University of Lincoln: Sustainable Construction Guidelines

UNIVERSITY OF
LINCOLN

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1.0 Introduction

The environmental and sustainability impacts of new buildings and major refurbishment projects are an important consideration for the University of Lincoln. The University has a target from HEFCE to reduce carbon emissions by 43% by 2020 against a 2005/06 baseline. The HEFCE target cannot be achieved unless the University's buildings are energy efficient and designed on firm sustainability principles.

Another important consideration is the operating cost of a building once it is in use. The Estates Department has tightly controlled budgets for utilities, maintenance, cleaning and waste management and careful consideration of these issues at the design stage can reduce costs once the building is in operation. It is no longer acceptable for the construction of a building to be seen as a stand alone project to be delivered to a set capital budget. For a successful estate whole life costs need to be at the heart of both new build and refurbishment projects.

In order to ensure that sustainability is taken into account during all stages of construction projects the following guidelines have been developed. The guidelines have two main purposes. Firstly, they set out a small number of "red-line" environmental and sustainability issues that the University expects to be addressed in any major construction project. Secondly, the guidelines cover sustainability topics that should at least be considered within the development of a project.

This document is divided into two sections. The first section covers guiding principles and is intended to be used at Gateway Stages 0 (Outline Business Case) and 1 (Feasibility). These principles should also apply in later stages of project, but their main use will be in the development of projects. The second section covers the Guiding Principles in more depth and is intended to be used in the development of the detailed design development for the project (Gateway 2).

The document is intended to be used for new build construction projects and major refurbishment projects. The guidelines would be too detailed for smaller construction projects.

The aim of the guidelines is to allow maximum flexibility in the building design, heating method, ventilation strategy etc. It is not the intention that these guidelines should tie a project to a specific technology, design strategy or methodology of working. The main objective is to produce sustainable outcomes, not to dictate the method of arriving there.

2.0 Guiding Principles

Sustainability Principles: The outline planning permission for the Brayford Campus Masterplan contains a condition requiring that any new buildings achieve a BREEAM rating of “Very Good” or higher. Realistically the University should be aiming for a BREEAM rating of excellent.

The BREEAM process ensures that sustainability is embedded within a project, but it is not always suitable for every project. A decision must be made at the start of the project if BREEAM is to be used. If BREEAM is used then the whole project team should engage with the process from the very beginning of the project.

Energy and Carbon: The project should aim to minimise the energy used once the building is in operation. An Energy Performance Certificate rating of "B" is the very minimum level required. Methods of reducing the energy consumption and minimising the running costs of the building should be at the heart of the project. Through-out the project the implications of design changes and value engineering on energy consumption should be considered.

Clear targets for the final in use energy consumption of the building should be set at an early stage based on the expected GIA for the building – producing an expected kilowatt-hour per metre squared target figure. It may be applicable to consider proprietary methodologies for energy minimisation such as the Passivhaus Standard.

The use of natural ventilation techniques should be favoured over air conditioning and energy intensive mechanical ventilation. Air conditioning should not be used as a “get out” for not considering ventilation issues at the earliest stages of a project. In the past some ICT systems have required dedicated air conditioned cooling – ideally systems that can tolerate higher temperatures should be specified.

Other energy related issues, such as lighting, user controls, small appliances etc. should be considered in detail at the design stage. Some simple guidelines for these issues are included in the design stage section of this document.

Renewable / Alternative Energy: Consideration should be given to incorporating renewable technologies into the fabric of new buildings and major refurbishment projects. Even if the budget is not available to install systems such as photovoltaic solar panels the project designs should allow for their potential install at a later date.

Opportunities to take advantage of feed-in tariffs and other Government incentives for renewables should be considered prior to the design stage of the project. These schemes have the potential to reduce the operating costs for buildings and to provide an on going income stream for the University.

Site Considerations: Undertaking major projects in the centre of Lincoln is a complicated process in terms of planning permissions. At the Brayford Campus there are a number of conditions that were specified in the Masterplan planning approval, which need to be adhered to. There will also be a number of specialist reports that are required, such as contaminated land, archaeology and ecology.

The aspect and orientation of the building should be considered at the very early stages of the project. It is vital that adequate solar shading is provided to elevations

facing the sun. Consideration should also be made to ensure that internal spaces receive adequate day-lighting.

Waste Management: The project should have a clear plan to minimise the amount of waste produced during construction. Ideally the project should utilise a Site Waste Management Plan identifying a clear process for minimising, reusing or recycling waste materials.

