifying their requirements, which can lead to unnecessary use of materials and, in the case of services installations, oversized plant.
- Designers are often cautious, allowing generous safety margins in their design, again resulting in unnecessary use of materials. This however has to be balanced against the flexibility and adaptability which over-design can provide.
- Construction products are often not produced in coordinated sizes. A more consistent range of sizes for many materials and components could help to reduce wastage without compromising design flexibility. One simple example of this is the size of standard joinery components that do not co-ordinate with brick-sized openings in external walls
- Lack of attention to design for build-ability can result in unnecessary use of resources.

Wastage should be reduced by designers at all stages of the design process considering the Waste Resource Action Programme's (WRAP) five key principles for 'Designing out Waste':

- Design for Reuse of Materials on and off site: By considering what materials will be available from demolition of the early stages of refurbishment, designers can reduce the quantity of demolition waste

and minimise new materials brought on site and therefore the associated wastage.

- Design for Off Site Construction: The benefits of off-site construction and prefabrication range from reduced waste arising, more efficient reuse and recycling in the factory, improved accident rates and programme benefits from having fewer trades on site.
- Design of Materials Optimisation: This heading brings together three key principles; design standardisation allowing greater use and fewer errors; reducing excavation; and dimensional co-ordination of materials.
- Design for Waste Efficient Procurement: Designers can have a significant impact on the procurement process, especially regarding materials specification and procurement. When this is considered at the early stages (RIBA stages A-D) often conflicts that may result in waste can be designed out; and
- Design for Deconstruction and Flexibility: Considering the potential to reuse the building, services or site at the end of the commissioned life can allow the design to be altered to give grater flexibility. Similarly, considering the potential for deconstruction and reuse of materials rather than demolition, and the specification of materials that are easily recyclable or reusable can have a significant impact on waste arising at the end of the building's life.

Guidance on designing out waste can be found on the WRAP web site under the headings of 'construction/ tools and guidance/designing out waste'.

In addition to the five key principles of designing Out waste, the options to address over-consumption of resources include:

- working closely with clients to define their requirements at each stage in the project process in order to match design to need;
- ensuring the design and specification is appropriate for the end use of the construction project, for example in determining floor loadings or works capacity requirements; and
- striking a balance between over-design and the requirements of flexibility and adaptability, to avoid premature obsolescence of the works or building

'Half Waste to land fill by 2012

HEIG is committed to playing its part in halving the amount of construction, demolition and excavation waste going to Landfill by 2012. HEIG will work to promote the adoption and implementation of standards for good practice in reducing waste, recycling more and increasing the use of recycled and recovered materials.

To achieve a reduction in construction, demolition and excavation (CD&E) waste going to land fill design teams shall use the WRAP Net Waste Tool to quantify and priorities the potential for waste reduction, recovery and higher recycled content and feed into the development of a Site Waste Management Plan (SWMP) (and the corresponding project brief / output specification/ Employers Requirements) should include project – specific targets for waste reduction, recovery and reused/recycled content.

Clients are recommend to use CD&E waste reports returned by Design Teams and Contractors to establish base line data on typical CD&E waste arisings from Health and Social Care and Public Safety capital projects

7.3 **Recycle Greenfield Soils**

Excess soils from development sites are generally regarded as a waste and their end use requires a waste management licence or a registered exemption. The Waste Framework Directive (Directive 2008/98 EC) makes it clear that this is so even if the soils are uncontaminated. However, in order to promote the sustainable re-use of uncontaminated Greenfield soils, the Northern Ireland Environment Agency (NIEA) takes the view that if such soils are put to agreed, suitable end uses as described in this guidance, the soils will not be subject to the waste regulatory controls. If producers and users of Greenfield soil comply with guidance NIEA will not regulate its use under waste legislation. Whilst producers and users are not obliged to comply with this guidance, if they do not then the Greenfield soil will be classified as a waste and fall subject to the requirements of waste legislation. Consequently, the storage, treatment, transportation, deposit, or disposal of such material without the requisite licences or permit may constitute an offence.

