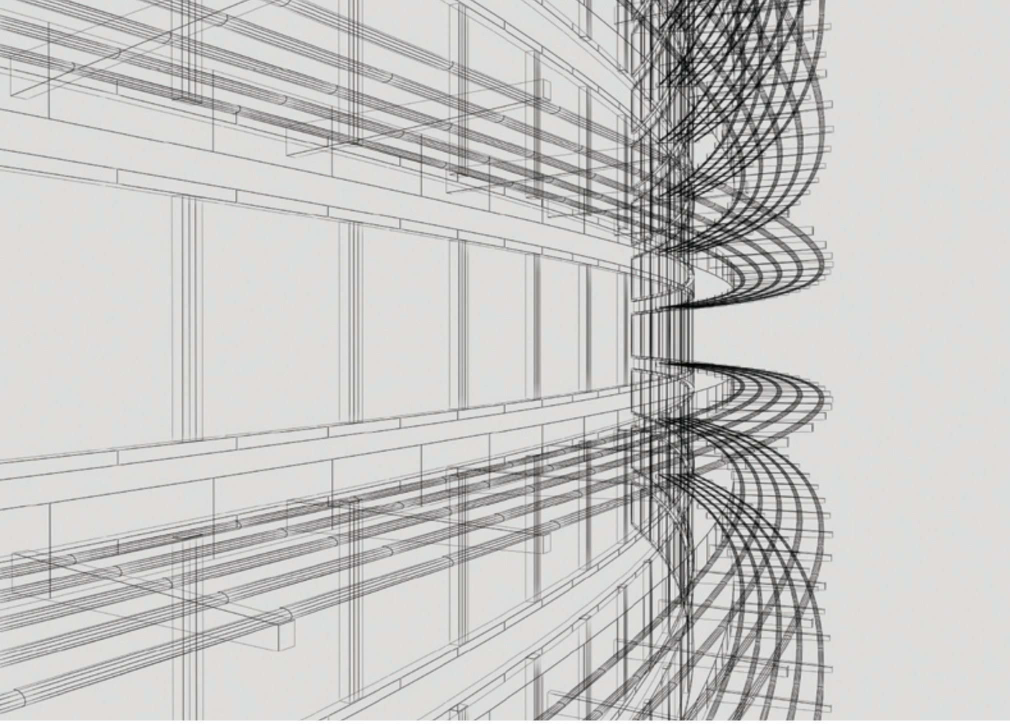


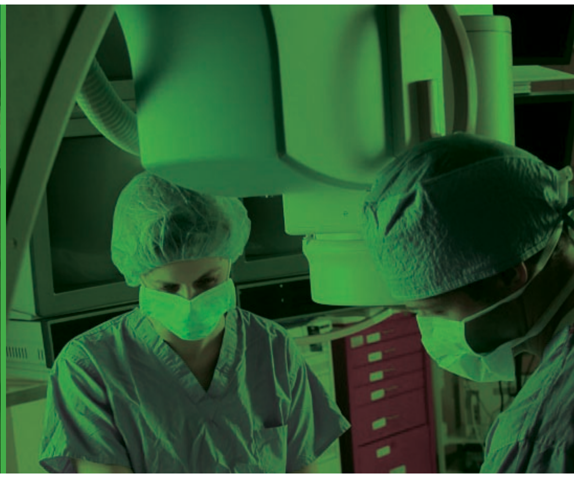

SUSTAINABLE DEVELOPMENT
Design Brief for Consultants

Queen's University Belfast

University of ULSTER

HEALTH ESTATES

Sustainable Development Design Brief

Part 1 - Sustainable Design Guidance – Best Practice

Part 2 - Sustainable Design Reports - Checklists

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1. Health Estates

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SUSTAINABLE DEVELOPMENT DESIGN BRIEF

Part 1 - Best Practice

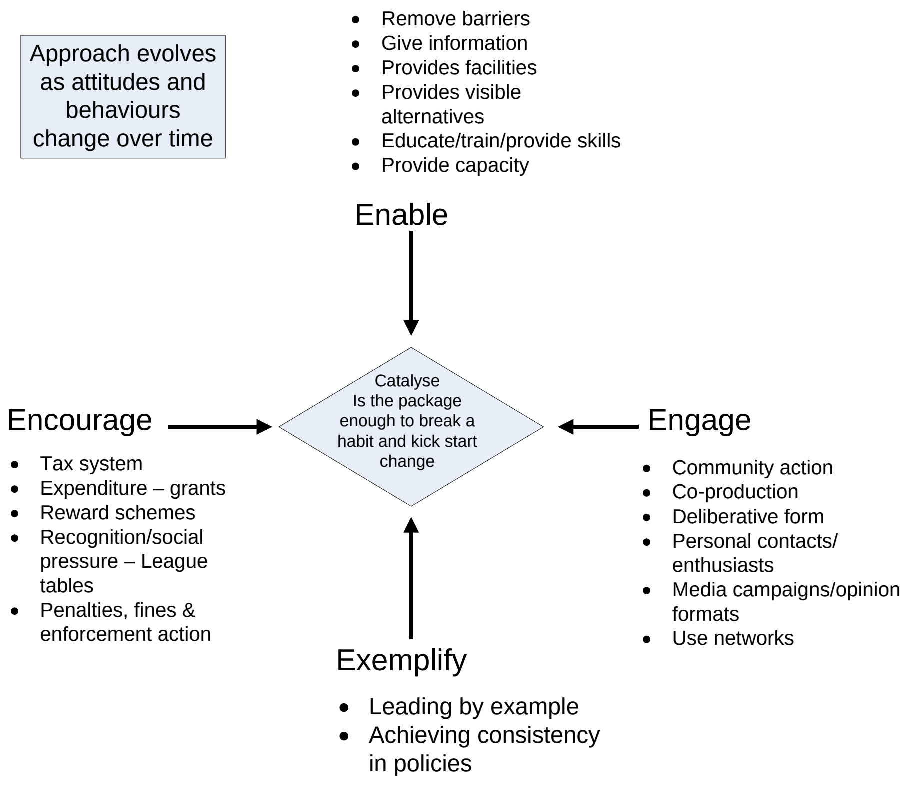
SUSTAINABLE DEVELOPMENT

Introduction

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

The University is committed to the delivery of sustainable buildings in accordance with international, national and local sustainable development policies. As champion for sustainable development within the Higher Education sector, the University seeks to promote new standards of sustainable development and advance best practice alongside the highest standards of design, environmental sustainability and construction.

The University recognises that capital development projects have the potential to impact on sociol 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:



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

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

Section 1	Land use, urban form and design
Section 2	Transport
Section 3	Energy
Section 4	Impact of buildings
Section 5	Building materials
Section 6	Waste
Section 7	Ecology
Section 8	Social Wellbeing
Section 9	Procurement
Section 10	Management

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 Lead consultant and returned to the University Project Manager at each project review stage.

