University of Bristol
Temple Quarter Enterprise Campus
Sustainability Brief

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University of BRISTOL

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Executive Summary

Context

The University of Bristol is developing a new enterprise campus with a focus on fostering innovations in digital technology. The Temple Quarter Enterprise Campus (TQEC) will be a flagship development for the University, especially given its prime location adjacent to Bristol Temple Meads station. In the context of a city that is pioneering smart city initiatives, and on the back of being awarded the European Green Capital for 2015, there are high expectations that the TQEC will be an exemplar of sustainable development. There is an opportunity to create pared back enterprise buildings that are adaptable to future technology and provide a canvas for testing new approaches.

The campus will play an important part in catalysing regeneration of the Temple Quarter area. There is an aspiration for the campus to be inclusive and to engage with local communities through the creation of educational and employment opportunities, a programme of events and provision of spaces that will bring people together.

Vision and Objectives

The University of Bristol's vision for the campus is to take a restorative approach to development, making a significant contribution to the environment, economy and community over the long term.

Recognising that sustainability themes are complex and interrelated, the vision is underpinned by a series of objectives which describe more fully the expectations of the University. These are framed across 5 principal themes as illustrated. The brief identifies performance targets across the sustainability themes with examples of how they might be achieved in practice.

These include commitments to be a Carbon Neutral and Car Free Campus. Objectives also include the creation of significant areas of green space, with a focus on ecological enhancement and improvements to the river and harbour edges. The brief includes performance targets on the reduction of embodied carbon and requirements to embed a Circular Economy approach through design, construction and operation. There is a strong focus on building community wellbeing, both through the environmental design of the campus, but also in the creation of enterprise and employment opportunities for specific community groups.

Delivering in practice

Whilst the performance targets are stretching, they can be delivered in practice. Reference projects and examples are included within the brief to illustrate how they could be achieved. Delivering the vision will require a systemic approach and the development of simple solutions that achieve multiple sustainability objectives.

The brief includes a delivery process with responsibilities through each of the RIBA stages including a commitment to implement a Soft Landings approach. Whilst a robust process ensures that sustainability objectives are being met as the project progress, establishing the right culture for innovation is equally important in fostering creative approaches.

There is an expectation that the delivery team will work in a collaborative way with different parts of the university, key stakeholders and community groups, and with the design team and contractors. The Campus sits within the wider Temple Quarter Enterprise Zone and it will be important to work across red line boundaries to ensure that development is knitted into the wider area. Working with community groups will be especially important to resolve challenges around accessibility to the site and create the right opportunities within the TQEC.

Design and delivery of solutions will be supported by an evidence base and whole life appraisal of options. It will be important to ensure that unintended consequences are avoided and solutions are tested for their sensitivity to design assumptions. There is an opportunity to engage with the University and stakeholders in the city to bring forward innovation throughout the development process.

Scope of this Brief

This document sets out the sustainability vision and objectives for the University of Bristol Temple Quarter Enterprise Campus. It is a brief to all those who will be involved in the delivery of the campus including the University of Bristol and their delivery partners.

The structure of the brief is as follows:

- Section 1 describes the Development Context and Vision and includes descriptions of precedent projects
- Section 2 sets out Objectives and Targets for each of the sustainability themes. This includes a description of the development context, expectations of the design and delivery team and illustrative examples of possible approaches.
- Section 3 sets out Delivery Process and Key Responsibilities across the delivery team

This document has been prepared by Useful Projects on behalf of the University of Bristol.

VISION

A restorative campus built on the principles of the Circular Economy

RESOURCES	ENVIRONMENT	COMMUNITY	CONNECTIVITY	BUILDING LONG TERM VALUE
Energy and Carbon	Ecological Enhancement	Health and Wellbeing	Sustainable Travel	Designed for the Future
Materials and Waste	Climate Change Adaptation	Accessible Living Estate	Digital Infrastructure	Lifecycle Value
Water		Local Economy		Living Lab
				Building Performance

