University of Bristol

Sustainable Construction Strategy

Introduction

The University of Bristol has included sustainability criteria in its capital building programs for over ten years, delivering 20 new build and refurbishment projects to the BREEAM standard, reducing carbon emissions, increasing Biodiversity and raising wellbeing standards for occupants. Improved sustainability within the construction process contributes to many of the University's wider sustainability goals and is therefore a key strategy for the University.

Aim

The University has made a commitment to,

> 'Aim to become a net carbon neutral campus by 2030: net zero carbon emitted from our buildings. Carbon neutrality will be a challenge for a research-led university such as Bristol, but a suite of efficiency gains, renewable energy projects and strategic energy supply choices make this an ambitious but achievable goal. It also will stimulate challenging debates around alternative energy sources in the city and region'.

To this end significant building projects should contribute to the attainment of this aim. The following criteria set out how this would be delivered. In additional to this, the use of BREEAM will also support wider sustainability policy aims.

Sustainable Construction Objectives

1. All construction projects over £3million (build) are expected to achieve BREEAM Excellent certification* for both design and post construction certification and this is expected to be achieved in a cost effective manner.

2. All refurbishment projects between £750,000 and £3million build cost are expected to achieve BREEAM Refurbishment Excellent certification* and this is expected to be achieved in a cost effective manner.

3. Any project that has a Very Good BREEAM target set will aim to achieve as many criteria as possible, scoring at least 62%.

4. All projects over £3million build cost should provide a report on how an EPC A can be achieved in a cost effective manner. The University will decide if EPC A will be set as a target for the project from this report, if not an EPC B will be expected.

5. Between 2016 and 2026 two BREEAM 'Outstanding' projects will be achieved. This would be funded cost effectively or via additional capital funding.

6. PassivHaus principles will be used for all construction projects.

7. Project teams should design buildings with controls that enable unoccupied areas to be easily (and where possible automatically) switched off across all key energy using services.

8. Project teams should integrate waste and transport requirements from the University into building designs at an early stage and check at each stage of a project that these requirements are being met.

9. The University will produce by 2019 a briefing note on key sustainability objectives and targets in addition to the objectives noted above.

10. Design delivery will follow the Capital Projects Manual which sets how design teams will deliver sustainable designs.

*The University of Bristol reserves the right to change the above targets to reflect differing building project types and circumstances.

Project Manual Sustainability Brief

Stage 0 Strategic Definition

1. Any project over £750,000 build cost should appoint a BREEAM Assessor at Stage 0 (Strategic Definition). Either to BREEAM or BREEAM refurbishment, as set out in sustainable construction objectives above. This must be early enough to deliver all 'early' BREEAM credits, as set out in guidance document in appendix one below. The Project Officer with the assistance of the Project Manager to arrange this appointment in consultation with the Head of Sustainability.

2. Appointment of BREEAM Assessors should be from a tender (or tendered framework for BREEAM) and should not involve any design team consultancies working on the project in question.

3. The Capital and Sustainability teams will agree the scope of activities included within the design and construction in particular, energy, waste and transport issues at the start of the project (Stage 0 Strategic Definition or if appropriate at stage 1 Preparation and Brief). Project Officer (via Project Manager if appropriate) to arrange meeting.

4. During design stage 0 (Strategic Definition), an initial meeting should be held between the BREEAM Assessor and design team to set out BREEAM principles. The Project Manager is to coordinate.

5. During design stage 0 (Strategic Definition), an initial meeting should be held between the University sustainability team (Head of and 4 sustainability managers) and the design team. The BREEAM Assessor should also attend this meeting. The purpose of this meeting is to set out the sustainability goals for the project and note specific features that the sustainability team would like to see included in the design in addition to the University overall BREEAM targets. The Project Manager is to coordinate.

6. All credits within BREEAM should be targeted at the start of the project (stage 0 Strategic Definition) and only discounted with approval from the University Sustainability team and Capital teams' Project Officer. The Project Manager is mandated to ensure the design team delivers this approach.

7. The design team are to make the BREEAM Assessor aware of any BREEAM criteria that would conflict with design advice from other stakeholders (e.g. other Estates Office teams and the University GPR). The BREEAM assessor will include any of these items in their regular update to the Head of Sustainability and inform the Project Manager.