The designs for the project should consider how building users will dispose of their waste once the building is in use. Adequate space should be provided for segregated waste bins in rooms. Additionally, external space for waste storage is required. In new open plan offices individual desk bins should not be used.

Sustainable Transport: It is highly likely that any buildings that the University develops in the future will be in Lincoln City Centre – therefore access to public transport services should be adequate. The key transport issues will be the provision of facilities for cyclists and pedestrians. Cycle parking spaces should be provided for 10% of building users. There should be clear and safe pedestrian routes for users around the buildings.

Space for car parking will be limited at sites in Lincoln City Centre, however it will be important to ensure that parking does not spread out to surrounding streets and areas.

Prevention of Pollution: The requirements to reduce the energy consumption of the buildings will ensure that emissions of carbon dioxide are also reduced. The University has a target from HEFCE to reduce carbon emissions by 43% by 2020 against a 2005/06 baseline.

Equipment specified for the buildings should also look to minimise other pollution sources – for example boilers should have low levels of nitrous oxide emissions.

Building Materials: Sustainable procurement methods should be used for the purchasing of building materials for projects. This is will include Forestry Stewardship Council approved timber. Other materials should ideally achieve a rating of between A+ and B in the BRE Green Guide to Specification.

Building Handover and Initial Operation: Commissioning is a vital part of the project process and if done well can reduce the running costs of a building. Ideally all major projects should have seasonal commissioning over their first year of operation. It is crucial to give consideration to a commissioning plan in the early stages of project development. Schemes such as Soft Landings can provide support during the handover period and in the early stages of building use. A decision on using Soft Landings on a project should be taken prior to the Design Stage.

3.0 Detailed Considerations

This section gives a more detailed view of the sustainability considerations for major projects at the University of Lincoln. It is intended that these issues should be considered at the Design Stage of project development (Gateway 2).

3.1: BREEAM 2011 New Construction: Minimum standards for a rating of "Excellent"

It is probable that all future planning applications for new buildings at the Brayford Campus and surrounding areas will contain a planning condition for the building to achieve a BREEAM rating of at least "very good" or “excellent”.

The BREEAM 2011 New Construction guidance has a series of minimum standards that must be met to achieve a rating of "Excellent" – these are:

Man 01: Sustainable procurement
Man 02: Responsible construction practices
Man 04: Stakeholder participation
Hea 01: Visual comfort
Hea 04: Water quality
Ene 01: Reduction of CO2 emissions
Ene 02: Energy monitoring
Ene 04: Low or zero carbon technologies
Wat 01: Water consumption
Wat 02: Water monitoring
Mat 03: Responsible sourcing
Wst 03: Operational waste
LE 03: Mitigating ecological impact

Detailed descriptions and evidence requirements for each of the above BREEAM areas are contained within the BREEAM 2011 guidance.

Further Information:

The BREEAM 2011 New Construction guidance can be downloaded from:
http://www.breeam.org (log-in required)
The above requirements are outlined on pages 27 & 28 of the New Construction guidance

3.2: BREEAM: Engagement with the BREEAM process

The nature of the BREEAM requirements means that the project team must engage with the BREEAM process at the earliest opportunity. The traditional RIBA Stage C (Stages 2 & 3 in the 2013 RIBA Plan of Work) is far too late in the process to begin thinking about BREEAM. Ideally a BREEAM Assessor should be appointed and working on the project during the briefing stage if BREEAM is to be used in the project.

The Design Team needs to be thinking about BREEAM requirements from the first stage of project development. Many BREEAM points become unobtainable if they are not considered at an early enough stage.

Another issue to consider is how the Design Team engages with the BREEAM process. To achieve an acceptable BREEAM score it is necessary for the whole project team to engage with the process through-out the project. It can't be left to one person – it has to be the responsibility of the whole team.

Further Information:

Page 15 of the BREEAM 2011 New Construction guidance shows the appropriate time scales for engagement with BREEAM

3.3: Environment & Sustainability: Policy and Strategy

The University has both an Environmental Policy and an Environmental & Sustainability Strategy.

The Policy document sets out the general principles of how environmental issues will be tackled at the University. The Policy has been designed with the intention that it will meet the requirements of the ISO14,001 standard for Environmental Management Systems.