The review stages are listed below:

Project Review Stage 1	-	Preliminary Client Brief	(RIBA Stages A&B)
Project Review Stage 2	-	Conceptual Scheme Design	(RIBA Stages C)
Project Review Stage 3	-	Scheme/Exemplar Design	(RIBA Stages D)
Project Review Stage 4	-	Final Detailed Design	(RIBA Stages E, F & G)
Project Review Stage 5	-	Readiness for Service	(RIBA Stages H - L)
Project Review Stage 6	-	Project Review – Post Occupancy	

Recognition of sustainable principles and issues will be a key criterion in the selection of design teams, contractors and construction supply chains and each will be required to demonstrate appropriate resources and specialist skills to deliver on this critical area.

Volume 1 - Sustainable Design Guidance

This guide to sustainable development in practice aims to address some of the core issues faced within the University 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.	**Land use, urban form and design**	
1.1	**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 planning policy guidance notes and DETR Good Practice Guides 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 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.
1.2	**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 be maximised within the footprint 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 are rewarded that can demonstrate that their footprint largely falls within the boundary of land previously developed, as well as encouraging positive action to use contaminated 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.
1.3	**Form of development: layout**	It is important that the location of the site is assessed along with a detailed site investigation and priority must be given to sites that are well served by connecting roads, bus routes, cycle routes, etc (see 2.0 Transport).
1.4	**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 curtilage 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.
1.5	**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.
1.6	**Mix of Uses**	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.
1.7	**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 where appropriate.
1.8	**Flood Risk Identification**	Undertake a flood risk assessment. 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

2.	Transport	
2.1	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 transportation and land use 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 that through the Northern Ireland Regional Transportation Strategy (RTS) 2002/2012, a strategic move away from a transport system that is dominated by car use is encouraged. The RTS is being progressed by three Transport Plans: the Belfast Metropolitan Transport Plan, the Regional Strategic Transport 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 University related transport. In accordance with BREEAM criteria, each University 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. <u>Travel Information Space</u> Provide a dedicated space within the development for provision of up-to-date public transport information.
2.2	**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 assuming increased highway capacity to meet forecast demand.
2.3	**Green Travel Plan**	The University has a Green Travel Plan which sets out the transport choices available to students, staff and visitors and help encourage sustainable modes of travel such as cycling and walking and public transport options.
2.4	**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 students, 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…"* <u>Travelwise 160</u> The Department for Regional Development is promoting a "Travelwise" scheme across Northern Ireland, 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.
2.5	**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. The design should seek to limit the provision of additional car parking: 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. *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 designated for disabled usage.
2.6	**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.

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, and well-lit. 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

Provide for availability of showers, changing facilities, storage lockers and drying space where appropriate. 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 University 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.

3.	Energy	
3.1	**Design Concepts**	Designs submitted for approval will need to demonstrate that every effort has been made to arrive at a low carbon solution. The whole team, including the Client, have a contribution to make and therefore the final design will be as a result of several 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. Examples of Passive solutions would be: • Orientation • Maximising natural lighting • Maximising natural ventilation • Optimising 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 modeling should be used where appropriate . 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**	Conduct whole life costing analysis of all major elements. Each system incorporated into the design will require whole life costing spreadsheets to be provided to demonstrate value for money. University 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 sites. 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 loops or water 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 must 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. Consideration shall be given to the use of variable speed type pumps and should be set to reduce speed to meet the actual circuit loads.
3.6	**Thermal Comfort**	Assess thermal comfort at design stage, use this to evaluate appropriate servicing options and demonstrate that appropriate thermal comfort levels are achieved. Where appropriate, complete feasible studies aimed at optimising and meet the thermal comfort requirements set out in studies CIBSE Guide A.
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 • 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 compliance with the control of 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 be available for discussion during Stage 1. Mechanical ventilation, where appropriate, must incorporate heat recovery with an efficiency of at least 70% and should 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 must achieve an energy performance of less than 1.5 W/l/s <u>Ventilation rates</u> Maintenance of a healthy indoor environment 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.
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 7.5m^3/h/m^2 at 50 Pa for new builds and 10m^3/h/m^2. for major refurbishments in naturally ventilated spaces and 5.0m^3/h/m^2 in air conditioned spaces.
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.

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

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. Where appropriate design the heating/cooling system to allow for limited independent occupant thermal control in separate rooms. Where a BMS is employed confirm the level of adjustment available.

Sub-metering

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

Designs must 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
- 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 and energy intensive equipment

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 landlords 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 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**	QUB to insert points 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% must be achieved in all 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 • 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' <u>External Lighting</u> Specify energy efficient light fittings for external luminaries and where all light fittings are controlled for the presence of daylight. Ensure: • All lighting for the building, access ways and pathways have an efficacy of at least 50 luminaire-lumens/circuit-Watt • All lighting to car parking area and associated roads have an efficacy of at least 70 luminaire-lumens/circuit-Watt • All flood lighting has an efficacy of at least 70 luminaire-

		lumens/circuit-Watt • All sign lighting with a bulb efficacy of >25watt has an efficacy of at least 70 luminaire-lumens/circuit-Watt • All 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 <u>Reduction of night time light pollution</u> 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. <u>Efficient Lighting Controls & Zoning</u> 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 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.
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. 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 the University to ensure commissioning will be carried out in line with current Building Regulations and (where applicable), best practice. In addition, the tender documents must include a

		requirement to 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 target as set out of between 35-55Gj/100m^3 /annum. The design team will provide calculations giving anticipated energy inputs (Gj/M3/annum) and CO_2 emissions (Kg/M^2/annum). The values should be inclusive of embedded renewables. <u>Whole Life Performance</u> The project team must carry out quantitative analysis of the life cycle energy consumption for at least two viable design options for each of the following services and should specify the option that has the lower CO_2 emissions over a 60 year building life cycle. • General lighting • Heating • Hot water • Mechanical ventilation • Air conditioning, including the chiller or cooling source where this is being provided as part of the scheme • Controls • External envelope
3.14	**Renewable Energy**	The Building Regulations do not include a specific requirement to include renewable energy systems in buildings. However, ongoing revisions 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 therefore, renewables must be considered to be the path of least cost/resistance. <u>Renewable & low emission energy</u> 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.

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 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:

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 buildings.

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)

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:

Geo-thermal

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

Biomass

(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.

This remains an untested technology in the Northern Ireland context and, therefore, further investigation is required before this can be widely adopted.

Combined Heat and Power

- Biomass CHP

4.	Impact of Building(s)	
4.1	**NI Building Regulations**	In order to meet the necessary BREEAM rating for University 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-residential buildings calculated using complex SBEM energy model • Air pressure test of commercial buildings • Consequential improvements to buildings over 1000 m² (QUB to re-order logically) 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 and land • 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
4.2	**Meeting a specified BREEAM**	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 principles of BREEAM have been encompassed within this Sustainable Development Brief, however it is expected that specific assessments will be conducted for all developments to demonstrate compliance with the NI Sustainability Action Plan.

4.3	**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.
		