8. The End stage report should include some form of BREEAM tracker highlighting which credits are being targeted and which are not (including reasons why they are not) and that this report needs to be provided to the Head of Sustainability. Project Manager to action.

9. The End stage report should also include a section noting progress in meeting sustainability actions requested by the University's sustainability team. Project Manager to action.

10. Prior to the completion of design stage 0 (Strategic Definition), the design team will hold a meeting with the sustainability team to agree sustainability design sign off – this is not part of the end stage review meeting set up by the capital team. The Project Manager is to coordinate.

11. Any design comments required by the design team from the Sustainability team should be requested in a timely fashion, usually two week turn around.

12. Any documents used for discussions between the design team and the Sustainability team should be current and version controlled. It should be clear if versions vary from this, Sustainability are informed and made aware of the reasons.

13. The BREEAM assessor will regularly update the Head of Sustainability on progress with sustainability design during this stage of the project, highlighting any issues.

Stage 1 Preparation and Brief

1. At the start of design stage 1 (Preparation and Brief), a further meeting with the sustainability team and design team should be held, so the design team can update the Sustainability team on progress with sustainability and seek input from the team. The Project Manager is to coordinate.

2. The design team are to make the BREEAM Assessor aware of any BREEAM criteria that would conflict with design advice from other stakeholders (e.g. other Estates Office teams). The BREEAM assessor will include any of these items in their regular update to the Head of Sustainability and inform the Project Manager.

3. During design stage 1 (Preparation and Brief), the design team will set out a waste strategy for the Sustainability Manager for Waste to agree. This strategy should be worked up in consultation with the Sustainability Manager. This would address designing out waste, construction waste and design for operation after project completion. This will be the culmination of discussions as set out in stage 0 point 3. The Project Manager is to coordinate.

4. During design stage 1 (Preparation and Brief), the design team will set out a transport strategy for the Sustainability Manager for Transport to agree. This

strategy should be worked up in consultation with the Sustainability Manager. This will be the culmination of discussions as set out in stage 0 point 3. The Project Manager is to coordinate.

5. During design stage 1 (Preparation and Brief), the design team will set out an energy strategy for the Sustainability Managers for Energy and Analysis to agree. This strategy should be worked up in consultation with the Sustainability Manager. This will be the culmination of discussions as set out in stage 0 point 3. The Project Manager is to coordinate.

6. The End stage report should include some form of BREEAM tracker highlighting which credits are being targeted and which are not (including reasons why they are not) and that this report needs to be provided to the Head of Sustainability. Project Manager to action.

7. The End stage report should also include a section noting progress in meeting sustainability actions requested by the University's sustainability team. Project Manager to action.

8. Prior to the completion of design stage 1 (Preparation and Brief), the design team will hold a meeting with the sustainability team to agree sustainability design sign off – this is not part of the end stage review meeting set up by the capital team. The Project Manager is to coordinate.

9. Any design comments required by the design team from the Sustainability team should be requested in a timely fashion, usually two week turn around.

10. Any documents used for discussions between the design team and the Sustainability team should be current and version controlled. It should be clear if versions vary from this, Sustainability are informed and made aware of the reasons.

11. The BREEAM assessor will regularly update the Head of Sustainability on progress with sustainability design during this stage of the project, highlighting any issues.

Stage 2 Concept Design

1. At the start of design stage 2 (Concept Design), a further meeting with the sustainability team and design team should be held, so the design team can update the Sustainability team on progress with sustainability and seek input from the team. The Project Manager is to coordinate.

2. The design team are to make the BREEAM Assessor aware of any BREEAM criteria that would conflict with design advice from other stakeholders (e.g. other Estates

Office teams). The BREEAM assessor will include any of these items in their regular update to the Head of Sustainability and inform the Project Manager.

3. The End stage report should include some form of BREEAM tracker highlighting which credits are being targeted and which are not (including reasons why they are not) and that this report needs to be provided to the Head of Sustainability. Project Manager to action.

4. The End stage report should also include a section noting progress in meeting sustainability actions requested by the University's sustainability team. Project Manager to action.

5. Prior to the completion of design stage 2 (Concept Design) , the design team will hold a meeting with the sustainability team to agree sustainability design sign off – this is not part of the end stage review meeting set up by the capital team. The Project Manager is to coordinate.