TQEC Sustainability Framework

1. Context and Vision

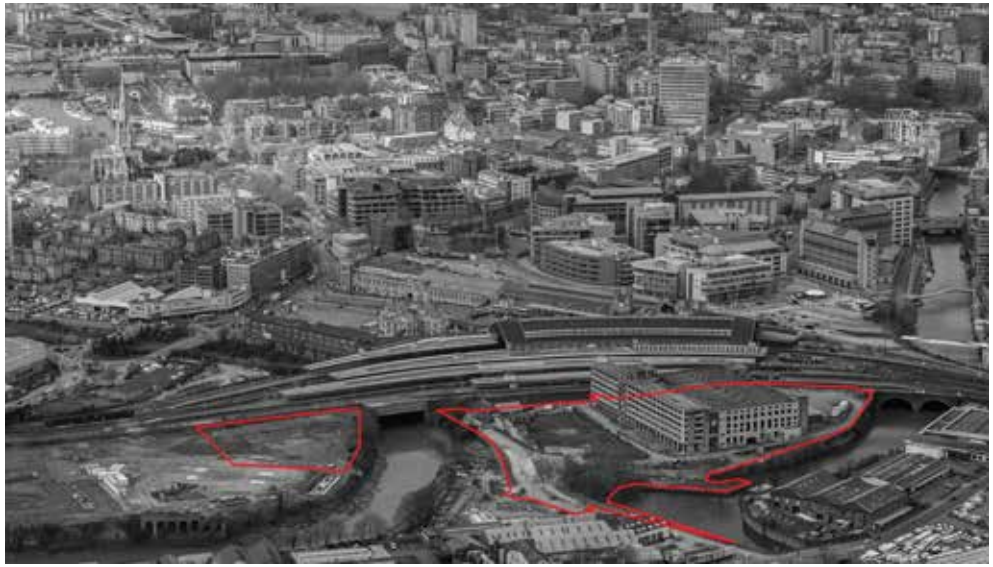
1.1 Development Context

The University is developing a new enterprise campus with a focus on fostering innovations in digital technology. The site comprises two city centre sites adjacent to Bristol Temple Meads Station. The campus will include a mix of University and student accommodation along with some commercial and supporting space over 80,000m^2 GIA.

The location of the development is at the edge of the city centre and has the potential to shape the future character of the area as part of a wider enterprise zone. The campus will need to be designed in a way that is future proofed and can respond to the changing needs of the area.

The site has a number of constraints. It is located within Flood Zone 3. It is also bounded by the River Avon, the Floating Harbour and existing rail infrastructure. These are great features of the site, but also means it is currently a difficult place to access.

Outline proposals for the site and key constraints are explored in the Masterplan and Site Appraisal prepared by Feilden Clegg Bradley Studios.



Existing site

Outline masterplan

1.2 Development Vision

“The University of Bristol Temple Quarter Enterprise Campus (TQEC) is an opportunity to deliver an exemplar sustainable development. In the context of a city that is pioneering smart city initiatives, and on the back of being European Green Capital, there are high expectations that the TQEC demonstrates what technology can deliver to support sustainable development. Creating a platform to test digital technologies will be a core feature of the campus and a Living Lab approach.

Our vision for the campus is to take a restorative approach, making a positive contribution to the environment, economy and community over the long term. This will build on the University of Bristol’s long-standing commitment to achieving exemplary sustainability performance in capital projects.

The campus is about innovation, enterprise and engagement in the work that we do. The design of the buildings will need to foster collaborative working, attract private and social enterprise partnerships, and build links with the surrounding communities. A vibrant urban realm, a programme of activities and events, and a range of employment opportunities will bring different communities into the campus.

The campus will also provide affordable accommodation for students, designed to support healthy and sustainable lifestyles.

We have set some stretching and yet achievable performance targets for the campus. These include a commitment to deliver a carbon neutral and car free campus. Our aspiration is that the campus will also feel very green, enhancing the local ecology, reduce the risk of flooding, create a comfortable microclimate and contributing to a sense of wellbeing.

Most of all, we want to create a development that is well used, built to last and creates long term value for the area.”

The TQEC Programme Board

1.3 TQEC Sustainability Framework

Sustainability Themes

We recognise that sustainability themes are complex and intrinsically interrelated. Delivering the vision will require a systemic approach and solutions that achieve multiple sustainability outcomes. We have framed the sustainability objectives within a framework of 5 principal themes:

- Resources and the Circular Economy
- Environment
- Community
- Connectivity
- Building Long Term Value

For the themes, Section 2 sets out:

- Context
- Specific objectives and performance targets
- Strategies to be investigated by the delivery team
- Illustration of the approach that could be taken

The objectives under each theme are:

Set within the city context – based on an understanding of the needs and aims of the wider area and to maximise the positive contribution of the TQEC to Bristol.

Holistic – taking account of all aspects of sustainability: environmental, social and economic.

Outcome focused –rather than prescribing specific design solutions, the framework enables the design and delivery team to identify the best way of achieving results.