		There are a variety of benefits to be obtained as a result of efficient water use including:
		
		• Financial/cost savings
		  o water conservation and water efficient technology reduces water use and bills
		  o water efficient devices can further reduce water use and provide greater savings especially in high use components

		such as toilet flushing and urinals o monitoring of water use helps target areas where cost savings can be made o sub-metering certain specific water uses such as landscaping, can provide evidence to gain reductions in sewerage charges o SUDS may be cheaper to build than traditional drainage and easier to maintain by on-site staff o Efficient plumbing design can reduce heating costs • Environment o water conservation helps reduce the demand for new water resources, and the need for potentially damaging increases in abstractions o SUDS can help in the management of flood risk, the improvement of environmental water quality, and can contribute to increased biological and ecological diversity o good plumbing design minimises energy use o within the environs, there are increased amenity and wildlife creation benefits The water management strategy for University 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 are a requirement of BREEAM. 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 periods. 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.
4.4	**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 University projects include the following: • Dual flush WCs with operating instructions on the cistern with a maximum 6-litre flush and lower 4-litre flush • Timed turn off push taps or electronic sensor taps 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). 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 Irrigation Systems 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.
4.5	**Rainwater /water recycling**	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.

		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 risk assessment: 1. A rainwater collection tank sized to collect at least 50% of EITHER: • The total predicted rainwater run off from roof areas (for the period of collection); OR • 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: • Toilet flushing demand; OR • Toilet flushing and (where specified) irrigation of planting and landscaping demand
4.6	**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.
4.7	**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.

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.

As part of the building modeling requirement 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 requirement that an average daylight factor of at least 3% shall be achieved in at least 80% by floor area of all occupied spaces. This is to demonstrate improved quality of day lighting for building users. The standard daylight factor formula outlined in CIBSE LG10 must be used.

Natural light

Where possible, all workstations/desks should be 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 should benefit from natural light 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).

4.8	**Noise Attenuation**	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. An environmental noise assessment should be considered to demonstrate compliance with guidance as well as a study of noise levels to be carried out by the design team. 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 set out in the specification • 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
4.9	**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. 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).
4.10	**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. One credit, if NOx emission rates are below 100 mg/kWh, two credits if the NOx emission rate is below 70 mg/kWh and three credits if the NOx emission rate of the heating plant is below 40 mg/kWh.
4.11	**Air quality**	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). Therefore 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, maximise planting belts and green areas. Trees and shrubs help to remove air-borne pollutants and particulates. and must be an aspiration for roadways/circulation areas within University sites.

		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 located over 10m from major sources of external pollution in accordance with the relevant standards. 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. 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%.
4.12	**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 Minimising flood risk 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
4.13	**Minimising Water Course Pollution**	Minimise Watercourse Pollution 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. <u>Kitchen Waste Water Filtration</u> 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 Pollution Prevention Guidelines 11 (PPG11). Confirmation is required from either the local authority or Environment & Heritage Service or both that the design proposals for the chemical storage facilities are reasonable.

5.	Building Materials	
5.1	**Use of 'A' grade materials**	The reduction in the use of new building materials through the optimisation of existing available resources is a critical factor in achieving sustainable design. 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. 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.
5.2	**Life Cycle Costing**	Life cycle costing of the development should be considered in the design and specification of University 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 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.
5.3	**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". 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 fibreglass 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, Pulverised Fuel Ash, 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
5.4	**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 entrances and main circulation routes. This will prolong the life of the building and reduce maintenance costs.
5.5	**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 sustainable sources. For all other materials used, make it a procurement criteria that suppliers 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
5.6	**Hazardous substances**	Information on the presence of known hazardous materials will be available to the design team and the contractor. Likewise throughout the course of the construction process, the contractor will maintain a register of hazardous substances stored on the site.

6.	Site Waste	
6.1	**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 The University is committed to following the waste hierarchy method, 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. Effective waste management is dependent on good planning. In order to minimise waste on University sites, it is vital for the contractor to ensure that their 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.
6.2	**Waste Minimisation & Resource Efficiency**	Poor resource efficiency resulting in over-consumption 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

		These aspects of over-consumption of resources are particularly difficult to deal with, but options to consider 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 • striking a balance between over-design and the requirements of flexibility and adaptability, to avoid premature obsolescence of the works or building • choosing and designing components which can be coordinated, and paying attention to build-ability in the design conception • selecting lightweight demountable methods of construction and materials where appropriate • working closely with suppliers of construction products to minimise wastage, for example supply of non-standard panel sizes to avoid cutting standard panels A further way to reduce wastage of materials is to incorporate into the design the use of prefabricated elements. This allows the construction process to often be faster and more efficient, whilst significantly reducing wastage as most of the fabrication is done under factory conditions where waste and quality can be more carefully controlled.
6.3	**Waste Segregation & Storage**	Based on the waste management hierarchy, initial waste management options employed on University 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 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.
6.4	**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: • Clearly labelled for recycling • 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) • In a location with good vehicular access to facilitate collections Include designated short term 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.
6.5	**Refuse/ Composting**	Bio-degradables comprise 'organic' or natural materials. These materials will break down over time ('biodegrade') by natural processes. 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.
6.6	**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 waste 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.

7.	Ecology	
7.1	**Conservation**	A Strategic Objective of the Government's Sustainability Strategy is 'To conserve our landscape and manage it in a more sustainable way.' 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." 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. 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 university is committed to preserving the culture and heritage of the site.
7.2	**Enhancement of existing site**	All sites 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 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. All projects should aim to minimise the negative impact of development. An increase in ecological value of 6 or more species is necessary to meet University requirements. Consider the ecologist's recommendations on mitigating ecological impact of the building and enhancing site ecology. Consider the programming of site works to minimise disturbance to wildlife. For example, site preparation, ground works, and landscaping have been, or may 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, hibernating animals, flowering plants, seed germination, amphibians etc. Actions such as phased clearance of vegetation may help to mitigate ecological impacts. This additional requirement may be achieved where a clear plan has been produced detailing the timing of activities to avoid any impact on site biodiversity.

		In the design of new developments, it is preferable 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. 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 enhances the amenity value of the site to the benefit of students and staff alike.
7.3	**Biodiversity**	Biodiversity is defined as the variety of life on earth. It includes all living species and the habitats that they depend upon. A Biodiversity Management Plan will be produced to minimise negative impacts during the construction phase and enhancing the ecological value following occupation.
7.4	**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. Green roofs may be considered as part of SUDS, with the vegetated surface providing a degree of retention of rainwater run off. 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 sewers • If intensive, provide new open space for recreation

		Where possible, introduce natural habitats to the site in such a way as to provide pleasant surroundings for students and staff.

8.	Social Wellbeing	
8.1	**General**	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.
8.2	**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. In terms of contributing to the neighbourhood the development can contribute to the enhancement of public realm and the civic pride of the citizens living and working in it. With this in mind a key measure in the design of University developments will be to stimulate consultation and raise aspirations of the project. The development of schemes must involve extensive stakeholder consultation with the aim of delivering a building that responds effectively to the needs of staff and students, 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 stakeholder commitment. Sites can thereby be transformed into places of civic value and help all those involved to build a better understanding of design quality. As well as being consulted at the initial concept and design stage, involve stakeholders in ongoing consultations and updates on the development throughout the construction and development of the community project. Recognise and encourage flexibility in the design to enable the building to be used, where possible, as a shared facility with the community. Ensure that these facilities can be accessed without comprising the safety of the building and its occupants.
8.3	**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.
8.4	**Construction Phase**	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, all schemes will be registered 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 more than 32 points out of a possible 40 for the scheme.

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. The central target is to reduce the number of major injury accidents to construction workers by 50% of the 2002 level, by 2008.