6. Any design comments required by the design team from the Sustainability team should be requested in a timely fashion, usually two week turn around.

7. Any documents used for discussions between the design team and the Sustainability team should be current and version controlled. It should be clear if versions vary from this, Sustainability are informed and made aware of the reasons.

8. During development of tender documents, the BREEAM assessor should be consulted to help produce BREEAM compliant documentation. For certain documents the BREEAM consultant will produce clauses for inclusion within tender documents. The Project Manager is to coordinate.

9. Novation - The BREEAM assessor will be retained by the University via the Capital team and will not be novated at contract stage to the contractor.

10. The BREEAM assessor will regularly update the Head of Sustainability on progress with sustainability design during this stage of the project, highlighting any issues.

Stage 3 Developed Design

1. At the start of design stage 3 (Developed Design), a further meeting with the sustainability team and design team should be held, so the design team can update the Sustainability team on progress with sustainability and seek input from the team. The Project Manager is to coordinate.

2. The design team are to make the BREEAM Assessor aware of any BREEAM criteria that would conflict with design advice from other stakeholders (e.g. other Estates

Office teams). The BREEAM assessor will include any of these items in their regular update to the Head of Sustainability and inform the Project Manager.

3. The End stage report should include some form of BREEAM tracker highlighting which credits are being targeted and which are not (including reasons why they are not) and that this report needs to be provided to the Head of Sustainability. Project Manager to action.

4. The End stage report should also include a section noting progress in meeting sustainability actions requested by the University's sustainability team. Project Manager to action.

5. Prior to the completion of design stage 3 (Developed Design) , the design team will hold a meeting with the sustainability team to agree sustainability design sign off – this is not part of the end stage review meeting set up by the capital team. This should include reference to any Waste, Transport and Energy strategies agreed in earlier stages of design. The Project Manager is to coordinate.

6. Any design comments required by the design team from the Sustainability team should be requested in a timely fashion, usually two week turn around.

7. Any documents used for discussions between the design team and the Sustainability team should be current and version controlled. It should be clear if versions vary from this, Sustainability are informed and made aware of the reasons.

8. During development of tender documents, the BREEAM assessor should be consulted to help produce BREEAM compliant documentation. For certain documents the BREEAM consultant will produce clauses for inclusion within tender documents. The Project Manager is to coordinate.

9. The BREEAM assessor will regularly update the Head of Sustainability on progress with sustainability design during this stage of the project, highlighting any issues.

Stage 4 Technical Design

1. At the start of design stage 4 (Technical Design), a further meeting with the sustainability team and design team should be held, so the design team can update the Sustainability team on progress with sustainability and seek input from the team. The Project Manager is to coordinate.

2. The design team are to make the BREEAM Assessor aware of any BREEAM criteria that would conflict with design advice from other stakeholders (e.g. other Estates Office teams). The BREEAM assessor will include any of these items in their regular update to the Head of Sustainability and inform the Project Manager.

3. The End stage report should include some form of BREEAM tracker highlighting which credits are being targeted and which are not (including reasons why they are not) and that this report needs to be provided to the Head of Sustainability. Project Manager to action.

4. The End stage report should also include a section noting progress in meeting sustainability actions requested by the University's sustainability team. Project Manager to action.

5. Prior to the completion of design stage 4 (Technical Design) , the design team will hold a meeting with the sustainability team to agree sustainability design sign off – this is not part of the end stage review meeting set up by the capital team. The Project Manager is to coordinate.

6. Any design comments required by the design team from the Sustainability team should be requested in a timely fashion, usually two week turn around.

7. Any documents used for discussions between the design team and the Sustainability team should be current and version controlled. It should be clear if versions vary from this, Sustainability are informed and made aware of the reasons.

8. During development of tender documents, the BREEAM assessor should be consulted to help produce BREEAM compliant documentation. For certain documents the BREEAM consultant will produce clauses for inclusion within tender documents. The Project Manager is to coordinate.

9. Design consultants will provide all necessary information relating to BREEAM to the BREEAM assessor prior to project contract after tender. This will ensure the design stage BREEAM report can be produced. This is the responsibility of the members of the design team, but the Project Manager should assist.