Inherently interlinked – requiring a collaborative and multidisciplinary approach to identifying solutions.

Future focused – designed to foster innovative approaches.

TQEC Sustainability Framework

Cross Cutting Opportunities

Recognising the interlinked nature of sustainable development, we have identified the following cross cutting opportunities for the TQEC to:

- Make a significant contribution to the reduction of the university's carbon footprint.
- Focus on ecological enhancement and improvements to the river and harbour edges to create wild areas, creating a comfortable microclimate, reducing flood risk and contributing to a sense of wellbeing and place identity.
- Create a highly utilised development where the spaces foster collaboration, inspire innovation, and build opportunities for employment and for local businesses – both through enterprise activities and commercial spaces within the buildings.
- Create pared back enterprise buildings that are adaptable to future technology and provide a canvas for testing new approaches.
- Embed the principles of the Circular Economy through design construction and into the operation, including opportunities for circular business models.
- Adopt a co-design approach, drawing on expertise within the university to inform the design of the new campus through engagement with the local community.
- Provide a car free development that promotes active and alternative modes of travel, and creates an inclusive and accessible campus.
- Adopt a Soft Landings approach to achieve exemplary building performance and a highly productive working environment.
- Act as a catalyst for the regeneration of deprived areas to the east of the city centre.

Accreditation Requirements

Accreditation can provide a tool to promote sustainable development. It is most effective when used to promote discussion around the best way to achieve sustainable development outcomes, rather than as a tick box approach.

The following sets out accreditation requirements for TQEC:

- All new academic buildings should seek to achieve BREEAM Outstanding, and should achieve BREEAM Excellent as a minimum.
- All new buildings should seek to achieve Passivhaus Standards.
- Performance levels against these standards have been set for specific objectives within this standard.
- Reference has also been made to other standards such as the WELL Building Standard and Transit Orientated Development principles where relevant.
- An appraisal has also been undertaken against BREEAM communities. This concluded that a score of 73% is achievable (Excellent Rating). The pre-assessment also identified potential extra credits which would enable the scheme to achieve a score of 84%.

The Delivery Process

It is very easy to set a vision for sustainable development, but much more difficult to deliver in practice. Specific reasons for why certain aspects are not achieved vary according to project and are especially dependent on project culture. Common reasons to be aware of include:

- Design team briefs are not aligned to sustainable development objectives.
- Key stakeholders have not been engaged in the process.
- Organisational culture does not support a commitment towards sustainable development.
- Delivery partners do not share values for sustainability.
- Late design changes or substitution of alternative products undermine the achievement of objectives.
- Systems and processes that support a sustainable approach are considered too costly and are value engineered out of the scheme.
- Sustainability objectives and rationale for design are not clearly communicated to the operational team, nor resourced adequately.

Section 3 sets out our approach to delivering the sustainability objectives for TQEC. It identifies the responsibilities of the team and key actions to be undertaken at each of the RIBA stages.

Whilst the process is important, creating a culture of collaboration, partnership working and support for innovation will be critical to achieving the objectives. There is an opportunity to engage with the expertise within the university and wider city to develop creative approaches. Developing the evidence base and appraising whole life value of options will be key to the decision making process.

1.4 Precedent Buildings

Higher education institutions are taking a lead in creating healthy and sustainable buildings, to attract and retain the best talent in an increasingly competitive economy.

We have identified several reference projects which illustrate aspects of the vision for the Temple Quarter Enterprise Campus.

© Handel Architects LLP

The House, Cornell Tech – PassivHaus

Cornell Tech's new student accommodation is the first high-rise residential building in the world built to Passivhaus standards. It has a high performance facade integrated with highly efficient indoor environmental systems.

© Yazdani Studio

Lassonde Studios, University of Utah – Innovative student accommodation

A new type of student accommodation designed to promote a culture of innovation and entrepreneurship modelled on Facebook and Google: lively, flexible spaces designed to enable students to live, create and launch companies in one place.

© Wood Awards

The Centre for Sustainable Chemistry, Nottingham University – net energy positive

This laboratory building at Nottingham University is net energy positive. It generates more energy than it consumes and enough to pay back the embodied carbon used in its construction over 25 years.

© Marcel van der Burg

Alliander Head Office, Netherlands – Circular Economy

This circular economy office re-utilised over 80% of the raw materials from the original structures on the site. Future reuse has been enabled through the design approach and use of digital material passports.