The Environmental & Sustainability Strategy sets out a programme of environmental improvements up to 2017. The Strategy includes sections on energy improvements, reductions in carbon emissions, sustainable buildings, sustainable procurement, water consumption and sustainable transport. Detailed action plans for each section will be developed to support the Strategy.

The Strategy and Policy were approved by the University's Senior Management Team in February 2013. Both of these documents will provide background information to any major construction project.

Further Information:

The Environmental Policy is available at:
http://environment.blogs.lincoln.ac.uk/files/2010/11/Signed-Environmental-Policy.pdf

The Environmental and Sustainability Strategy is available at:
http://environment.blogs.lincoln.ac.uk/files/2013/02/Updated-Environmental-Strategy-2013.pdf

3.4: Planning Conditions and Parameters

Each planning application will have a number of conditions that are set by the local planning authority. The conditions need to be discharged as part of the planning process.

The Brayford Campus Masterplan planning application has a number of ongoing conditions and parameters that will apply to future Brayford Campus planning applications during the Masterplan period (2013 – 2023). These cover issues such as building heights, building lines, flood risk design levels and the requirements for contaminated land surveys. The fixed building lines ensure that views up to the Cathedral are protected.

Each of the planning conditions and the building parameters need to be considered in the design process for new buildings. Early engagement with the planning team is vital.

Further Information:

A copy of the Masterplan Design & Access Statement can be downloaded from:
http://learninglandscapes.blogs.lincoln.ac.uk/masterplan/

A copy of the Masterplan Planning Conditions will be provided.

4.0 Site Considerations / Project Brief Development

4.1: Building Orientation & Solar Gain

Due to the East / West linear orientation of the Brayford Campus it is highly likely that any new buildings constructed on the site will have extensive south facing elevations. Therefore, overheating of south facing rooms could be an issue.

Designs for substantial new buildings (1,000 m^2 plus) will be expected to be modelled thermally to check for any potential overheating issues.

It may be appropriate to avoid having large expanses of south facing glass as part of the designs. Additionally, solar shading may be required to reduce solar gain within buildings. The Design Team should refer to the documents listed below:

Further Information:

The following publications should be considered:

- Littlefair, P.J., et al. 2000. ***"Environmental Site Layout Planning: Solar Access, Microclimate And Passive Cooling In Urban Areas"*** BRE

- CIBSE ***"TM37 – Design for Improved Solar Shading Control"***

4.2: Flood Levels

Each new building will have to meet the flood level agreed between the University, City of Lincoln Council and the Environment Agency - as set out in the Flood Risk Assessment for the Brayford Campus Masterplan.

For the Engineering Hub building the Grant of Planning Permission document required finished floor levels at 5.6 metres above Ordnance Datum and for "Flood resilient construction techniques" to be used. Examples of flood resilient construction techniques are contained in the DEFRA report listed in the further information section.

It is likely that future buildings at the Brayford Campus will need to be constructed at the 5.6 metres above Ordnance Datum level. This is the level outlined in the Brayford Masterplan Outline Planning Permission Conditions.

As part of landscaping works around new buildings opportunities to extend flood defences or make them more robust should be pursued. This could involve extending the height or increasing the width of the defences and the construction of additional flood barriers.

Further Information:

The following documents are of use for Flood Levels

- Bowker,P., et al. 2007 ***"Improving The Flood Performance Of New Buildings: Flood Resilient Construction"*** DEFRA & the Environment Agency

- Holmes,R., 2012 ***"Flood Risk Assessment and Drainage Strategy – Brayford Campus"*** - http://learninglandscapes.blogs.lincoln.ac.uk/masterplan/

4.3: Flood Risk Assessment

An extensive Flood Risk Assessment was completed by Ward Cole for the Brayford Campus as part of the Masterplan project. This document should be used to inform any building specific flood risk assessment that is produced for the new projects.

The bulk of the Brayford Campus is located in Flood Zone 3a – which is judged to have a greater than 1% annual probability of flooding. The University Science Park development is also located in Flood Zone 3a. The flood defences at the Brayford Campus offer defence against the 1:100 year flood event plus a "freeboard" level of 100mm.

Any planning application within these areas will have to demonstrate that flooding has been considered in the form of a flood risk assessment.