10. The BREEAM assessor will regularly update the Head of Sustainability on progress with sustainability design during this stage of the project, highlighting any issues.

11. The BREEAM assessor will submit its Design Stage report to the Head of Sustainability two weeks before it is submitted to the BRE for sign off.

Value Engineering – not sure if this is a stage 3 or 4 activity – depends when substantive tenders relating to design are done?

1. Tender returns and any subsequent value engineering process should be reviewed by the BREEAM assessor who will report on any items that put at risk BREEAM credits or certification levels to the Head of Sustainability and the Project Manager.

2. Any value engineering items that affect BREEAM credits or certification must be signed off by the Head of Sustainability and Capital team Project Officer.

Stage 5 Construction

1. The BREEAM assessor will provide briefing session/s for the contractors post contract award regarding sustainability and BREEAM aims for the project.

2. The BREEAM Assessor will be informed by the Project Manager of any contract variations during construction stage as and when they arise. The BREEAM Assessor will review impacts on BREEAM scores and inform the Head of Sustainability and Project Officer of any detrimental impacts. The Head of Sustainability will review these contract variations with the Project Officer and agree any adaptations required.

3. During construction the BREEAM Assessor will carry out two mutually agreed spot checks to ensure BREEAM credits are being delivered to avoid any slippage in score.

4. The design team will update a BREEAM tracker on a monthly basis charting progress to the agreed BREEAM criteria noted in stage 4 design.

5. The BREEAM assessor will regularly update the Head of Sustainability on progress with sustainability design during this stage of the project, highlighting any issues.

6. Contractors and design team will ensure they have evidence recorded/saved to support the BREEAM process.

Stage 6 (Handover and Close Out)

1. Contractors and consultants will provide evidence of compliance with BREEAM in a timely fashion during the project, with all evidence provided within 1 month of practical completion of any project.

2. The BREEAM Assessor will compile a post-construction report and submit to the Head of Sustainability for sign off two weeks before it submits the report to the BRE.

3. The contractor will ensure a plan of all utility metering is available to the Sustainability Manager (Energy), noting location, meter references, the area the meter measures and any technical specifications regarding the meters.

Stage 7 (In Use)

1. The BREEAM assessor will undertake a Post-Occupancy review on BREEAM for projects after a year of practical completion. This will be run in conjunction with any University Post-Occupancy review.

BREEAM Assessor activities

1. Complete BREEAM design and post-construction assessments and submit to the Head of Sustainability for sign off.
2. Act as an advocate for the University within the design team meetings, pushing the design team to deliver sustainability within the projects.
3. Highlight any 'early delivery' BREEAM criteria during stage 0 to design team.
4. Run an initial BREEAM workshop with the design team outlining BREEAM principles and running through criteria.
5. Attend subsequent design team meetings to advice on BREEAM and sustainability.
6. Correspond where necessary with design team members during all design stages.
7. Report to the Head of Sustainability highlighting **any** credits that cannot be achieved and why, as and when they arise.
8. Keep an updated BREEAM tracker and share with the Head of Sustainability on a regular basis.
9. Attend design team meeting with sustainability team in stage 0. This meeting is to set out the Sustainability team requirements.
10. Produce a design stage progress report for the Head of Sustainability at each stage of the design – this can be the tracker noted above.
11. Review and report on value engineering (VE) to the Head of Sustainability, highlighting impacts of any VE items that affect BREEAM.
12. Run briefing sessions for the contractors at the start of the construction period outlining the main elements of BREEAM and what needs to be achieved.
13. Collate information/evidence to support BREEAM certification during the design and construction of the project.
14. Carry out two audits during the construction process to highlight potential areas where delivery of BREEAM criteria is not being achieved by contractors and advise the Head of sustainability as well as the contractor.
15. Provide a short one page document summarizing key sustainability features of the project and submit to the Head of Sustainability at the start of stage 6.
16. Provide a lessons learnt report (no more than 2 pages of A4) after stage 7.

Sustainability Team Responsibilities

1. Commit to review all documentation in a timely fashion for each stage of design – two weeks usually.
2. Do post occupancy measurement of key sustainability criteria, including energy.
3. Provide project specific guidance and help relating to Sustainability.