© Nicholas Hare Architects

UCL New Student Centre – high quality, sustainable design

UCL's flagship Student Centre provides a mix of learning spaces varying in character and size. The design is responsive to change with flexible, lightly serviced spaces and integrated technology.

© O'Donnell + Tuomey

LSE Saw Swee Hock Student Centre

This building achieved exemplary sustainability performance, inlcuding BREEAM Outstanding, with a score of 86.45%. It also utilises innovative technologies and incorporates LED screens displaying dynamic building performance information.

© Feilden Clegg Bradley Studios

Ulster University Campus development, Belfast

The Warwick Building on the Belfast Campus is an exemplar low carbon building and includes CHP linked to an absorption chiller, a 26 kW PV Array on the roof, natural cooling, and solar shading.

© Feilden Clegg Bradley Studios

Oxford University Kellogg College Social Hub - Passivhaus

This is the first Passivhaus standard building to be constructed at the university. The building features super-thick insulation, triple glazing and an optimised south façade. Summertime overheating is controlled by solar shading, natural ventilation coupled with thermal mass, and night purge.

© Feilden Clegg Bradley Studios

Manchester Metropolitan University Business School

This building exceeded the university's target for renewables, and improved on the energy use targets. It features a ground source heat pump, 1,000m^2 PV array and chilled water pipe-work which is cast into pre-cast concrete floor slabs.

© Ronald Tilleman

The Edge, Amsterdam - smart building

This radical new office is a smart building exemplar. Ceilings are embedded with 28,000 sensors, office items connect to the internet, and employees use phone apps for information & control.

© Jeroen Musch

Erasmus University Rotterdam

Over the long run, Erasmus University is aiming at becoming an energy-neutral campus. Its intermediate targets are 30% energy efficiency in 2020 compared to 2005 (2% reduction per year) and 50% CO_2 reduction by 2025 compared to 1990.

2. Objectives and Targets

For each sustainability theme we set out:

- Context, including policy where relevant
- Objectives
- Performance targets; and
- An illustration of how targets might be delivered

2.1 Resources and the Circular Economy

- Carbon and Energy
- Materials and Waste
- Low Water Footprint

Resources and the Circular Economy

Context

The University has a commitment to deliver a Zero Carbon Campus by 2030. This means the new development will have to work much harder to provide a net reduction to the overall footprint, especially in the context of growth. Bristol City Council also has demanding requirements in terms of carbon and energy performance, with a requirement for new developments to produce 20% of regulated demand from renewable sources.

At the same time, energy markets are changing rapidly with decarbonisation of the grid, falling costs of technology and promotion of decentralised networks becoming a key part of the Governments Industrial Strategy. There is an opportunity to connect into the city's District Energy Network. Uncertainty about the energy future will be a key consideration for the design of the campus.

The University also needs to tackle the embodied impacts of new development and operation. The Circular Economy offers a platform for taking an integrated approach to resource management and maximising the value of materials over their lifecycle. Durable and low impact materials will be used and assets will be designed for ease of maintenance, upgrade and change of use. Any waste generated will be transformed into a valuable resource.

Key material challenges that will need to be addressed on site include imports of fill to create the podium and demolition of existing buildings.

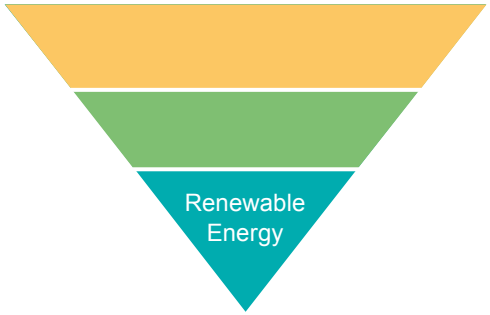
Like many cities, Bristol also faces increasing demand on water resources. Bristol Water predicts that population and housing growth result will increase he demand for water by 15% by 2045, creating a long term deficit. Potential shortfalls in supply in dry years are predicted from 2020.

Design approaches should focus first and foremost on designing out demand, in accordance with the waste and energy hierarchy.

Engagement with the supply chain will be critical to achieving these objectives.

Objectives

- Deliver a **Carbon Neutral Campus** for all operational emissions.
- Achieve a very **low water footprint.**
- Achieve a low **embodied carbon footprint.**
- Use **durable and sustainable materials** with low lifecycle impacts, following circular economy principles.
- Create a **zero waste environment** during construction, optimising the value of materials throughout.
- Create zero waste environment during operation and promote circular economy business opportunities across the campus.