This will include a commitment to:

- 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

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 timber is sustainably sourced

8.5	**Local Procurement**	The University recognise the benefit of the sustainable procurement of local products and services. By procuring sustainably, the University seeks 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.
8.6	**Measures taken to reduce the opportunity for crime**	The University will work in partnership to reduce crime and antisocial behaviour. 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* 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. Carefully plan the design of street lighting and lighting within the development to provide the appropriate type and amount of lighting throughout the development.

9.	Procurement	
9.1	**Strategy**	At the heart of the University's procurement strategy are the following principles: • Engage key procurement decision-makers • Ensure system allows consideration of whole life costs. 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
9.2	**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. The University will 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: i. Business justification ii. Project brief and Procurement Process iii. Design brief iv. Construction process v. Operation and management vi. Disposal and re-use. It is expected that the principles of OGC 'Achieving Excellence Procurement Guide 11 – Sustainability' are incorporated into the management of the design development process, construction stage and (where applicable) operation and maintenance phase.
9.3	**Specification**	In the specification and procurement of materials and equipment, sustainability criteria must be incorporated, together with functionality, appearance, useability, etc. Specific opportunities exist, as discussed previously, in: • Use of 'A' grade materials

		• Application of whole-life costing • 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 - Quick Wins and Energy Consumption Guide 72.
9.4	**Supply Chain**	The sustainability of a development will be dependent on the entire supply chain engaged in the process, through from design, construction and operation. The evaluation of the capabilities of suppliers of products and services to be evaluated based on both corporate level commitment (e.g. operating an accredited environmental management system to ISO 14001/BS8555/EMAS) and products / services supplied. Give preference to suppliers and manufacturers who can provide life-cycle assessment (LCA) & include this requirement in pre-qualification criteria.

10.	Management	
10.1	General	The management of a building project from design stage through construction to completion and operational phase is an important University requirement.
10.2	Maintenance	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 Building Bulletin 98/99 as appropriate. This must be evenly distributed throughout the site/building and as a minimum storage should be provided on each floor. 5. Where there is a management plan for the landscaping, included in the maintenance strategy. <u>Building user guide</u> 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.

		<u>Building user education</u> 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). <u>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. <u>Environmental Policies and Responsibility</u> 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.

SUSTAINABLE DEVELOPMENT DESIGN BRIEF

Part 2 – Checklists & Reports

1. INTRODUCTION

The Sustainable Development Design brief is intended to facilitate reporting on design proposals, contract documentation and construction practice, and their monitoring against identified sustainable development standards.

The document is structured in two volumes:

Part 1 A guide to sustainable development best practice, including opportunities and targets for the integration of sustainable development principles and practices.

Part 2 Reporting pro-formas against each of the identified sustainable development central themes. These should be completed by the Design Team Leader and returned to the University Project Manager at each project review stage.

Recognition of sustainable principles and issues will be a key criterion in the selection of design teams and construction supply chains, and all commissioned consultants and contractors must confirm that they have the requisite resources and skills to deliver on this critical area.

2. SUSTAINABILITY THEMES

A number of sustainable development themes and associated criteria have been identified by the University. Whilst recognising that the themes and criteria will not apply universally to all projects each project, the Design Team leader, on behalf of the full design team, must reference them when completing the attached pro forma sheets. Reference should also be included in each of the project milestone review reports.

The identified sustainability themes are:

1. Land use, urban form and design
2. Transport
3. Energy
4. Impact of building(s)
5. Building Materials
6. Waste
7. Ecology
8. Social Wellbeing
9. Procurement
10. Management

3. Part 2 – Checklists & Reports

Project Review			RIBA Stage	Check List
Stage	1	Preliminary Client Brief	A & B	
Stage	2	Conceptual Scheme Design	C	
Stage	3	Scheme Design	D	
Stage	4	Final Detailed Design	E, F & G	
Stage	5	Readiness for Service	H - L	
Stage	6	Project Review – Post Occupancy	-	

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review: Stage 1: Preliminary Client Brief - (RIBA Stages A & B)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
1.0 Land Use, Urban Form & Design	1.1 Site Criteria Does the land use encourage compact urban areas, reduce physical separation of key land uses; promote mixed use developments; and improve travel choices for people?				
	1.2 Reusing Sites ▪ Is the site a Brownfield site? ▪ If yes, is the footprint maximized within the footprint of this land?		**LE**		
	1.3 Form of Development Layout ▪ Has site selections given priority to good local infrastructure?		**T1**		
	1.4. Site Investigation ▪ Has a detailed site investigation been carried out?		**M6**		
	1.8 Flood Risk Identification ▪ Have you undertook a flood risk assessment for the site?				

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review: Stage 1: Preliminary Client Brief - (RIBA Stages A & B)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
2.0 Transport	2.1 General ▪ Which policy statements/documents have you considered in the selection of this site?		**T1**		
	2.4 Public Transport ▪ Is the site entrance in close proximity to transport nodes with a good service frequency? ie bus stops 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 ≤10min?		**T1**		
	2.8 Local Facilities ▪ Are there local amenities within 500m of the site or integrated into the design?		**T3, M9**		
3.0 Energy	3.1 ▪ Do good practice environmental parameters and energy consumption figures form part of the design brief and performance specification?				

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review: Stage 1: Preliminary Client Brief - (RIBA Stages A & B)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
4.0 Impact of Buildings	4.2 BREEAM Rating ▪ Has advice been sought from the BREEAM Assessor for this project on how to achieve 'Excellent' rating for new building project or "very good" for refurbishment? ▪				
5.0 Building Materials	5.2 Life Cycle Costing • Have the anticipated life cycle and maintenance strategies been identified within the project Design Brief?				
7.0 Ecology	7.1 Conservation • Not required for major refurbishment of existing building needing no landscaping works.		**LE3, LE4, LE5, LE6**		
8.0 Social Wellbeing	8.2 Stakeholder Consultation ▪ Have stakeholder been identified?				
10.0 Management	10. Management How have specifications for the building and its services/systems and landscaping considered ease and efficiency of maintenance?				

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
SUMMARY REPORT

Project Review Stage 1: Preliminary Client Brief (RIBA Stage A & B)

Project Name:			
Project No.:			
REPORT ON LEVEL OF ACHIEVEMENT			
1.	Land Use Urban Form and Design	✓	
2.	Transport	✓	
3.	Energy	✓	
4.	Impact of Building(s)	✓	
5.	Building Materials	✓	
6.	Waste	Not applicable at this stage	
7.	Ecology	✓	
8.	Social Wellbeing	✓	
9.	Procurement	Not applicable at this stage	
10.	Management	Not applicable at this stage	
Prepared by:		*(Design Team Leader's name)*	
Date:			
Sign Off by Design Team Leader:		*Name*	*Date*
Sign Off by University Project Manager:		*Name*	*Date*