Prior to beginning any excavation works, the person responsible for the excavation site must establish that there is an identified and certain end-use

		for the Greenfield soil. All uses must be in accordance with a current planning permission or in the case of a road scheme permitted development rights including a Direction Order or Designation Order, incorporating approved drawings. Project Teams, Design Teams and contractors are advised to comply with the guidance given by NIEA at http://www.ni-environment.gov.uk/nieasoilguidance.pdf
7.4	**Site Waste Segregation & Storage**	Based on the waste management hierarchy, initial waste management options employed on health and social care development projects are expected to include: • Initial salvage and storage of materials from any existing buildings, prior to re-use either on or off site on other developments. • On-site crushing of the structure of any existing buildings, ideally prior to re-use on-site as fill and / or base material for road, paths and car parks. • Consideration, and where possible, incorporation of secondary / recycled materials into the final development specification. • Carry out a demolition audit to maximize the level of materials recovered or recycled, see CPD SCG Guidance Note 6 for more details on demolition. • Consider cut and fill to reduce or eliminate removal of spoil from site. • If there is the space then a designated reuse area should be set up for off-cuts and unused materials. Both the areas for recycling and reuse should be clearly marked. Main Contractors and their supply chain must prepare and submit a Site Waste Management Plan for consideration by the Client prior to commencement of the works on site. The SWMP must identify the actions to be taken to reduce waste, increase the level of recovery and increase reused and recycled content, and quantify the resulting changes. CPD SCG Guidance Note 3 and associated SWMP Code of Practice should be consulted. On completion of the works, the principle Contractor shall submit to the Client a copy of the completed SWMP, reporting the forecast and actual

		performance for waste quantities, disposal routes, and reused and recycled content used in construction.
7.5	**Facilities for Recycling & Storage**	Storage of recyclable waste to encourage recycling of consumables in order to reduce the demand for virgin material and the amount of waste going to landfill or incineration. A central, dedicated storage space must be provided for materials that can be recycled. This can be either within the building itself, or on site using skips, (provided there is good access for collections and it is within easy reach of the building). Design the storage space to have the following characteristics: a. Fully complying with HTM 07-01: Safe management of Healthcare waste b. Clearly labelled for recycling. c. Located within a dedicated centralised waste management unit or alternatively within easy reach of all building areas (e.g. less than 20m from the base of a stairwell serving all floors). d. In a location with good vehicular access to facilitate collections. The size of the space allocated must be at least: a. 2m^2 per 1000m^2 of net floor area, b. 10m^2 for buildings with net floor area over 5,000m^2. c. A further 2m^2 per 1000m^2 of net floor area (up to a max of 10m^2) where catering is provided. Include designated short term storage space for storing recyclable materials in offices, kitchens, common rooms etc in the buildings. The bags or containers used to collect the segregated recyclable materials (usually newspapers, magazines, aluminium cans, glass and plastic bottles) can be emptied into designated containers in central, communal refuse stores. Bin stores on the site will be sized to accommodate dedicated, labelled recyclable storage as well as containers for general waste. These stores will be located to facilitate vehicular access for easier collection. Provide facilities such as a compactor or baler that allows efficient and