Further Information:

- The Brayford Campus Flood Risk Assessment is available from the University lEarning Landscapes blog – http://learninglandscapes.blogs.lincoln.ac.uk/masterplan/

4.4: Contaminated Land

The Brayford Campus is a previously developed site that has the potential for contamination. The site was a railway marshalling yard from the 1850s and there were several later industrial uses – such as storage of oil. A large scale remediation project was undertaken before the Brayford Campus was handed over to the University in the 1990s. The Science Park site also had previous industrial uses, which may have led to contamination.

Due to the history of the site it will be necessary to conduct an onsite contaminated land assessment for any new development on either site. It is almost certain that this will be a condition of the grant of planning permission. Any intrusive investigation of contaminated land should comply with BS 10175:2001 "Investigation of Potentially Contaminated Sites – Code of Practice".

As part of the Brayford Campus Masterplan a Phase One Geo-environmental Assessment report was produced. This document should be used to inform any Phase 2 contaminated land study around the Brayford Campus.

For building projects external to the Brayford Campus it will be necessary to conduct both Phase 1 and 2 studies of the site. It will be necessary to liaise with the Contaminated Land Officer at the City of Lincoln Council.

Further Information:

- BSI 10175:2001 - ***"Investigation of potentially contaminated sites – Code of Practice"***
- Delta Simons, 2012. – ***"Phase I Environmental Assessment Report – Land to the South and West of Brayford Pool"***

4.5: Protecting Archaeological Sites

Whilst the Brayford Campus is in the centre of a historic city, for much of Lincoln's history until the railways arrived in the City the site was undeveloped. Therefore, the site does contain undisturbed prehistoric and Roman archaeological remains. Flint arrowheads have been found in several locations across the site, as have wooden structures associated with track-ways and flood defences.

Due to the historic nature of the area each project needs to take into account the archaeological heritage of the site. A number of investigation reports have been produced examining the site and it has been possible to establish a palaeo-environmental record of the site using pollen records.

For the Brayford Campus Masterplan project an archaeological overview report was produced by CgMs. This report should be used to inform any future archaeological work undertaken at the Brayford Campus.

It is highly likely that other sites in the centre of Lincoln will have archaeological features – i.e. Wigford Yard and the Science Park site. It would be appropriate to conduct archaeological desk studies and investigations on these sites.

In most cases an archaeological investigation will be a requirement of a planning application and a "watching brief" during ground works will be a planning condition. During the development stage of a project the Design Team should liaise with the Heritage Team at the City of Lincoln Council at the earliest opportunity.

Further Information:

- Mortimer,S. 2011 – "Archaeological Input Into Masterplan"
- Rackham,J. 2011 – "The Palaeotopography of the Lincoln University Campus, Brayford, Lincoln"

4.6: Ecological Survey

The following ecological issues should be considered:

- The project should meet the guidelines and ethos as set out in the University's Ecological Policy.
- Prior to the commencement of any project the relevant ecological surveys conducted at the University's sites should be consulted. This is to identify any special considerations that need to be made to protect habitats or species. At the Brayford Campus specific reference must be made to the Ecological Survey conducted for the Brayford Campus Masterplan.
- Where possible building projects should improve the wildlife value of an area – this could be achieved through more diverse planting, green roofs,
- It may also be appropriate to conduct a new ecological survey and assessment for the project – this will definitely be the case if the project is a BREEAM project.
- Careful note of any trees that have Tree Preservation Orders should be made. A significant proportion of the Brayford Campus is in a conservation area and as such any work on trees needs to be carefully planned and the local council will need to be given notice of any work.
- The appropriate Local Biodiversity Action Plan should be consulted before the design work begins on any landscaping project.
- Any soft landscaping scheme should look to incorporate some native species within the planting. It is not essential that all native species are used – but there should be some attempt to use native plants.
- Opportunities to create nesting spaces for birds as part of buildings should be considered. This could be through nest boxes that are an integral part of building structures.
- Landscaping projects should consider opportunities to create new habitats for invertebrates.
- Planting schemes should avoid the need for irrigation and should be entirely supplied through precipitation.
- There are a growing number of projects in the Higher Education sector where habitats and landscaping are used for student engagement. Examples include "the Edible Campus" where fruit bearing plants are used in landscaping. Opportunities to develop these ideas and link into existing biodiversity projects at the University should be considered.