Energy and hierarchy

Waste hierarchy

Performance Targets

Carbon and Energy

- On-site generation or agreed off-site generation is greater than operational emissions (regulated, unregulated including fleet transport)
- DEC A ready - Target Display Energy Certificate A rating from the outset of design Passivhaus Standard for all buildings
- All internal and external lighting (fittings and bulbs) meet or exceed the Energy Technology List (ETL) criteria for high efficiency lighting units

Materials and Waste

- Reduce embodied carbon by 30% from industry average standard practice (as defined by RICS and without compromising durability or whole of life carbon)
- 90% materials with a responsible sourcing certification and 100% FSC/PEFC timber
- Achieve ≤ 1.6 m^3 or ≤ 1.9 tonnes waste/100m^2 during design and construction
- Zero waste to landfill during demolition and construction with 10% reuse, 70% recycling and 20% other (incineration, anaerobic digestion etc..)
- Zero virgin fill material imported to site
- Zero waste to landfill in operation
- Waste management practices in accordance with UoB Circular Economy Policy
- Over ordering no more than 2% during construction

Water

- Water Consumption less than 0.38m^3/year/m^2 NIA in academic buildings and less than 80l/person/day in accommodation buildings.
- Reduce demand for irrigation and meet 70% of irrigation demand through rainwater harvesting.

Resources and the Circular Economy

Design and delivery teams to:

Focus on energy and water demand reduction:

- Develop the masterplan to ensure solar gains and daylight are seasonally optimised
- Passive solutions including high thermal performance of building fabric, increased air tightness, use of thermal mass and shading
- Passivhaus standard for all buildings
- Strategies for natural ventilation and free cooling prioritised
- High efficiency building services with high heat recovery, low fan powers, lower heating and higher cooling temperatures
- Maximise opportunities for heat recovery from cooling systems, server rooms, foul drainage
- A district energy network future proofed and adaptable to different energy sources, be it water/air/ground source heat pumps, connection to BCC network or other technologies
- Use TM54 to evaluate energy consumption at the design stage and test sensitivity to change
- Explore synergies for adjacent sites including the arena and station, for example combined energy networks or heat transfer
- Super insulation of pipes to minimise heat losses
- Voltage optimization and power factor correction
- Water efficient fittings and provision of drinking water fountains
- Smart metering and active management, Internet of Things approach
- Strategies to reduce energy and water use during construction

Investigate opportunities to supply energy and water from renewable sources:

- Photovoltaics including opportunities for integrated PV. Integrated solutions must be considered within the context of the circular economy and life expectancy of façades, roofs and PV cells.
- Battery storage to level out supply from renewables, potentially also integrated with electric fleet vehicles
- Rainwater harvesting for irrigation

Take a lifecycle approach to material and product specification:

- Lean design, using just enough material for principal structures
- Use of exposed finished to design out materials and reduce maintenance requirements
- Durable materials that will stand the test of time for landscaping, façades and primary structure
- Obtaining lifecycle environmental data at design stage to inform decision making (e.g. LCA, EPD, Cradle to Cradle certificate or carbon footprint)
- Locking in carbon by specifying timber and other rapidly renewable materials
- Using recycled materials in construction like recycled paper for insulation or recycled plastic for curb stones
- Reuse of materials such as piled foundations using waste oil/gas pipes
- Designing out the need for finishes by using exposed surfaces

- Adopting design out waste principles
- Designing shorter life components to be easily repurposed or reconfigured such as fit-out and M&E
- Modular and offsite construction, taking a kit of parts approach
- Consolidated logistics to reduce transportation related emissions (see also Community and Connectivity sections)
- Smart delivery through BIM (at least Level 2) and materials passports
- Engage with the end of life supply chain

Create opportunities in operation:

- Procuring products with high recycled content
- Procurement approaches that minimise the potential for waste (aspiring to zero waste), including take back schemes
- Segregated waste collection to facilitate recycling and reuse (paper, card, cans & plastics, glass, food, landfill) with clear signage and sufficient space
- Circular Economy businesses that can create value from waste streams

Camden's Agar Grove estate is to become the UK's largest residential Passivhaus scheme

High thermal mass, exposed concrete finishes at EPA headquarters, ZGF Architects, Denver

Resources and the Circular Economy

© Acuity

Smart metering and building data visualisation by ACME Dashboard

© MGF

Passive solar design at Aalen University

© Philips Lighting

Philips ‘pay per lux’ high efficient lighting system at NUS building in London. The service model incentivises re-use of materials and design for long life

© Polysolar

Solar PV glazing system at Future Business Centre building, Cambridge. The U-value of the integrated panels is similar to that of a high performing façade

© Acuity

Intelligent demand control ventilation uses high quality sensors to accurately measure air quality to inform building ventilation controls and optimise ventilation effectiveness

© Ben Luxmoore

Modular volumetric construction for temporary housing at Ladywell, Lewisham. A rapid build solution that reduces waste generation. Also, units can be dismantled and re-used at another location.