		hygienic operation of waste sorting and storage with provision of water outlet for cleaning.
7.6	**Refuse/ Composting**	Bio-degradables comprise 'organic' or natural materials. These materials will break down over time ('biodegrade') by natural processes. However this process releases gases and leachate which have a detrimental impact on the environment. The principal 'biodegradable' components of municipal (domestic and commercial) waste are paper and cardboard, food wastes and garden wastes. The Landfill Directive calls for a reduction in the quantity of biodegradable municipal waste being land-filled and as such facilities for segregation and composting (on or off-site) is desirable. Provide facilities for composting of organic waste, thereby reducing waste from developments going directly to landfill. Provide either a composting vessel on site for organic waste and adequate storage for organic material or ensure there is a dedicated space for organic waste to be stored prior to removal and composting at an alternative site.
7.7	**Waste Disposal**	The Environmental Protection (Duty of Care) Regulations 2003 states that all reasonable steps must be taken to keep waste safe and that all those who produce or handle controlled wastes have legal responsibilities for its safe keeping, transport and subsequent recovery or disposal. During demolition, earthworks and construction activities identify methods for the control of waste disposal within the Site Waste Management Plan (as outlined above). Opportunities are also available during design to ensure the provision of appropriate waste storage facilities. To encourage the avoidance of disposal of waste, identify a central dedicated storage space to provide sufficient facilities for the segregation and recycling of waste generated by the building occupants. To encourage final occupants to make efficient use of recycling facilities, provide adequate storage space, with appropriate fire protection and with access for collection. Such an approach is in line with the Northern Ireland Waste Management Strategy requirements to encourage the diversion from landfill of waste materials.

8.0 Land Use and Ecology

8.1 General

One of the four themes of *Everyone's Involved,* Northern Ireland's Sustainable Development Strategy is Environmental Protection. This involves "Safeguarding the capacity of our natural environment to support life in all its diversity, respect the limits of our natural resources and ensure a high level of protection and improvement of the quality of the environment.". Another theme is Economic Prosperity "to promote a prosperous, innovative, knowledge-rich, competitive and eco-efficient, responsible economy which provides high living standards and full and high-quality employment".

The DHSSPS is investing in modern infrastructure to support the needs of the people of Northern Ireland in a way that combine both the themes of Environmental Projection and Economic Prosperity. The Department's capital development programme for period 2005-15 will deliver hospital, mental health and primary care facilities to help promote sustainable communities.

The DHSSPS is committed to the objectives of Sustainable Development, of which Biodiversity is a key indicator, in the delivery of health, social care and public safety services. It is therefore essential that anyone involved with development and management of Health and Social Care & Public Safety estates has a working knowledge of their responsibilities with regard to biodiversity.

8.1 Conservation

A *priority Area for action of Everyone's Involved,* the Northern Ireland Sustainability Strategy, is 'Striking an appropriate balance between the responsible use and protection of natural resources in support of a better quality of environment. '

The promotion of nature conservation is sought through the Planning Policy Statement (PPS) 2 – Planning and Nature Conservation. In particular, this PPS seeks to protect trees as they are "of immense importance both as

habitats and by providing a strong visual element which helps create a varied interesting and attractive landscape."

In 2011 it expected that all public bodies in Northern Ireland will have a Statutory Duty to further the conservation of biodiversity. Health Estates Investment Group has published guidance to assist project teams, design consultants and contractors comply with this Statutory Duty, and the requirements of this Section of the brief, which is available at http://www.dhsspsni.gov.uk/index/hea/hea_publications.htm

Development will be encouraged, where possible, on land that already has limited value to wildlife. A suitably qualified ecological consultant will be employed to ascertain the ecological value of the land, within an ecological assessment report, based on a site survey using the Convention on Biological Diversity (CBD).

If there are existing features of ecological value on the surrounding site and boundary area e.g. trees, hedgerows, ponds etc they must be adequately protected from damage during clearance, site preparation and construction.

The culture and heritage of the area must be preserved by displaying and promoting the history of the site, area and organisation and any artefacts are to be preserved and enhanced.

8.2 Site Criteria

Development land continues to be in short supply and pressure remains high to provide the majority of new development on brownfield sites or sites with low ecological value. In general, development should be proposed in line with:

- The land use guidance contained in the development plan; and
- Current Northern Ireland planning policy statements and Good Practice Guides published by the Department for Communities and Local Government (DCLG).

Land use patterns will be encouraged which maintain compact urban areas, reduce physical separation of key land uses, and promote mixed use

developments. This will help to reduce the need to travel and to improve choice for people to walk, cycle or use public transport rather than drive – Regional Development Strategy *'Shaping our Future'*).