Further Information:

- The Lincolnshire Biodiversity Action Plan can be downloaded from: www.glnp.org.uk
- University of Lincoln: Biodiversity Policy - http://environment.blogs.lincoln.ac.uk/files/2011/04/University-of-Lincoln-Biodiversity-Policy.pdf

4.7: Sustainable Transport

The following sustainable transport issues should be considered

- The University Travel Plan should be used as the base document for any transport related issues
- Car parking spaces are likely to be limited at future development sites, especially in Lincoln City Centre. Therefore the project may provide opportunities to promote alternative modes of transport to single occupancy cars.
- Ensure adequate cycle parking facilities are provided for the project site. Lincolnshire County Council has set a target of cycle parking spaces for 10% of building users.
- Consider opportunities for showers, changing rooms and lockers for those who cycle or walk to work
- Any locker provision should include a variety of sizes – with lockers suitable to hang work clothes.
- Landscaping schemes should set out clear and safe pedestrian routes for users of the site.

Further Information:

- The University Travel Plan can be downloaded from: http://learninglandscapes.blogs.lincoln.ac.uk/files/2013/05/Brayford-Campus-Travel-Plan.pdf

4.8: Noise

The following noise issues should be considered at the Design Stage of the project

- The building should meet the noise level requirements as set out in “Building Bulletin 93 – Acoustic Design of Schools”. Although this document was developed for the Department for Education in relation to schools, its findings and recommendations are relevant to the Higher Education sector.
- An acoustician should be appointed for all major construction projects - at least at the design stage. This role should also include pre-completion noise testing.
- Noise levels coming from the building should be considered. Any external plant rooms should be carefully sited to reduce noise impacts. This issue will become increasingly important as the Brayford Campus is developed and residential buildings could be in close proximity to academic buildings.

Further Information:

- The criteria for Building Bulletin 93 are discussed in the BREEAM 2011 Guidance and BB93 can be downloaded in full from the National Archive

4.9: Whole Life Costing / Life Cycle Assessment

Whole Life Costing analysis is about providing an economic appraisal of different solutions to a given problem, so that a better decision can be made.

Research from organisations such as Carbon Buzz has shown that project teams often significantly underestimate the in-use energy consumption of the buildings they are designing. In addition, there are problems when value engineering strips out energy saving systems at the later stages of projects.

Whole Life Costing is one way of ensuring that the full costs of a building are considered at an early stage within the project. There is an increasing amount of guidance on using both Whole Life Costing and Life Cycle Assessment approaches to projects. In general it will be more straight-forward to use just Whole Life Costing.

Life Cycle Assessment examines the environmental impacts of a product from cradle to grave. There are several methodologies already in place that assess the impact of building products. The use of both the BRE Green Guide to Specification and www.greenbooklive.com have been encouraged through-out this guide. These systems use the principles of Life Cycle Assessment to measure the environmental impact of products and services.

Recommendations:

- A Whole Life Cost model should be developed for major building projects during the design stage
- The Whole Life Costing model should be used to examine various options for the building project
- Life Cycle Assessment should be used by specifying products that are A+ or A rated in the Green Guide to Specification website.

Further Information:

- The BSRIA Guide – “Whole Life Costing Analysis” should be used as guidance

4.9: Waste Management - Construction

The following waste management issues should be considered prior to the construction stage:

- All appropriate waste legislation should be followed during the project – including keeping appropriate paperwork and dealing with licensed operators
- For major construction projects a waste compound should be set up to ensure that the Duty of Care obligations for waste materials are met. This includes the requirement to keep the waste secure
- The use of products and materials that generate hazardous waste should be minimised or completely excluded from the project. If hazardous waste is produced it should be stored in a separate compound.
- Although Site Waste Management Plans are no longer a legal requirement it may be appropriate to produce one for the project. This would include a target level of waste generated for the construction of the building.
- Waste minimisation should be at the core of the project.
- Prior to construction targets for the recycling and re-use of materials should be set and the levels achieved should be measured during the project.
- At least 80% of any demolition waste should be diverted away from disposal to landfill.

Further Information:

- The BREEAM 2011 Guidance has a section on waste management
- The Environment Agency website provides guidance on meeting the Duty of Care Regulations

4.10: Waste Management – In Use

The following issues regarding waste management while the building is in use should be considered during the Design Stage of the project:

- Adequate space should be provided for segregated waste collection within the building. Ideally there will be separate or segregated bins for mixed dry recyclables and general waste.
- An appropriately sized waste compound needs to be provided for bulk waste storage. The BREEAM guidance is for a space of at least $10m^2$ for buildings over 5,000 m^2. Additionally, buildings with catering provision should have an additional $2m^2$ of space for waste management storage.
- The waste compound should enable the University to meet the requirements of the Duty of Care regulations. This means that the waste should be stored securely.
- In general circumstances in offices under desk bins should not be used. This is especially the case in open plan office spaces. It should be enough to provide adequate recycling bins in each area.