Resources and the Circular Economy

© Shell

Biofuels from waste coffee grounds, Bio-Bean is the type of Circular Economy business that could be stimulated by development

The online resource is intended to help the construction industry start its journey towards the circular economy by offering a series of practical tips for clients, designers, contractors and manufacturers.

© Janie Airey

Low embodied carbon cross laminated timber structural members, WWF headquarters

© AESOP

ICE Manifesto for Ethical Sourcing, Action Programme for Responsible Sourcing (APRES), based at Loughborough University

© GreenSpec

Hemclad wall panels at Marks & Spencer, Cheshire Oaks. A natural material embedded in modular panels which reduces operational energy and sequesters carbon

© Walmart

BigBelly solar waste bin compacts waste and is connected to the IoT which alerts management when bins are nearly full, to optimise collections and measure recycling performance

2.2 A Restorative Approach to the Environment

- Ecological Enhancement
- Climate Change Adaptation

A Restorative Approach to the Environment

Context

The redevelopment of an under used brownfield site provides an opportunity to significantly enhance biodiversity and create a healthy urban ecology, as part of UoB's 'My Wild University' initiative.

Whilst the current site has low ecological value, the campus borders Sites of Nature Conservation Interest. Particular features include interfaces with the wet woodland area of the Totterdown Basin, the Floating Harbour and the mudflats of the River Avon. Approaches to create an ecologically rich landscape should focus on the waterway boundaries, working with Bristol City Council to do so.

Successful integration of green spaces into the urban development will have wider benefits as part of a green infrastructure strategy. Green spaces, especially mature trees are highly valued in development and create a comfortable microclimate, particularly within the context of predicted future temperature rise. The planting strategy can also create a strong visual impact and contribute to the identity of place.

The site is on the edge of Bristol's Air Quality Management Area and areas near to the site are known to breach national standards for particulate and nitrogen dioxide levels. A restorative approach also includes strategies for improving air quality.

Parts of the site are located in Flood Zones 2 and 3, and therefore have a high probability of flooding. The site is particularly susceptible to flooding from storm surges that funnel through the Bristol Channel.

The development will also need to plan for the likely impacts of climate change and ensure that critical systems are resilient.

There are opportunities to take an integrated approach to flood mitigation and ecological enhancement through expressed drainage features and habitat creation at the river edge, as part of a green infrastructure approach. However, sustainable drainage systems need to be responsive to the local catchment, designed for free discharge and attenuation only, to accommodate high tide scenarios.

Objectives

- Maximise opportunities for **habitat creation** as an exemplar of restorative approach with a net positive contribution to **ecology and biodiversity.**
- Reduce vulnerability to climate change through **flood risk reduction** and the creation of a **comfortable microclimate.**

Performance Targets

Ecological enhancement

- Greenspace accounts for 50% of total developable plan area, to include green roofs, canopy etc.
- An increase of six local plant species in accordance with the Bristol Biodiversity Action Plan
- Development to be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (as defined in the GLA London Plan)

Climate change adaptation

- No increase in off-site flood risk
- Summer temperatures 2°C cooler compared with city centre sites (to be measured at night on a typical summer day)
- Critical infrastructure serving the site is resilient to extreme events
- Planting strategy resilient to climate change

A Restorative Approach to the Environment

Design and delivery teams to:

Ecological enhancement

- Create layers of biodiversity throughout the development to establish a local urban ecosystem including:
  - Extensive green roofs
  - Urban arboretum and planting mature trees of the future
  - Use of climbing plants
  - Bird and bat boxes integrated within the development
  - Habitats for insects
  - Productive planting such as fruit and nut trees
  - Urban hedgerows to support bird species
  - Green walls, recognising that they create more of a visual statement than ecological benefit. Consideration should be given to their required maintenance, nutrient and water demand requirements
  - Linking to University initiatives such as 'My Wild University', the urban pollinators project, and other community programmes, e.g Edible Bristol.