Project Manager

1. Responsibility for ensuring the BREEAM process is met.
2. Ensure the BREEAM Assessor is appointed at the correct stage.
3. Ensure the sustainability scope of the project is communicated with the design team.
4. Ensure relevant design and sustainability meetings are arranged and attendees invited.
5. Feedback any BREEAM criteria that are not being met to the Head of Sustainability.

6. Ensure all relevant evidence required by the BREEAM Assessor is provided in a timely fashion. Particularly at end stage 4 and the start of stage 6.

Appendix One – Early Stage BREEAM criteria.

The following BREEAM 2014 credits need early action within the noted RIBA stages during project design, if a high level of performance is to be achieved:

Stage 1

- Ene 07: Labs – Stage 1
- Tra 05: Travel Plan – Stage 1
- Mat 06: Material Efficiency – Stage 1
- LE 04: Enhancing Site Ecology – Stage 1
- An early energy model should also be developed to test design including glazing needed pre-planning – Stage 1

Stage 2

- Man 01: Project Brief & Design - Stage 2
- Man 02: Lifecycle Cost & Service Life Planning – Stage 2
- Hea 02: Indoor Air Quality Management – Stage 2
- Hea 04: Thermal Comfort – Stage 2
- Hea 06: Safety & Security – Stage 2
- Ene 04: Low Carbon Design – Stage 2
- Wst 05: Adaptation to Climate Change – Stage 2
- Wst 06: Functional Adaptability – Stage 2

Stage 3

- Hea 03: Safe Containment in Laboratories – Stage 3

Full details for each criteria are noted below;

STAGE 1

ENE 07: LABS

Client engagement is sought through consultation during the preparation of the initial project brief (**RIBA Stage 1 or equivalent**) to determine occupant requirements and define laboratory performance criteria. Performance criteria should include, but not be limited to the following aspects:

- Description of purpose
- Occupant/process activities

- Containment requirements and standards
- Air change rate requirements
- Ventilation system performance and efficiencies
- Heating and cooling requirements
- Interaction between systems
- Flexibility/adaptability of laboratory facilities.

The design team demonstrates that the energy demand of the laboratory facilities has been minimised as a result of achieving the defined design performance criteria. This has informed the right-sizing (see Relevant definitions) of the services system equipment (including ventilation supply and extract).

TRA 05: TRAVEL PLAN

A travel plan will need to be developed as part of the feasibility stage [i.e. RIBA Stage 1] that considers and confirm the following:

- A site specific travel assessment/statement has been undertaken to ensure the travel plan is structured to meet the needs of the particular site and covers the following [as a minimum]:
- Where relevant, existing travel patterns and opinions of existing building or site users towards cycling and walking so that constraints and opportunities can be identified.
- Travel patterns and transport impact of future building users.
- Current local environment for walkers and cyclists [accounting for visitors who may be accompanied by young children].
- Disabled access [accounting for varying levels of disability and visual impairment].
- Public transport links serving the site.
- Current facilities for cyclists.
- The travel plan includes a package of measures to encourage the use of sustainable modes of transport and movement of people and goods during the building's operation and use.
- The client and end users, must be involved in the development of the travel plan and they must confirm that the travel plan will be implemented post refurbishment or fit-out and be supported by the building's management in operation.

MAT 06: MATERIAL EFFICIENCY REVIEW

The project team needs to carry out a review as part of the feasibility stage [**i.e. RIBA Stage 1]** to identify the following, materials options in line with "WRAP" guidance (http://www.modular.org/marketing/documents/DesigningoutWaste.pdf):

- Design opportunities to reuse or recover materials already on site
- Design opportunities for off-site construction
- Design opportunities for Material Optimisation
- Design opportunities for Waste Efficiency Procurement
- Design opportunities for Deconstruction and Reuse

Examples of specific issues that could be reviewed include:

- Can existing elements be reused, preferably on-site?
- Can materials with a high recycled content be used?
- Consider the waste hierarchy for waste materials removed as part of the refurbishment
- Pipe work: use of materials with a high recycled content
- Ventilation systems and ductwork: consider changes to design to minimise the need for ventilation systems, position of air handling units closer to ventilated spaces to minimise length in ductwork, consider use of fabric ductwork to replace galvanised steel.
- Floor coverings: can existing floor coverings be reused on or off-site?
- Partitions and ceilings: can existing ceilings and partitions be reused? If not, consider adjusting sizes of partitions to minimise off cuts of material or removable partitions that can be reused