Further Information:

- The BREEAM 2011 Guidance includes a specific section on waste.
- The Environment Agency website provides guidance on meeting the Duty of Care Regulations

5.0: Energy & Utilities Infrastructure

5.1: Overall Energy Performance

Every new building is required to have an Energy Performance Certificate (EPC). In order to meet the HEFCE 2020 carbon reduction targets for the University it is crucial that energy consumption is minimised in new buildings.

To reduce the in-use energy consumption of the building the EPC rating should be at the very least a "B" rating.

It is usually the case that the actual in usage energy consumption of buildings is higher than the EPC predicted level. An estimated EPC for the building should be produced early in the design stage and should be adapted as design changes and value engineering takes place during the project.

The energy benchmarks in kilowatt-hours per metre squared (kWh/m2) should be significantly above the good practice levels for the sector – as set out in the HEEPI "HE Building Energy Benchmarking Initiative 2003-4".

A low energy approach such as the Passivhaus Standard should be considered to reduce energy consumption.

Further Information:

- DCLG: "Energy Performance Certificates for the construction, sale and let of non-dwellings"
- HEEPI (2004): "HE Building Energy Benchmarking Initiative 2003-4"

5.2: External Lighting

The following issues regarding external lighting should be considered

External lighting is important, but it can be a significant energy user if it is not properly specified and controlled. Additionally, inadequate control of external lighting can give a poor impression of profligate energy use to students and visitors to the University.

- Floodlights – energy saving options such as LED, high pressure sodium or mercury discharge lighting should be considered.
- The BREEAM 2011 guidance has the following information on appropriate lighting levels - Pathways should have an efficacy of at least 50 lamp lumens and the lamp should have a colour rendering index which is either greater than or equal to 60. Car park areas should have an efficacy of at least 70 lamp lumens and the lamp should have a colour rendering index which is either greater than or equal to 60.
- All external lighting should be controlled through time switches/ daylight sensors.
- The various good practice guides from CIBSE on lighting should be followed.

Further Information:

- CIBSE Lighting Guide 6 has information for external lighting
- BS EN 12193:2007 - Light and lighting. Sports lighting
- BS EN 13201-2:2003 - Road lighting. Performance requirement

5.3: Internal Lighting

The following issues regarding internal lighting should be considered

Lighting is a vital energy use issue, which can account of one third of electricity consumption in some buildings.

- The first key principle is that natural daylight should be the primary source of lighting wherever possible.
- Secondly the preference should be for LED lighting. A full life cost assessment for lighting should be made prior to any decision on lighting types – this should include energy, maintenance, replacement etc.
- Example lighting levels for different areas are described in the "CIBSE Code for Lighting (2006)", "CIBSE Lighting Guide 7" and "Building Bulletin 90". These should be used as guidance. In some areas it will be appropriate to use task lighting, with lower levels of background lighting.
- The use of lighting controls such as timed, movement or light detecting shut-off devices should be installed for all occupied spaces. The Building Controls Industry Association produces a guide on controls – "Controls for End Users – A Guide for Good Design and Implementation". This guide should be consulted prior to any lighting control system being used.
- Lighting controls should be appropriately labelled to avoid confusion.

Further Information:

- CIBSE Code for Lighting 2006
- CIBSE Lighting Guide 7 has information for internal lighting
- Department for Education – Building Bulletin 90
- BCIA "Controls for End Users – A Guide for Good Design and Implementation"
- BS EN 12193:2007 - Light and lighting. Sports lighting
- BS EN 13201-2:2003 - Road lighting. Performance requirement
- Lighting – Carbon Trust – CTV 049

5.4: Water Management

The following issues regarding water management

- The building should be provided with a pulsed output water meter
- All WCs should be dual flush with a low flush volume
- There have been advances in recent years in the standard and performance of waterless urinal systems. These products should be reviewed to determine if they are appropriate for the building.
- Any water using urinals in the building should have flush presence detection sensors. The system should ideally fail off rather than fail on.
- Taps in washrooms should be percussion taps with a minimal flow time.
- The BREEAM 2011 Guidance contains a section on Water Consumption. The building should aim to score at least 3 BREEAM Credits under this calculation system.