CIRIA C512 (Environmental Handbook for Building and Civil Engineering Projects) highlights the need to 'green the built environment'. It is greatly beneficial to use planting on, and in close proximity to, buildings and civil engineering works, not only to provide more green space but also to improve the overall environment of the immediate area as well as having a beneficial effect on people.

8.3 Enhancement of existing site

All developments will maintain and enhance the ecological value of the site. This will be achieved by the appointment of a suitably qualified ecologist to advise and report on enhancing and protecting the ecological value of the site and implementing the professional's recommendations for general enhancement and protection of site ecology.

<u>Mitigating Ecological Impact and Enhancing Site Ecology</u>

Ensure the impact of a building development project on existing site ecology is minimized and where the ecological value of the site is maintained and enhanced. The ecologist will advise on how to achieve a positive change in ecological value on the site and report on enhancement of the ecology. Demonstrate there is no negative change in the ecological value of sites as a result of development, i.e. equal to, or greater than, zero species.

An increase in ecological value of 6 or more species is necessary to meet HE requirements. Implement all the ecologist's recommendations on mitigating ecological impact of the building and enhancing site ecology.

Programme site works to minimise disturbance to wildlife. For example, site preparation, ground works, and landscaping have been, or will be, scheduled at an appropriate time of year to minimise disturbance to wildlife. Timing of works may have a significant impact on, for example, breeding birds, flowering plants, seed germination, amphibians etc. Actions such as

phased clearance of vegetation may help to mitigate ecological impacts. This additional requirement will be achieved where a clear plan has been produced detailing how activities will be timed to avoid any impact on site biodiversity in line with the recommendations of a suitably qualified Ecologist.

In the design of new developments, it is essential to retain existing trees, and to plant additional trees, particularly along internal road networks. In addition to the retention of mature trees on the site, where they have an ecological value, additional landscaping and planting will be undertaken to enhance the existing habitats on the site. This will include both general landscaping, together with the planting of additional native species, complimenting the site, providing screening of the development and encouraging wildlife.

Courtyards play a very specific role in the interior and exterior landscape of developments. Appropriately landscaped inner courtyards will provide amenity spaces for visitors, patients and staff throughout the buildings and provide a visual connection to external landscape. Terraces off wards and balconies provide physical and visual access to the natural environment whilst also providing external views.

Within the environs of the development, the incorporation of both hard and soft landscaping into the design along access roads and car parking areas is encouraged. The connection with the external environment develops a therapeutic atmosphere to comfort and reassure patients and staff alike. These ideas captures the themes and objectives of Section 2, Health and Wellbeing.

8.4 Reusing sites

Preference should always be given to the reuse of land that has previously been occupied by building developments, discouraging the use of previously undeveloped land for building and increasing the ecological value of the site. Developing brownfield sites eases pressure on the green belt and can improve the ecological value of the land, i.e. in cases where the land is contaminated. Where the site contains previously developed land the footprint of the new development shall occupy at least 75% of this land.

Remediation of brownfield sites, where the land used has been defined as contaminated, requires adequate remedial steps to be taken to decontaminate the site prior to construction. The method of site decontamination can have a significant environmental impact, and in sustainability terms the method of decontamination is as important as the fact that the land is being reused. On-site remediation techniques (such as bioremediation) are preferred over the more traditional 'dig and dump' methods which tend to increase environmental risk, pose potential H&S issues regarding transport and/or increase costs.

In order to discourage the use of previously undeveloped land for building, proposed sites should demonstrate that their footprint largely falls within the boundary of land previously developed, Sites that comprise areas of contaminated land may also be considered to be encouraging the development of land that otherwise would not have been developed.

Development of land is encouraged whereby the land has already limited value to wildlife and that protection of existing ecological features is adhered to.

8.5 Long Term Impact on Biodiversity

Biodiversity is defined as the variety of life on earth. It includes all species, animal, plants, fungi, algae, bacteria and the habitats that they depend upon.