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 2: Conceptual Scheme Design - (RIBA Stages C)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
1.0 Land Use, Urban Form & Design	1.5 Open Space and Landscaping ▪ Have you provided accessible green space and enhanced existing landscape features on the site?		**LE3, LE4, LE5, LE6**		
	1.6 Mix of Uses ▪ Do structural grids, adequate floor to floor heights and suitable engineering infrastructure allow for 75% of spaces to be flexible?				
	1.7 Density ▪ Have you encouraged high density development, where appropriate?				
2.0 Transport	2.2 Transport Assessments ▪ Have you undertaken a Transport Assessment for the project?				
	2.3 Green Travel Plan ▪ Has a Green Travel Plan been developed for the project?		**T8**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
2.0 Transport cont'd	2.5 Parking ▪ Has the visual impact of car parking been minimised? ▪ Has the amount of car parking met or bettered the requirements for general and disabled parking?		T9 **T9**		
	2.6 Cyclist and Pedestrian ▪ Have you provided a safe pedestrian network on site? ▪ Does the project incorporate appropriate cyclists facilities?		**T5, T6** **T5, T6**		
3.0 Energy	3.1 Design Concept ▪ Has the whole team made a contribution to arrive at low carbon solution? Has analysis been carried out and strategic recommendations made on: ▪ Building layout, orientation and zoning strategy. ▪ External influences, such as landscape, trees, roads, other buildings and outdoor pollutants ▪ The thermal performance of the building, the ability of the		**E1**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	structure to minimise heating & cooling energy requirements through optimisation of insulation and glazing ratio. ▪ Heat gain from IT load growth. ▪ Opportunities to use renewable energy, including building integrated systems. ▪ Requirements for air conditioning and comfort cooling. ▪ The building ventilation and lighting strategy. ▪ The alternatives for heating, cooling and ventilation distribution systems. ▪ Cooling & heating plant options, including assessment of CHP and energy storage. ▪ The system control strategies, including an element of personal control of space temperature and lighting. ▪ Specification of energy target for the building. ▪ The impact of entrance and exit of people and plant to buildings. ▪ Life cycle costings.		**E1**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 2: Conceptual Scheme Design - (RIBA Stages C)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	▪ Have all passive solutions been explored?				
	3.2 Modelling ▪ Which method has been used to comply with the Building Regulations?				
4.0 Impact of Buildings	4.1 Building Regulations ▪ To what extent have you exceeded the key sustainability factors within the Building Regulations?				
	4.2 BREEAM Rating ▪ Has advice been sought from the BREEAM Assessor for this project on how to achieve an 'Excellent' rating?				
	4.7 Maximum Day Lighting ▪ Does your design maximise the amount of natural light used in the building? ▪ Are the appropriate 'view out' targets achieved		**HW1, HW2, HW3** **HW1, HW2, HW3**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 2: Conceptual Scheme Design - (RIBA Stages C)

Project Name:				Project No.:	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
	▪ Do you have a glare control system in place?		**HW1, HW2, HW3**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 2: Conceptual Scheme Design - (RIBA Stages C)

Project Name:				Project No.:	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
5.0 Building Materials	5.3 High Recycled Content • Has a pre-demolition audit been carried out to establish the potential for recycling existing building materials?				
	5.5 Sustainable Sourcing ▪ Can a minimum of 80% of the proposed building elements be sustainably sourced?		**MW8**		
7.0 Ecology	7.3 Biodiversity ▪ Has a post-project Biodiversity management plan been produced? ▪ Has a 'Biodiversity Champion' been appointed within the		 **L66**		

Project Name:				**Project No.:**	
	design team?				
8.0 Social Wellbeing	8.2 Stakeholder Involvement ▪ Have stakeholder been consulted? ▪ Is there agreement that the development enhances the urban landscape?		**M8** **M8**		
	8.4 Design for Social Wellbeing ▪ Does the design contribute to		**HW28, HW23**		
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
8.0 Social Wellbeing con'td	the well being of the users e.g. artworks, art strategy, sitting areas, walks etc?				
	▪ Is an adequate outdoor space provided?				

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
SUMMARY REPORT

Project Review Stage 2: Conceptual Scheme Design (RIBA Stage C)

Project Name:		
Project No.		
REPORT ON LEVEL OF ACHIEVEMENT		
1.	Land Use Urban Form and Design	✓
2.	Transport	✓
3.	Energy	✓
4.	Impact of Building(s)	✓
5.	Building Materials	✓
6.	Waste	✓
7.	Ecology	✓
8.	Social Wellbeing	✓
9.	Procurement	Not applicable at this stage
10.	Management	Not applicable at this stage

Prepared by:	*(Design Team Leader's name)*	
Date:		
Sign Off by Design Team Leader:	*Name*	*Date*
Sign Off by University Project Manager:	*Name*	*Date*