Note the above will also need to be carried out at the following stages of the development:

- Concept Design [RIBA Stage 2]
- Developed Design [RIBA Stage 3]
- Technical Design [RIBA Stage 4]
- Construction [RIBA Stage 5]

LE 04: ENHANCING SITE ECOLOGY

A suitably qualified ecologist has been appointed by the client or their project representative by the end of the Preparation and Brief stage [**RIBA Stage 1** or equivalent] to advise on enhancing the ecology of the site at an early stage.

STAGE 2

MAN 01: PROJECT BRIEF & DESIGN

Stakeholder Consultation [Project Delivery]

Prior to completion of the Concept Design [**RIBA Stage 2** or equivalent], the client, the building occupier, the design team and the principal contractor / project manager have met to identify and define their roles, responsibilities and contributions for each of the key phases of project delivery:

- Concept Design
- Developed Design
- Construction
- Commissioning and Handover
- In-Use occupation

In defining the roles and responsibilities for each key phase of the project, the following must be considered:

- End user requirements
- Aims of the design and design strategy
- Particular installation and construction requirements/limitations
- Occupiers budget and technical expertise in maintaining any proposed systems
- Maintainability and adaptability of the proposals
- Requirements for the production of project and end user documentation
- Requirements for commissioning, training and aftercare support.

The project team demonstrate how the project delivery stakeholder contributions and the outcomes of the consultation process have influenced or changed the Initial Project Brief, including if appropriate, the Project Execution Plan, Communication Strategy, and the Concept Design.

Stakeholder Consultation [Third Party]

Prior to completion of the **Concept Design** stage, all relevant third party stakeholders have been consulted by the design team and this covers the minimum consultation content.

The minimum consultation content of the consultation plan will be dependent on the building but would typically include the following:

- Functionality, build quality and impact (including aesthetics)
- Provision of appropriate internal and external facilities (for future building occupants and visitors/users)
- Management and operational implications
- Maintenance resources implications

- Impacts on the local community, e.g. local traffic/transport impact

- Opportunities for shared use of facilities and infrastructure with the community/appropriate stakeholders, if relevant/appropriate to building type.

- Compliance with statutory [national/local] consultation requirements.

- Inclusive and accessible design.

- How the building/grounds could best be designed to facilitate learning and provide a range of social spaces appropriate to the needs of pupils, students and other users.

- The end users broad requirements for technical areas [e.g. laboratories], including appropriate sizing, optimisation and integration of equipment and systems.

The project must demonstrate how the stakeholder contributions and outcomes of the consultation exercise have influenced or changed the Initial Project Brief and Concept Design.

Sustainability Champion (design)

A Sustainability Champion needs to be appointed to facilitate the setting and achievement of BREEAM performance targets for the project. The design stage Sustainability Champion needs to be appointed to perform this role during the feasibility stage (RIBA Stage 1).

The defined BREEAM performance target(s) has been formally agreed (see relevant definitions) between the client and design/project team no later than the Concept Design stage (RIBA Stage 2 or equivalent).

MAN 02: LIFECYCLE COST & SERVICE LIFE PLANNING

Elemental life cycle cost [LCC]

An elemental life cycle cost [LCC] analysis has been carried out, at Process Stage 2 [equivalent to Concept Design - **RIBA Stage 2**] together with any design option appraisals in line with 'Standardised method of life cycle costing for construction procurement' PD 156865:2008.

The LCC analysis shows:

- An outline LCC plan for the project based on the building's basic structure and envelope, appraising a range of options and based on multiple cash flow scenarios e.g. 20, 30, 50+ years;

- The fabric and servicing strategy for the project outlining services component and fit-out options [if applicable] over a 15-year period, in the form of an 'elemental LCC Plan'.