One of the guiding principles of the Northern Ireland Sustainability Strategy is 'Living Within Environmental Limits - Respecting the limits of the planet's environment, resources and biodiversity – to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future generations'. To address this, a Strategic Objective 'To protect and enhance biodiversity' was developed, to be delivered by ensuring the 'full and timely implementation of the Northern Ireland Biodiversity Strategy and all national and international nature conservation legislation.' A comprehensive Biodiversity Strategy for Northern Ireland was launched in 2002.

A suitably qualified ecologist appointed prior to commencement of activities

		on site, must confirm in writing that: • All relevant UK and EU legislation relating to protection and enhancement of ecology has been, or will be, complied with during the development's process • An appropriate management plan has been produced covering at least the first 5 years after project completion. This will be handed over to the building occupants and will include: o Management of any protected features on site, o Management of any new, existing or enhanced habitats, o A reference to the current or future site level Biodiversity Action Plan. Where a management plan is provided provide information detailing the scope of the management plan and key responsibilities, and with whom these responsibilities lie, e.g. HE, management, occupier, other. Improvements to the biodiversity of healthcare facilities in Northern Ireland can be achieved through the creation of 'wildlife corners', which will include habitats that support nationally, regionally or locally important biodiversity, and/or which is nationally, regionally or locally important itself; including any habitat listed in the Northern Ireland Biodiversity Action Plan, Local Biodiversity Action Plan (LBAP), those protected within statutory sites (e.g. SSSIs), or those within non-statutory sites identified in local plans. An appropriate management plan should be committed to being produced covering the first 5 years after project completion. This should include management of protected features and existing or enhanced habitats. Appoint a 'Biodiversity Champion' within the design team to influence design and site activities and ensure that detrimental impacts on site biodiversity are minimised in line with the recommendations of a suitably qualified ecologist.
8.6	**Planting**	Ensure planting schemes developed as part of a scheme design incorporate a wide palette of plants, to support a diverse number of insects, birds and other wildlife. Use drought-tolerant, native plants where appropriate.

Elsewhere, choose plants for their ability to provide a food source and/or wildlife habitat. Small 'pocket parks' may be created as part of an overall landscaping plan where native tree and hedge species are used, together with wildflower planting, to create an area of use for the occupants of the building.

Where soil products (growing media and soil improvers) are imported onto the site all ingredients are to be derived from the processing and/or re-use of waste materials as required by CDP 'Quick Wins' guidance note 04 / 04.

Green roofs may be considered as part of SUDS, with the vegetated surface providing a degree of retention of rainwater run off. For sites with minimal landscaped areas and/or in largely built up areas, it would be appropriate to consider the installation of green roofs – either 'intensive' (which supports a variety of plants, requires regular maintenance and can be used as a recreational space) or 'extensive' (which is lightweight, requires little maintenance and usually has sedum growing on it).

Green roofs:

Provide value to biodiversity by providing habitat, shelter and feeding opportunities.
Improve the views for nearby buildings
Help to cleanse the air of some dust and pollutants
Lower temperatures in and around the building in the summer
Provide extra insulation for a building
Slow storm water run-off by retaining moisture and moderating run-off to street sewer,
May provide new open space for recreation.
Introduce natural habitats to the site in such a way as to provide pleasant surroundings for patients as well as the availability of a reasonable budget for the provision of living plants within buildings.

8.7 **Site Investigation**

The site has been investigated to determine local conditions that will affect the design and specification of the proposed development.