- Work with BCC to enhance and protect boundary habitats including:
  - Creation and enhancement of sheltered areas along the water edges for otters and water voles as per the Bristol Biodiversity Action Plan
  - Conservation and enhancement of the wet woodland at Totterdown Basin
  - Enhancement and protection of foraging sites at the boundaries of the development
  - Create habitats for microorganisms and subspecies along the river edge and conserve the habitats within the mudflat areas
  - Intelligent street lighting to avoid light pollution, particularly to waterside areas
- Promote green spaces as part of place identity, creating a strong visual impact with microclimate, health and wellbeing objectives in mind

Mitigate pollution impacts

- Plant street trees adjacent to main roads to improve local air quality
- Promote fossil fuel free mobility (refer also to Connectivity objectives)
- Assess air quality impacts of CHP systems and consider use of ultra-low NO_x CHP technologies and/or NO_x reduction techniques
- Utilis best practice management during construction to minimise noise, dust and associated impacts (refer also to Community objectives)
- Plan orientation of buildings to prevent pollution canyons
- Ensure specifications for building systems have low greenhouse gas emissions such as low global warming potential refrigerants

Climate change adaptation

- Adopt a drought resistant and resilient planting strategy
- Design sustainable drainage systems to take account of climate change but also responsive to local catchment
- Protect buildings and primary access routes from inundation from flood waters
- Create space for water in extreme events and appropriate attenuation
- Planting to provide seasonal shading
- Orientate buildings and layout of green spaces to optimize microclimate
- Provide flood warning systems
- Best practice approach to reducing the urban heat island effect
- Measure environmental conditions using Bristol's IOT network, in particular around reducing the urban heat island.

Establish riverside habitat with wetland and riverside planting, Bristol Harbourside floating gardens

A Restorative Approach to the environment

© Bristol City Council

Enhance wetland wildlife and habitats in accordance with Bristol Biodiversity Action Plan

© Muf Architects

An urban arboretum, Barking Central

© Fruit Routes

Barefoot Orchard and Fruit Routes projects at Loughborough University aim to develop an edible campus

© World Wildlife Fund

Extensive green roofs at WWF headquarters Washington

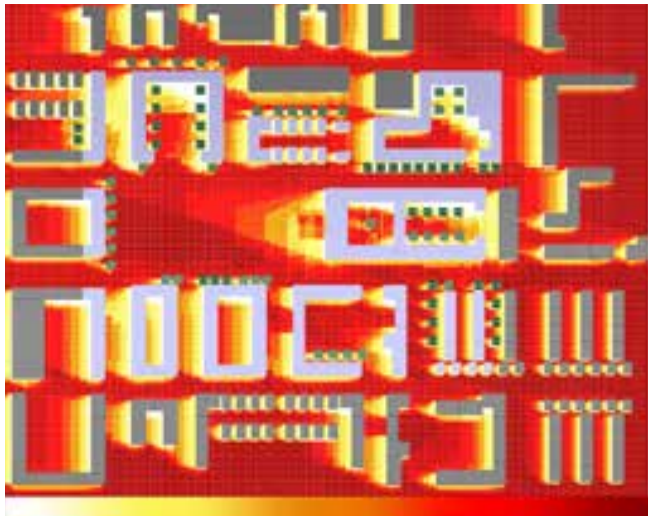
© eMoov

Barking Town Square, providing seasonal shading

© GREEN&BLUE

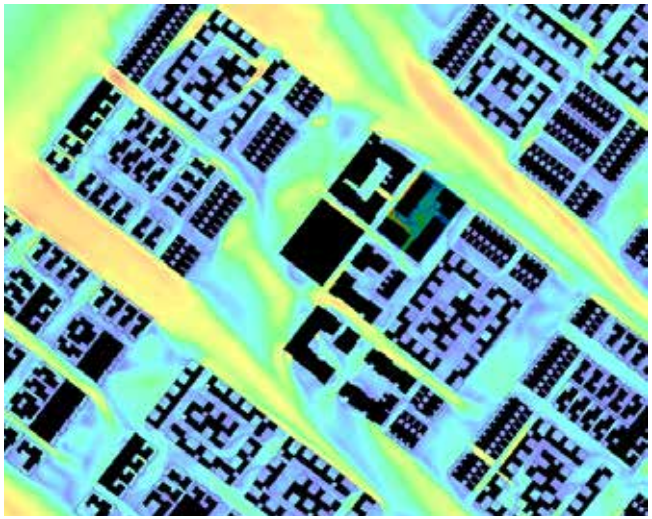
Bee bricks are an example of providing habitats for insects