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 3: Scheme Design (RIBA Stages D)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
2.0 Transport	2.1 General Travel Information Space Have you provided a dedicated space within the development for provision of up-to-date public transport information?		**T10**		
3.0 Energy	3.4 Active Solutions What are the reasons for your decision to use active solutions?				
	3.5 Heating and Hot Water Design Has analysis of specific energy efficiency measures been carried out with the following objectives in mind?: ▪ Has the most efficient primary heat/hot water plant been selected? ▪ Has the most efficient plant been selected to supply the base load? ▪ Has plant been sized to provide appropriate margins without over-sizing?				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd					
	▪ Has consideration been given to using modular boilers? ▪ Have effective controls been included on primary plant and distribution systems to ensure heat/hot water is only provided when and where it is needed and at the correct temperature? ▪ Are controls compatible with the existing University campus BMS? ▪ Have higher-efficiency motors (HEMs) and variable speed drives been selected for distribution pumps where appropriate? ▪ Has hot water storage capacity been kept to a minimum and has consideration been given to the use of plate heat exchangers? ▪ Have adequate facilities been provided to allow				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	chemical treatment of water? ▪ Has the optimum thickness of insulation been provided to insulate all hot water services pipework and valves?				
	3.7 Refrigeration Design ▪ Has the building been designed to minimise the cooling requirement? ▪ Have rooms that have a high cooling load been grouped and located on the north side of the building wherever practicable? ▪ Has the hot service pipework been routed to avoid passing through heat critical areas? ▪ Has free cooling been utilised where practicable? ▪ Has night cooling strategy been considered?				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd					
	▪ Has night cooling strategy been considered? ▪ Has a comparison been made between centralised and decentralised systems? ▪ Has plant COP been specified? ▪ Has consideration been given to the application of heat pumps where simultaneous heating and cooling are required? ▪ Has an assessment of the use of variable output controls been made? ▪ Has use been made of higher-efficiency motors (HEMs) and variable speed drives for distribution pumps where appropriate? ▪ Has the optimum cooling supply temperature been employed?				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	▪ Where refrigerant is specified does this comply with the Montreal Protocol?				
	3.8 Ventilation and Air Conditioning Design ▪ Has air infiltration been controlled by designing a tight envelope? ▪ Where possible, have rooms that have similar ventilation and air conditioning requirements been grouped together? ▪ Have 'Passive' before Active solutions been given preference to natural ventilation? ▪ Has the most efficient plant and equipment been specified where mechanical ventilation is essential? ▪ Where extract rates are variable, have you ensured that supply air volume can be reduced				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	to match extract rates? ▪ Have you ensured that ductwork is adequately sized, avoiding the sue of over-sized fans? ▪ Have you considered heat recovery between air streams? ▪ Will effective control be realised through good zoning, effective time control, and variable flow control? ▪ Have cooling requirements been met with free or passive cooling systems wherever practicable?				
	3.11 Lighting Design ▪ Does the design optimise the use of natural daylight? ▪ Have unnecessarily high illuminance (lighting levels) been avoided? ▪ Do all luminaries incorporate control gear				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	and lamps of the optimum efficiency? ▪ Has an assessment been made of lighting controls, including switching, dimming, daylight linked control, timed control and occupancy detection? ▪ Has consideration been given to the use of task lighting to enable lower general illumination levels?				
	3.13 Utilities ▪ Has an assessment been made of the impact of the climate change levy on the economics of renewable energy? ▪ Have you considered the implications for the design of fuel selection? ▪ Has the suitability of combined heat and power (CHP) plant been assessed?				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	▪ Has the impact on the present utility contracts for increased supplies been considered? ▪ For all direct utility supplies have you ensured that the service capacity required is accurate? ▪ Has power factor correction equipment been included at appropriate locations within the electrical distribution system? ▪ Has the impact of tariffs and standby strategic generation been considered? ▪ Has allowance been made for all supplies to be metered, with the facility for remote reading via the BEMs? ▪ Has sub metering been included for any unusual or high loads? ▪ Have control measures				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 **Energy cont'd**	been included to minimise wastage of cold water? ▪ Has the impact of urinals and low capacity WC's been considered with regard to water consumption and introductions of chemicals into the water system? ▪ Has full consideration been given to the use of other water efficiency measures?				
	3.14 Renewable Energy ▪ Have you carried out a feasibility study for renewable energy technologies? ▪ What percentage of the total energy demand for the development is supplied from local renewable energy or low emission energy sources?		**P11** **P11**		
4.0 **Impact of Buildings**	4.5 Rainwater/Water Recycling ▪ Have you specified rainwater collection and/or greywater recycling?				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
	▪				
4.0 Impact of Buildings cont'd	4.11 Air Quality ▪ Have you mitigated possible increases in the levels of air pollution in the vicinity of the development? ▪ Does your design ensure internal air pollution is minimised? ▪ Is CO2 monitoring included?		**HW9, HW10** **HW9, HW10** **HW9, HW10**		
	4.12 Sustainable Drainage ▪ Have you minimised the risk of localised flooding on site or elsewhere?		**P7**		
	5.1 Use of 'A' Grade Materials Have you specified an 'A or A+' rating (in accordance with *'The Green Guide to Specification')*		**MW1, MW2**		
5.0 Building Materials	▪ External Walls ▪ Windows ▪ Roof ▪ Upper floor slabs ▪ Internal walls ▪ Floor finishes/coverings ▪ Is at least 50% of the building		**HW13**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
5.0 Building Materials cont'd	façade (by area) reused and does at least 80% of the reused façade (by mass) comprise in-situ reused material?				
	5.2 Life Cycle Costing ▪ Have you completed a Life Cycle Costing analysis on the building design for inclusion in the Stage D Report? ▪ Does the project meet the whole life costing requirements of BS ISO 15686? ▪ Do a minimum of 50% (by volume) of materials specified have a reuse value?		**M21** **M21**		
	5.3 High Recycled Content Materials ▪ Does 10% of the materials value of the project come from recycled or re-used sources? ▪ Is the amount of recycled aggregate over 25% (by weight) of the total 'high grade' aggregate used?		**MW7** **MW7**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
5.0 Building Materials cont'd	▪ Is this aggregate locally sourced? ▪ Does the design reuse at least 80% of an existing primary structure and, for part refurbishment and part new-build. ▪ Does the volume of the reused structure comprise at least 50% of the volume of the final structure?		**MW7**		
	5.4 Design Robustness ▪ Are vulnerable parts of the building protected to prolong the life of the building and reduce maintenance costs?		**MW10**		
	5.5 Sustainable Sourcing Have at least 80% of each of the basic building elements as detailed excluding materials which form less than 10% of each element, been responsibly sourced. Have at least 80% of each of the following finishing elements, excluding materials which form				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
5.0 Building Materials cont'd	less than 10% of each element, been responsibly sourced: ▪ Stairs ▪ Windows ▪ External and Internal doors and frames ▪ Internal joinery ▪ Panelling ▪ Fitted furniture ▪ Fascias, soffit boards, etc ▪ Any other significant use				
	5.6 Hazardous Substances ▪ Is information on the presence of hazardous materials available for staff and contractors? ▪ Has a review of all finishes and fittings containing volatile organic compounds (VOCs) been carried out?		**HW13** **HW13**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 3: Scheme Design (RIBA Stages D)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
6.0 Waste	6.1 Waste Management Planning • In what ways does your design meet the requirements of the waste hierarchy? • Reduce • Reuse • Recycle • Disposal				
	6.2 Waste Minimisation In what ways does your design minimize over consumption, oversizing plant and consider buildability?				
8.0 Social Wellbeing	8.5 Equity and Participation ▪ Has an Access Statement been developed?				

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
SUMMARY REPORT

Project Review Stage 3: Scheme Design (RIBA Stage D)

Project Name:			
Project No.:			
REPORT ON LEVEL OF ACHIEVEMENT			
1.	Land Use Urban Form and Design	Not applicable at this stage	
2.	Transport	✓	
3.	Energy	✓	
4.	Impact of Building(s)	✓	
5.	Building Materials	✓	
6.	Waste	✓	
7.	Ecology	Not applicable at this stage	
8.	Social Wellbeing	✓	
9.	Procurement	Not applicable at this stage	
10.	Management	Not applicable at this stage	
Prepared by:		*(Design Team Leader's Name)*	
Date:			
Sign Off by Design Team Leader:		*Name*	*Date*
Sign Off by University Project Manager:		*Name*	*Date*