		The following areas are covered in the investigation: ▪ Ground conditions assessed in accordance with BS5930 Code of Practice for Site Investigations ▪ Establishing the engineering properties of the soil in accordance with BS1377:1990. ▪ Establishing the position and quality of ground water at a particular location in accordance with BS6068. ▪ Establishing the chemical constituents of a soil (including contaminants) Confirm that relevant bodies (Local authority, national heritage/nature body etc.) have been consulted and have been able to confirm the absence of the following: ▪ Buildings of local architectural or historical interest referred to in a local authority development plan ▪ Buildings within areas of outstanding natural beauty and national parks ▪ Scheduled ancient monuments buildings in historic parks and gardens ▪ Buildings within the cartilage of scheduled ancient monuments ▪ Buildings or sites with distinguishing local architectural characteristics ▪ Sites of archaeological interest The investigation has been carried out at, or prior to, RIBA Stage C outline design stage. Where the building/site is identified as one of the building/site types outlined above, identify measures taken to protect any areas/features of value and confirmed that all relevant bodies have been consulted and have agreed the design adopted. In addition ensure that all works comply with the *Protocol for the care of the Government Historic Estate 2003.*
8.8	**Open Space & Landscaping**	Open green space must be a large part of the initial design of any development. Take every opportunity to provide accessible green space, enhance existing landscape features on the site and incorporate these into

		landscaped grounds.
8.9	**Density**	Encourage high density development, where appropriate, in order to save land and ensure accessibility to local facilities. PPS 3 'Access, Movement and Parking' states that a key planning objective is to ensure that a new development offers a realistic choice of access by walking, cycling and public transport, whilst accommodating responsible use of the private car. PPS 3 also links density with accessibility and recommends high densities around major public transport nodes. Use less accessible areas for low density development.

9.0	**Pollution**	
9.1	**Flood Risk Identification**	Undertake a flood risk assessment inline with PPS 15 Planning and Flood Risk and the Strategic Flood Map (NI) produced by the Northern Ireland Rivers Agency. This assessment should demonstrate the following: ▪ Whether any areas of the proposed development are likely to be affected by current or future flooding. ▪ To develop plans to demonstrate that the development is safe and will reduce the risk of flooding overall ▪ Whether it will increase flood risk elsewhere. ▪ The identification of mitigation measures to ensure that the site can be developed and occupied safely throughout its lifetime. ▪ Production of designs which will reduce flood risk to the development and elsewhere.
9.2	**Ozone depleting substances**	The Montreal Protocol addressed the use of chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) as refrigerants. Phase out programmes have resulted in these refrigerants no longer being used in all new and most existing buildings. These have currently been replaced by HFCs - which are serious contributors to global warming. Due to the environmental impacts of commonly used refrigerants, energy demand of ventilation systems (and associated carbon dioxide emissions and costs) the use of natural ventilation is generally recommended to be maximised wherever possible. In healthcare buildings however the risks associated with infection must be considered and therefore natural ventilation is generally not feasible in medical areas of the building. Where refrigerants are deemed necessary in the air conditioning system and for refrigerants used within cold storage systems, specify substances and materials that are the least polluting to the environment. Specify refrigerants and insulants with Ozone Depleting Potential (ODP) of zero and Global Warming Potential (GWP) of less than 5 (e.g. Mineral Wool).

		In addition, install refrigerant leak detection and refrigerant recovery measures (provision of automatic refrigerant pump down made to a heat exchanger (or dedicated storage tanks) with isolation valves).
9.3	**Low NOx emitting burners**	The efficiency of gas boilers is measured in terms of their seasonal efficiency. Boilers are grouped by class according to efficiency with 'A' rated being the best. Install high efficiency 'A' rated condensing gas boilers with low NOx emissions where possible. Condensing boilers offer higher energy efficiencies by recovering extra heat from the flue gases and return heating pipework, thus allowing the boilers to achieve seasonal efficiencies of 87 to 90%. BRE (Building Research Establishment) monitoring of similar condensing boiler installations indicate that an annual reduction of 7 to 8% in delivered energy and fuel costs will result from the use of condensing boilers. Gas fired boilers shall be fully condensing, fully modulating and shall have low NOx emissions. Where gas boilers are used, they should be set up to operate to their maximum efficiency through the use of direct boiler weather compensation BREEAM awards credits based on the NOx emission rate of the heating plant. 1 credit if NOx emission rates are below 100 mg/kWh, 2 credits if the NOx emission rate is below 70 mg/kWh and 3 credits if the NOx emission rate of the heating plant is below 40 mg/kWh.
9.4	**Sustainable Drainage**	Traditional drainage systems can increase the risk of flooding and create pollution caused by run-off. Sustainable Urban Drainage Systems (SUDS) offer an alternative approach to drainage in built-up areas, helping to minimise flooding and pollution by slowing down the run-off rate to rivers and watercourses and also by improving water quality through filtration. Originally sustainable drainage was only considered useful in locations where buildings and paved areas were outside the extents of a public sewer network or were not located within close proximity of a watercourse. However, the use of sustainable drainage has many benefits which far

outreach those outlined above. These include:

- Cost Reduction – not only by reducing the need for extensive pipework and storage measures but also by avoiding the cost of upgrading sewer networks downstream of the development.
- Improvement of water quality – through filtration, sedimentation and some biological breakdown of pollutants.
- Aesthetic value of green areas, ponds and wetlands – which may provide wildlife habitats and also a focus for the community in amenity and recreation areas.
- Reduction of environmental impact by redirecting run-off to ground away from rivers/watercourses etc. where it can cause potential flooding issues, etc.

There are various different types of sustainable drainage which will greatly enhance surface water infiltration. Incorporated into site design where practicable, in order to achieve the government target of a minimum of 50% of surface water to be disposed of by SUDs:

- Circular, Trench and Linked Soak-a-ways
- Infiltration Swales and Basins; targets >50% = good practice, > 80% = best practice
- Passive treatment systems such as detention ponds and reed beds; targets >30% = good practice, >50% best practice
- Infiltration Trenches with surface inflow
- Infiltration Pavements in roads, footpaths and car parking areas
- Infiltration Blankets

<u>Minimising flood risk</u>

BREEAM awards credits for the development of buildings in areas with reduced risk of flooding and ensure that storm water run-off from the development does not increase the flood risk on site or elsewhere. Credits are awarded as follows:

Where the development is located in a zone defined as having a low annual

		probability of flooding. **OR** Where the development is located in a zone defined as having a medium annual probability of flooding and the ground level of the building, car parking and access to it are designed (or zoned) so they are at least 600mm above the design flood level of the flood zone in which the development is located Further recognition is awarded where Sustainable Urban Drainage techniques are specified to minimise the risk of localised flooding, resulting from a loss of flood storage on site through development. Different attenuation figures are required depending on the annual probability of flooding for the site: *Low annual probability of flooding - SUDS techniques to attenuate 50% of the peak flow rate of water run off;* *Medium annual probability of flooding – SUDS techniques to attenuate 75% of the peak flow rate of water run off;* *High annual probability of flooding – SUDS techniques to attenuate 100% of the peak flow rate of water run off;*
9.5	**External**	The UK produced Air Quality Strategy in 2003, which sets targets for reducing levels of eight key air pollutants. Industry and road traffic are the main sources. A major revision of the strategy was published in July 2007. This provided a detailed update of the effectiveness of the strategy and established new objectives. The Department of the Environment in Northern Ireland has also published its own Air Quality Standards Regulations (Northern Ireland) 2007. The main impact of emissions to air from new developments is usually the emissions associated with increased traffic on the roads. Transport Assessments will be undertaken for each development, the results of which will be compared to Air quality Strategy objectives.