HEA 02: INDOOR AIR QUALITY PLAN

Indoor air quality plan

Prior to completion of the Concept Design [RIBA Stage 2 or equivalent] an indoor air quality [IAQ] plan needs to be completed and implemented, with the objective of facilitating a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during the design, construction and occupation of the building. The indoor air quality plan must consider the following:

- Removal of contaminant sources

- Dilution and control of contaminant sources

- Procedures for pre-occupancy flush out

- Protection of Heating Ventilation and Air Conditioning [HVAC] systems from sources of pollution during refurbishment/fit-out works e.g. dust

- Procedures for protecting the indoor air quality of areas outside of the refurbishment or fit-out zone that may be affected by the refurbishment/fit-out works

- Procedures for identifying and implementing third party testing and analysis required to ascertain that the contaminant sources have been removed effectively before occupancy

- Commitments for maintaining indoor air quality in-use, e.g. maintenance and cleaning of the HVAC system, ductwork and filters.

HEA 04: THERMAL COMFORT

Thermal modelling

Prior to completion of the Concept Design [RIBA Stage 2 or equivalent] a thermal modelling report needs to be carried out using software in accordance with CIBSE AM11 Building Energy and Environmental Modelling, and meets and includes confirmation of the following:

- The software used to carry out the simulation at the detailed design stage provides full dynamic thermal analysis.

- The modelling demonstrates that for air conditioned buildings, summer and winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design2, Table 1.5; or other appropriate industry standard.

- A competent person [e.g. chartered building services engineer] has undertaken the model and assessed the suitability of existing building services and controls to identify any changes that may be required as a result of fit-out works [e.g. as a result of changes to internal layout, occupant density, additional equipment that may increase cooling loads etc.]

For air conditioned buildings, the PMV [predicted mean vote] and PPD [predicted percentage of dissatisfied] indices based on the above modelling need to be confirmed within the report.

Adaptability

Prior to completion of the Concept Design [RIBA Stage 2 or equivalent], the thermal modelling will need to demonstrate that the relevant requirements set out in CIBSE Guide A Environmental design, Table 1.5; or other appropriate industry standard, are achieved for the projected climate change environment (i.e. 2030 for mechanically ventilated areas and 2050 for naturally ventilated spaces).

Where the thermal comfort criteria are not met for the projected climate change, the project team will need to demonstrate how the building has been adapted, or designed to be easily adapted in the future using passive design solutions in order to subsequently meet the above.

Thermal zoning and controls

The thermal modelling will need to demonstrate that the thermal comfort review has informed the temperature control strategy for the building and its users.

The strategy for proposed heating/cooling system[s] will need to specifically demonstrates that it has addressed the following:

- Zones within the building and how the building services could efficiently and appropriately heat or cool these areas. For example consider the different requirements for the central core of a building compared with the external perimeter adjacent to the windows.

- Where specified, any new local cooling or heating services [or changes to existing services] are designed to ensure they do not conflict with core services [e.g. conflicts between two separate cooling systems, conflicts between core heating and locally provided cooling systems].

The degree of occupant control required for these zones, based on discussions with the end user [or alternatively building type or use specific design guidance, case studies, feedback] considers:

- User knowledge of building services

- Occupancy type, patterns and room functions [and therefore appropriate level of control required]

- How the user is likely to operate or interact with the system[s], e.g. are they likely to open windows, access thermostatic radiator valves [TRV] on radiators, change air-conditioning settings etc.

- The user expectations [this may differ in the summer and winter] and degree of individual control [i.e. obtaining the balance between occupant preferences, for example some occupants like fresh air and others dislike drafts].

- How the proposed systems will interact with each other [where there is more than one system] and how this may affect the thermal comfort of the building occupants.

- The need or otherwise for an accessible building user actuated manual override for any automatic systems.

HEA 06: SAFETY & SECURITY

A suitably qualified security specialist conducts an evidence-based Security Needs Assessment during or prior to Concept Design [**RIBA Stage 2** or equivalent].

A suitably qualified security specialist develops a set of recommendations or solutions during or prior to Concept Design [**RIBA Stage 2** or equivalent]. These recommendations or solutions aim to ensure that the design of buildings, public and private car parks and public or amenity space are planned, designed and specified to address the issues identified in the preceding Security Needs Assessment.

ENE 04: LOW CARBON DESIGN

Passive design

The project team carries out an analysis of the proposed building design/development to influence decisions made during Concept Design stage [**RIBA Stage 2** or equivalent] and identify opportunities for the implementation of passive design solutions that reduce demands for energy consuming building services.