Further Information:

- The BREEAM 2011 Guidance includes a specific section on water consumption

5.5: Renewable / Alternative Energy Sources

The following issues regarding energy sources should be considered

- For major construction projects an initial economic assessment should be undertaken of the opportunities to include renewable / alternative energy sources. This work should be undertaken at an early period during the design stage
- The economic assessment should include the benefits of the Feed in Tariff, Renewable Heat Incentive and other governmental support mechanisms for renewable energy.
- All renewable / alternative energy services should be installed to the relevant quality standards – i.e. of a sufficient standard to qualify for Government funding.
- Renewables within a construction project are an obvious target area for value engineering as the project progresses. However, renewables would be an on-going source of revenue for the University and would reduce building running costs and carbon emissions. Ring fenced budgets for renewables within projects should be considered to avoid the value engineering trap.

Further Information:

- Further details of Feed in Tariffs can be found at www.gov.uk/feed-in-tariffs/overview
- Details of the Renewable Heat Incentive can be found at www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies

5.6: Building Management Systems

Building Management Systems (BMS) are a key part of the environmental control strategy for modern buildings. A good BMS design and associated management can significantly reduce the energy consumption of a building. Conversely a poorly managed system can increase energy consumption.

- There is a separate Building Management System specification in this group of documents – this should be used as the main source for BMS design
- At the design stage of the project a review of how the BMS will link with the rest of the University BMS should be undertaken.
- The BMS for a new building should be compatible with the existing BMS installation at the University.
- The requirements of maintenance, estates services and the environment teams should be taken into account in the preparation of the BMS design
- From the viewpoint of the Environment Team it would be useful to have the facility to closely control time schedules for equipment and to have actual temperature readings for each room.
- The locations for outside air temperature locations should be carefully chosen to avoid overheating and unrepresentative temperature recordings.
- The BMS should be set with "dead bands", where heating and cooling / ventilation systems are not competing.
- The BMS should be designed on the principle of minimising energy usage within the building.

Further Information:

- Further information on the Building Management System is contained in a separate specification document

5.7: Metering

The University has invested a great deal of time and resources in developing its metering system for utilities at the Brayford Campus. The eSight software is used as a monitoring and targeting system. There are a series of pulsed output meters that cover most buildings at the site. The data from the loggers is fed back wirelessly to a data logger, which then sends the data by ftp to eSight.

The main meters for each utility at any new building should feed into the eSight system. The requirements for metering are:

- Pulsed output meters should be used for all metering within the building
- The metering should fit in with and be compatible with the eSight metering system and the wireless data loggers
- The Part L requirements on metering should obviously be met – however, there should be a clear plan behind the metering
- A metering plan should be developed at the design stage of the project
- Any special power loads that the Environmental & Sustainability Team might wish to meter should be identified – this could be power to specific systems
- Any power loads above 20 kilowatts should be separately metered and the data from the meter should be capable of being fed into the eSight software
- The installed metering should be part of the University's asset management system.
- CIBSE Guide TM39 should be used as guidance for the metering strategy

Further Information:

- CIBSE Guide TM39 - Building Energy Metering

6.0: Construction / Building Fabric / Fit Out

6.1: Building Materials and Construction Impacts

The following issues regarding building materials should be considered

- Wherever possible “A+” or “A” rated construction materials from the BRE Green Guide to Specification should be used.
- In order to score the BREEAM 2011 Mat02 credit at least 80% of the building materials must come from A+ or A rated sources - even if the project is not following BREEAM this should be used as a principle.
- All timber used in the project must comply with the UK Government’s Timber Procurement Policy. This means that wood-derived products must be from only independently verifiable legal and sustainable sources or FLEGT licensed timber or equivalent sources
- The main contractor should consider signing the relevant project up for the Considerate Contractors scheme
- The main contractor should monitor electricity and water consumption on a weekly basis during the construction project

Further Information:

- The details of the BREEAM requirements can found in sections Mat01, Mat02 and Mat03 of the BREEAM 2011 Guidance
- Details of the BRE Green Guide to Specification can be downloaded from www.greenbooklive.com