		It is important to minimise air pollution, by identifying potential risks and implementing a plan to mitigate potential sources of pollution. Air emissions associated with energy consumption have been detailed separately within Section 3. The following measures will be implemented to minimise emissions to air by plant and machinery operating on the site: • Gas boilers are a source of emissions, particularly nitrous oxides (NOx). Low NOx emission gas boilers will be specified. • Refrigerants with low global warming potential (GWP) will be specified. • Refrigerant leak detection and refrigerant recovery system will be included within the chillers. In an effort to improve air quality design teams should maximise the planting of tree belts and green areas. Trees and shrubs help to remove air-borne pollutants and particulates. The planting of trees along 10- 30% of the length of main roads is the current UK target (with 60% being recognised as best practice), and must be an aspiration for roadways within healthcare sites. Research by Beckett et al (Tree Species and Air Quality, Journal of Arboriculture 26(1) January 2000) identified that all trees captured large quantities of airborne particulates, from health-damaging size fractions (particle diameters of 10 to 2.5µm, 2.5 to 1µm and < 1µm). Coniferous species were found to capture more particles than did broad-leaves, with pines (Pinus spp) capturing significantly more material than cypresses (Cypresses spp). Of the broad-leaved species, whitebeam (Sorbus aria) captured the most and poplar (Populus spp) the least weight of particles.
9.6	**Minimising Water Course Pollution**	<u>Minimise Watercourse Pollution</u> To reduce the potential for pollution to natural watercourses from surface water run-off from buildings and hard surfaces, specify on site treatment such as oil separators/interceptors or filtration for areas at risk from pollution,

i.e. vehicle manoeuvring areas, car parks, waste disposal facilities, delivery facilities or plant areas.

Kitchen Waste Water Filtration

In addition ensure food oils are separated from wastewater prior to discharge to the local sewer by fitting oil separators on wastewater discharge drains from all restaurant/catering/kitchen areas and fitting the separation equipment with bottom discharge and bypasses to allow for easy maintenance.

To prevent chemicals in chemical storage areas from entering municipal drainage systems or waterways, shut-off valves are to be specified on the site drainage system to prevent the escape of chemicals in the event of a spillage.

All storage areas for chemicals are designed and in adherence with the recommendations from the EHS (now the Northern Ireland Environment Agency NIEA) Pollution Prevention Guidelines 11 (PPG11).

Confirmation is required from either the local authority or Northern Ireland Environment Agency (NIEA) or both that the design proposals for the chemical storage facilities are reasonable.

10. Innovation

10.1 Innovation Credits

HEIG is supportive of design teams and contractors seeking to achieve the 10 additional innovation credits identified in Section 13.0 Innovation of the BREEAM Healthcare Assessors Manual.

10.2 BREEAM Accredited Assessor

Innovation credits provide additional recognition for a building that innovates in the field of sustainable performance, above and beyond the level that is currently recognised and rewarded within standard BREEAN issues. Innovation credits therefore enable clients and design teams to boost their building's BREEAM performance and in addition, help support the market for new innovative technologies and practices.

An additional 1% score can be added to a building's final BREEAM score for each Innovation credit achieved. The maximum number of Innovation credits that can be awarded for any one building assessed is 10; therefore the maximum available score achieved for 'innovation' is 10%. Innovation credits can be awarded regardless of the final BREEAM rating i.e. they are awardable at any BREEAM rating level.

There are three different ways in which a building can achieve an Innovation credit (all of which are summarised below and detailed in section 13 *Innovation*). The first is by meeting exemplary performance criteria for an existing BREEAM issue (table 5 outlines the BREEAM issues with exemplary performance criteria).

Table 5 BREEAM issues with exemplary level criteria

Man 2	-	Considerate Constructors
Hea 1	-	Daylighting
Hea 14	-	Office Space (BREEAM Retail & Industrial Schemes only)
Ene 1	-	Reduction of CO_2 emissions
Ene 5	-	Low or Zero Carbon Technologies
Wat 2	-	Water Meter
Mat 1	-	Materials Specification
Mat 5	-	Responsible Sourcing of Materials
Wst 1	-	Construction Site Waste Management

The second route is where the client/design team sets a specific BREEAM performance targets/objectives and appoints a BREEAM Accredited Professional (AP) throughout the key project work stages to help deliver a building that meets the performance objectives and target BREEAM rating.

The final and third route is where an application is made to BRE Global by the BREEAM Assessor to have a particular building feature, system or process recognised as 'innovative'. If the application is successful an Innovation credit can be awarded. The flow chart and eligibility criteria below outline the decision-making process to be used when applying for an Innovation credit (see also section 13 Innovation for further detail on the application and judging process). An additional fee is charged for each innovation credit application received.