As a minimum, the passive design analysis should cover:

- Site location

- Site weather

- Microclimate

- Building layout

- Building orientation
- Building form
- Building fabric
- Thermal mass or other fabric thermal storage
- Building occupancy type
- Daylighting strategy
- Ventilation strategy
- Adaptation to climate change.

The building uses passive design measures to reduce the total heating, cooling, mechanical ventilation and lighting loads and energy consumption in line with the findings of the passive design analysis and the analysis demonstrates a meaningful reduction in the total energy demand as a result. As a guide, the installation should contribute at least 5% of overall building energy demand and/or CO_2 emissions.

Free cooling

The passive design analysis includes an analysis of free cooling and identifies opportunities for the implementation of free cooling solutions.

The building uses ANY of the following free cooling strategies to reduce the cooling energy demand, i.e. it does not use active cooling:

- Night time cooling (which could include the use of a high exposed thermal mass)
- Ground coupled air cooling
- Displacement ventilation (not linked to any active cooling system)
- Ground water cooling
- Surface water cooling
- Evaporative cooling, direct or indirect
- Desiccant dehumidification and evaporative cooling, using waste heat
- Absorption cooling, using waste heat
- The building does not require any significant form of active cooling or mechanical ventilation (i.e. naturally ventilated).

Low and zero carbon technologies

A feasibility study has been carried out by the completion of the Concept Design stage [**RIBA Stage 2** or equivalent] by an energy specialist to establish the most appropriate recognised local [on-site or near-site] low or zero carbon [LZC] energy source[s] for the building/development.

A local LZC technology/technologies has/have been specified for the building/development in line with the recommendations of this feasibility study and this method of supply results in a meaningful reduction in regulated carbon dioxide [CO2] emissions. As a guide, the installation should contribute at least 5% of overall building energy demand and/or CO2 emissions.

WST 05: ADAPTATION TO CLIMATE CHANGE

Adaptation to climate change – structural and fabric resilience
Conduct a climate change adaptation strategy appraisal for structural and fabric resilience by the end of Concept Design [**RIBA Stage 2** or equivalent], in accordance with the following approach:
Carry out a systematic [structural and fabric resilience specific] risk assessment to identify and evaluate the impact on the building over its projected life cycle from expected extreme weather conditions arising from climate change and, where feasible, mitigate against these impacts. The assessment should cover the following stages:

- Hazard identification
- Hazard assessment
- Risk estimation
- Risk evaluation
- Risk management.

WST 06: FUNCTIONAL ADAPTABILITY

A building-specific functional adaptation strategy study has been undertaken by the client and design team by Concept Design [**RIBA Stage 2** or equivalent], which includes recommendations for measures to be incorporated to facilitate future adaptation.
The functional adaptability study should consider:

- The potential for major refurbishment, including replacing the façade.
- Design aspects that facilitate the replacement of all major plant within the life of the building e.g. panels in floors/walls that can be removed without affecting the structure, providing lifting beams and hoists.
- The degree of adaptability of the internal environment to accommodate changes in working practices.
- The degree of adaptability of the internal physical space and external shell to accommodate change in-use.
- The extent of accessibility to local services, such as local power, data infrastructure etc.

STAGE 3

HEA 03: SAFE CONTAINMENT IN LABORATORIES

An objective risk assessment of the proposed laboratory facilities has been carried out prior to completion of the Developed Design [RIBA Stage 3 or equivalent] to ensure potential risks are considered in the design of the laboratory.

Where containment devices such as fume cupboards are specified their manufacture and installation meet best practice safety and performance requirements and objectives, demonstrated through compliance with the following standards:

- General purpose fume cupboards: BS EN 14175 Parts 1-7 [as appropriate]1

- Recirculatory filtration fume cupboards: BS 7989:2001

- Microbiological safety cabinets: BS EN 12469:2000 [for manufacture] and BS 5726:2005 [for installation].

- Clean air hoods, glove boxes, isolators and mini-environments: BS EN ISO 14644-7:2004

- Articulated extension arms: PD CEN/TR 16589

- Building Bulletin 88, Fume cupboards in schools.

- Where laboratory containment devices that are ducted to discharge externally are specified, the guidance in the National Annex of BS EN 14175-2 must be followed to ensure an appropriate discharge velocity is achieved.