6.2: Ventilation Strategy & Air Conditioning

The following issues regarding ventilation should be considered

- It is not the intention of this guidance to dictate the type of ventilation strategy that is to be used. However, there should be a clear bias towards ventilation solutions that contribute towards a low energy building – such as natural ventilation or Passivhaus Standard. As there is not a set ventilation strategy it is not appropriate to set an air changes per hour level.
- The ventilation system should ideally be controlled by carbon dioxide sensor – this should ensure that the rooms are only ventilated when occupied and when required. The University already has too many spaces that are continuously ventilated and/or ventilated as though they are at maximum occupancy rates.
- The use of air conditioning should be severely limited and should only be used where there is not an alternative option. A cost analysis for the running and maintenance costs of the air conditioning should be produced
- Air conditioning should not be used to “bail out” poor design or a lack of thought at the design stage.
- Where it has to be installed air conditioning should be tightly controlled. The minimum cooling temperature should be set at 25°C.
- Where local controls are provided for air conditioning or ventilation they should be very simple – we do not want to see complex controls with hundreds of options
- Where air conditioning is used in offices and teaching spaces it should be controlled by occupancy sensors. This is to ensure that the systems are not left operating while the rooms are vacant.
- In ICT server rooms an assessment should be made of whether different specifications could eliminate the need for air conditioning. Many ICT systems can now operate at higher temperatures than has traditionally been the case. The full life cost of air conditioning over equipment that can operate at higher temperatures should be investigated.

Further Information:

- The CIBSE Guide AM10 has details of natural ventilation in non-domestic buildings
- The CIBSE Guide AM10 also has an excel based design guide tool

6.3: Hard Landscaping

The following issues regarding landscaping should be considered:

- Construction materials from the "Green Guide to Specification" should be considered – ideally A+ and A rated materials
- On the Brayford Campus the existing surface water drainage network needs to be considered in any hard landscaping proposal. Methods of reducing fast surface run off would be appropriate for the site. The Campus is in a hard landscaped urban area so areas with slower percolation rates would be appropriate.
- Surface and foul water drains should be clearly marked to allow easy identification
- Sustainable drainage (SUDS) is an option on the Brayford Campus and Lincoln Science & Innovation Park sites

Further Information:

- The Green Guide to Specification can be downloaded from: www.bre.co.uk/greenguide
- For SUDS CIRIA Guide C697 "The SUDS Manual" should be used for guidance.

7.0: Project Handover / First Months of Building Use

7.1: Handover materials – Operation and Maintenance Manuals

The following issues regarding handover materials should be considered:

- From an early stage of the scheme the Project Team should be planning for the handover of the building. It is appropriate to develop a handover plan at the design stage of the project.
- A clear set of requirements for handover information and O&M Manuals should be developed at the Design Stage of the project. This is likely to include colleagues from Maintenance, Estates Services, Project Management, Space Management and Environment and Sustainability.
- All handover materials and O&M manuals should be supplied in an electronic format
- Electronic versions of as built and as installed drawings should be supplied
- A building log-book should be developed in accordance with the requirements of the Building Regulations.

Further Information:

- CIBSE Guide TM31 – "A Guide to Building Logbooks"

7.2: Commissioning

The following issues regarding commissioning should be considered:

- Commissioning needs to be considered from the design stage of the project and a Commissioning Plan should be developed at an early stage of the project
- A specific person should be assigned to be the lead on commissioning during the project
- The following systems (if present in the project) should be commissioned - Air conditioning, mechanical ventilation, displacement ventilation, complex passive ventilation, Building Management Systems (BMS), renewable energy sources, microbiological safety cabinets and fume cupboards, cold storage enclosures and refrigeration plant
- Seasonal commissioning should be strongly considered. If it is not to be used clear and compelling reasons why not should be provided.
- Commissioning reports should be given in spread-sheet and scanned document format
- A clear guide to the various set points should be provided

Further Information:

- The various BSRIA Guides to commissioning should be consulted

7.3: Post Occupancy Evaluation

The following issues should be considered:

- Post Occupancy Evaluation (POE) of the project is crucial to provide a successful building and for lessons are to be learnt for future projects
- A simple POE survey should be planned during the design stage of the project. Ideally building users should be surveyed prior to moving into the building. Then a survey of users between six months to one year after the building has been opened should be conducted.
- The POE should include an energy survey, an occupant satisfaction survey and an audit of the building's engineering and architectural systems
- Building users should be encouraged to give extended feedback during the early stages of occupation – this will identify snags and allow commissioning issues to be tackled.
- If the building is using the Soft Landings Framework the Post Occupancy Evaluation will be a key part of the process.

Further Information:

- The Soft Landings Framework should be reviewed prior to drawing up the POE Survey.