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy	3.3 Whole Life Costing ▪ Have you demonstrated value for money?		**MW21**		
	3.5 Heating ▪ Have you shown the anticipated installed loading and revenue consequences for the fuel choice and plant selection?				
	3.6 Thermal Comfort ▪ Have you undertaken a thermal comfort model? ▪ Can you demonstrate that internal temperatures in offices, teaching spaces and laboratories do not exceed 24ºC dry bulb for more than 40 hours per year?		**HW14** **HW14**		
	3.7 Cooling ▪ Have you shown the anticipated installed loading and revenue consequences for the cooling system selection? ▪ Have you maximized the extent of free cooling?		**E20** **E20**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	3.8 Ventilation ▪ Do the ventilation systems satisfy the requirements of the room data sheets, noise criteria and the external environment? ▪ Does the ventilation system achieve an energy performance of less than 1.5 W/l/s? ▪ Does the heat recovery system have an efficiency of at least 70%? ▪ Does the ventilation system provide the required fresh air rates?		**HW11, HW8** **HW11, HW8** **HW11, HW8** **HW11, HW8**		
	3.9 Air Tightness ▪ Does the building achieve an air permeability index of no more than $10m^3/h/m^2$ at 50 Pa in naturally ventilated spaces and $5.0m^3/h/m^2$ in air conditioned spaces?		**HW11, HW8**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	3.10 Systems Control ▪ Have you included proposals to control the installation quality of the mechanical systems? ▪ Does the BMS or control system include sub-metering in line with the University's Design Brief?		**HW15, E2, E3** **HW15, E2, E3**		
	3.11 Lighting ▪ Have you maximized daylighting? ▪ Are room surfaces condusive to minimal artificial lighting? ▪ Are luminaires energy efficient with high frequency control gear? ▪ Does the scheme comply with the required lighting levels in line with the University's Design Brief? ▪ Does the lighting system have appropriate controls? ▪ Have you designed for a reduction in night time light pollution?		**HW4, HW5, HW6, E4** **HW4** **HW5** **HW5** **HW6** **HW6, E4**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	3.12 Commissioning ▪ Has a project team member or independent commissioning manager been appointed to monitor commissioning? ▪ Has provision been made for seasonal commissioning to be carried out during the first year of occupation, post construction (or post fit out)? Has approval been obtained for the use of any of the following systems and equipment? ▪ Single glazed fenestration ▪ Water features ▪ Electric water heaters ▪ Electric space heating ▪ Electric air hand dryers ▪ Feature lighting (both external and internal) ▪ Luminaires incorporating tungsten lamps ▪ Door hold open devices in entrance foyers ▪ Over door air curtains ▪ Air conditioning systems ▪ Mains water cooling systems ▪ V belt motor drives ▪ Compressed air or mains		**M1**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 4: Final Detailed Design (RIBA Stages E, F & G)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
3.0 Energy cont'd	water vacuum systems				
	▪ Does the project achieve a CO^2 emissions figure that is less than the HEEPI benchmark figure for premises of this nature? ▪ What percentage improvement over the Building Regulations does the design provide for CO_2 emissions? ▪ Have you carried out a building services whole life performance analysis?		**E1, E10** **E1, E10** **E1, E10**		
	3.14 Renewable Energy ▪ Have you carried out a feasibility study for renewable energy technologies? ▪ What percentage of the total energy demand for the development is supplied from local renewable energy or low emission energy sources?		**P11** **P11**		
4.0 Impact of Buildings	4.3 Water Management Strategy ▪ Does the design include a water management strategy?				

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
Project Review Stage 4: Final Detailed Design (RIBA Stages E, F & G)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
4.0 Impact of Buildings cont'd	4.4 Reducing Water Consumption Demand ▪ Do your sanitary fittings incorporate water reduction measures? ▪ How does your landscape strategy reduce water consumption?		**W1, W2, W3, W4, W6** **W1, W2, W3, W4, W6**		
	4.6 Microbial Contamination ▪ Have your building's services minimised the risk of waterborne and airborne legionella contamination?		**HW16**		
	4.8 Noise Attenuation ▪ Have you carried out an environmental noise assessment? ▪ Have the required sound levels been achieved? ▪ Does the design include for post construction testing of the acoustic performance of the building?		**HW17** **HW17** **HW17**		
	4.9 Ozone Depleting Substances ▪ Do refrigerants and insulants		**P1, P2**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
4.0 Impact of Buildings cont'd	meet the requirements?				
	▪ Have refrigerant leak detection and refrigerant recovery measures been included?		**P1, P2**		
	4.10 Low NOx Emitting Burners ▪ What are the Nox Emissions of the boilers specified?		**P6**		
	4.11 Air Quality ▪ Have you mitigated possible increases in the levels of air pollution in the vicinity of the development? ▪ Does your design insure internal air pollution is minimised? ▪ Is CO_2 monitoring included?		**HW9, HW10** **HW9, HW10** **HW10**		
	4.13 Minimising Watercourse Pollution ▪ How have you minimised watercourse pollution?		**P8, P14**		
5.0 Building Materials	▪ Do at least 80% of all paints and varnishes used for all internal purposes have a European Eco-label or achieve				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
	an 'A or A+' rating from the BRE Green Guide to Specification?				
6.0 Waste	6.3 Waste Segregation and Storage ▪ Have initial waste management options considered all the requirements? ▪ Have you provided a compactor and/or baler with provision of a water outlet for cleaning?		**MW16** **MW16**		
	6.4 Recycling and Storage ▪ Does the dedicated external storage space provided meet all the required characteristics? ▪ Is there adequate provision for internal storage of recyclable material such as newspapers, magazines and aluminium cans?		**MW12** **MW12**		
	6.5 Refuse/Composting ▪ Have you provided a composting vessel on site for organic waste and adequate storage for organic material? OR ▪ Is there is a dedicated space for organic waste to be stored prior to removal and composting at an alternative site?		**MW17** **MW17**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
7.0 Ecology	7.4 Planting ▪ Does your planting scheme include all the requirements? ▪ Are green roofs part of the building design?		**LE4, LE5, LE6** **LE4, LE5, LE6**		
8.0 Social Wellbeing	8.6 Measures for Crime Reduction ▪ Has the project team consulted with the Architectural Liaison Officer (ALO) or the Crime Reduction Design Adviser (CRDA). ▪ Have you developed a security strategy? ▪ Has the car parking been designed in accordance with the *PARK MARK Safer Parking* assessment guidance? ▪ Have you committed to applying for the Safer Parking Award within three months of occupation? ▪ How have you designed street lighting and lighting within the development to provide the appropriate type and amount of security?		**M10 HW19** **M10 HW19** **M10 HW19** **M10 HW19** **M10 HW19**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
9.0 Procurement	9.3 Specification ▪ Have sustainability criteria been incorporated into the specification and procurement of materials and equipment as per the requirements?		**E26**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
SUMMARY REPORT

Project Review Stage 4: Final Detailed Design (RIBA Stages E, F & G)

Project Name:		
Project No.:		
REPORT ON LEVEL OF ACHIEVEMENT		
1.	Land Use Urban Form and Design	Not applicable at this stage
2.	Transport	Not applicable at this stage
3.	Energy	✓
4.	Impact of Building(s)	✓
5.	Building Materials	✓
6.	Waste	✓
7.	Ecology	✓
8.	Social Wellbeing	✓
9.	Procurement	✓
10.	Management	Not applicable at this stage

Prepared by:	*(Design Team Leader's Name)*	
Date:		
Sign Off by Design Team Leader:	*Name*	*Date*
Sign Off by University Project Manager:	*Name*	*Date*

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
STAGE 5: Project Review – Readiness for Service (RIBA Stages H – L)

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
6.0 Waste	6.6 Waste Disposal ▪ What steps have been taken to keep, transport and dispose of waste safely? ▪ Has a Site Waste Management Plan been developed for construction phase? ▪ Is there provision of appropriate waste storage facilities?		**M5 MW12** **M5 MW12** **M5 MW12**		
8.0 Social Wellbeing	8.2 Stakeholder Consultation ▪ How has effective consultation been carried out? ▪ Has consultation been carried out at the design stage as well as throughout the construction and development stages?		**M8, M9** **M8, M9** **M8, M9**		
	8.4 Construction Phase ▪ Has the scheme been registered with the Considerate Constructor Scheme? ▪ Has the site gone significantly beyond best practice site management principles by achieving more than 32 points out of a possible 40 for the scheme? ▪ How do you comply with the The BUILDSAFE-NI Initiative?		**M4, M5** **M4, M5** **M4, M5**		

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
8.0 Social Wellbeing cont'd	▪ Is the construction site managed in an environmentally sound manner as per the requirements?		**M4, M5**		
	8.5 Local Procurement ▪ Does the project procure local products and services?				
9.0 Procurement	9.2 Sustainable Procurement ▪ How are the principles of OGC 'Achieving Excellence Procurement Guide 11 – Sustainability' incorporated into the management of the design development process, construction stage and (where applicable) operation and maintenance phase?				
	9.4 Supply Chain ▪ Have you evaluated the capabilities of suppliers of products and services to be based on both corporate level commitment (e.g. operating an accredited environmental management system to ISO 14001/BS8555/EMAS) and products / services supplied?				

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
9.0 Procurement cont'd	▪ Has preference been given to suppliers who can provide life-cycle assessment (LCA)? ▪ Has this requirement been included in pre-qualification of preferred suppliers?				
10.Management	• Has a structured building user training system been developed?		**M22**		

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
SUMMARY REPORT

Project Review Stage 5 – Readiness for Service (RIBA Stages H – K)

Project Name:		
Project No.:		
REPORT ON LEVEL OF ACHIEVEMENT		
1.	Land Use Urban Form and Design	Not applicable at this stage
2.	Transport	Not applicable at this stage
3.	Energy	Not applicable at this stage
4.	Impact of Building(s)	Not applicable at this stage
5.	Building Materials	Not applicable at this stage
6.	Waste	✓
7.	Ecology	Not applicable at this stage
8.	Social Wellbeing	✓
9.	Procurement	✓
10.	Management	✓

Prepared by:	*(Design Team Leader's Name)*	
Date:		
Sign Off by Design Team Leader:	*Name*	*Date*
Sign Off by University Project Manager:	*Name*	*Date*

SUSTAINABLE DEVELOPMENT DESIGN BRIEF
STAGE 6 : Project Review – Sustainable Post Occupancy

Project Name:				**Project No.:**	
Section	**Requirement**	**Compliance (Yes / No)**	**HC BREEAM Ref**	**Response/Evidence of Achievement**	**If No, Reason Why?**
10. Management	• Has a simple building user guide been developed to cover information relevant to both the non-technical building manager and the staff on the operation and environmental performance of the building? • Have you developed an Environmental Management System for the building? • Have you developed a process for Environmental Policies and Responsibility?		**M12** **M13** **M22** **M24**		

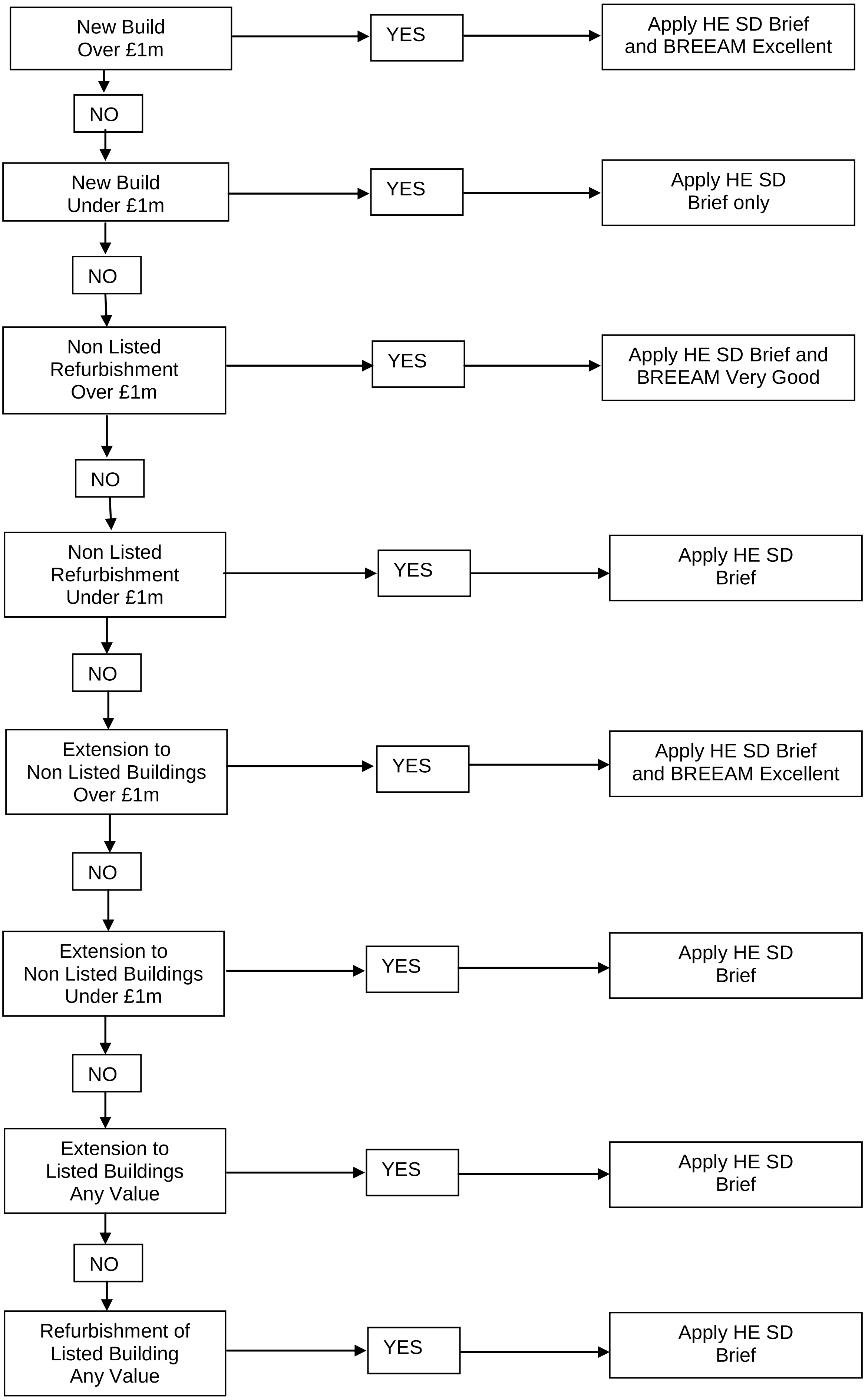
SUSTAINABLE DEVELOPMENT DESIGN BRIEF
SUMMARY REPORT

Project Review Stage 6: Sustainable Post Occupancy

Project Name:			
Project No.:			
REPORT ON LEVEL OF ACHIEVEMENT			
1.	Land Use Urban Form and Design	Not applicable at this stage	
2.	Transport	Not applicable at this stage	
3.	Energy	Not applicable at this stage	
4.	Impact of Building(s)	Not applicable at this stage	
5.	Building Materials	Not applicable at this stage	
6.	Waste	Not applicable at this stage	
7.	Ecology	Not applicable at this stage	
8.	Social Wellbeing	Not applicable at this stage	
9.	Procurement	Not applicable at this stage	
10.	Management	✓	
Prepared by:		*(Design Team Leader's Name)*	
Date:			
Sign Off by Design Team Leader:		*Name*	*Date*
Sign Off by University Project Manager:		*Name*	*Date*

Appendix 3

Flow Chart for the Application of the HE SD Brief and BREEAM (All Costs Are Ex Vat)



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