A Restorative Approach to the Environment



© MIT

Outdoor thermal comfort modelling



© LEAP CFD

CFD modelling to mitigate pollution build-up and improve microclimate conditions

© bere:architects

Rooftop wildflower meadow with beehives

© SvR Design

Stormwater planters and seating, Seattle

© City of Seattle

Growing canopies to improve microclimate, Occidental Square Seattle

© Salix

London Olympic Park wetland bowl reduced risk of flooding for 1000 homes upstream and demonstrates an integrated approach to flood risk management, habitat creation and amenity value

2.3 Strong and Healthy Community

- Health and Wellbeing
- Accessible Living Estate
- Supporting the Local Economy
- Managing Construction Impacts

Strong and Healthy Community

Context

Bristol has a vibrant local economy and in recent years has developed a reputation as a home for tech start ups. TQEC will lead development of the digital economy in Bristol. As part of the winder Enterprise Zone, the campus will act as a catalyst to draw in businesses, creating wider economic benefits. There is an expectation that the co-location of the university and businesses will create 17,000 jobs in the next 25 years. The location of the new campus will provide a link between the city centre and residential areas.

At the same time, several areas surrounding the development site are some of the most deprived in the country, with impacts on education, health and social inclusion. It will be important to create clear pathways into higher skilled jobs and enterprise opportunities for the local community.

This can be achieved by creating a campus which provides a range of activities, educational opportunities and events to draw people in from a diverse range of communities. It is important that the campus feels open and inclusive to all.

To foster creativity and innovation, the development must ensure a comfortable environment. There is an opportunity to provide a range of active and contemplative spaces across the campus to support community health and wellbeing. The design will especially need to consider noise impacts of the adjacent railway and poor air quality issues in Bristol.

Demolition and construction can be a real nuisance to local communities. Measures to reduce disruption and health impacts will need to be put in place. Specific challenges including dealing with demolition arisings and imports of fills to minimise vehicle movements.

We will also seek to provide benefits to the local community during construction, for example providing employment and apprenticeship opportunities, and donating skills and surplus materials to community projects.

Achieving these objectives will require a comprehensive community engagement programme and will benefit from a co-design approach. This will need to include staff, students, local businesses and residents and recognize that these communities are likely willing to change as the area develops.

Objectives

- Support a **Diverse Local Economy** and make a positive social impact during construction and over the lifetime of the development.
- Create an **Accessible Living Estate** which is permeable with engaging public spaces.
- Foster **Health and Wellbeing** of staff, students and visitors to the campus.
- Be a **Good Neighbour throughout Construction.**

Performance Targets

Local Economy

- Employment and business opportunities created, including for disadvantaged and minority groups
- Community enterprise opportunities
- Positive impact on quality of life (QoL) of local residents
- Make a measurable positive impact on the skills and employability of target communities against a 2017 baseline

Accessible Living Estate

- Exemplary on BCC Place Print Tool (see BTQEZ Making People-friendly Streets and Spaces - A Public Realm Guide)
- Number of visitors to the site
- Participation in cultural and social events

Health and Wellbeing

- WELL Standard Silver or equivalent
- Follow Sport England Ten Principles of Active Design
- Average 300-500 lux for 2000 hours per year or more (in offices and teaching spaces)
- Summer and winter comfort temperatures to be adaptive to climate and CIBSE Guide A
- Overheating limited to CIBSE TM52 criteria
- CO_2 levels below 800ppm, minimum ventilations rate of 12l/s/p and total volatile organic compounds (TVOC) below 500µg/m^3
- Acoustic levels in offices and teaching spaces to be below a maximum noise rating of 35 and meet standards in Building Bulletin 93
- Achieve external noise levels set out in BS8233
- Outdoor sunlight criteria as set out in BRE209 guidelines

A good neighbour through construction

- Considerate Constructors Scheme – score 7 or more points in each of the five sections
- 100% of apprenticeships leading to full time employment
- Zero complaints during construction

Strong and Healthy Community

Design and delivery teams to:

Local Economy

- Work with local schools to develop clear routes into opportunities within the campus
- Alongside big enterprise, establish start up and social enterprise partnerships specific to the local community, including minority/disadvantaged groups, around digital technology
- Develop learning opportunities to build local skills for specific community groups
- Build in outreach projects, for example, a digital 'maker space' that is open to all
- Build partnerships with local community groups targeting skills development and identifying needs of specific groups such as long-term unemployed, ex-offenders, veterans, or people with disabilities.
- Promote a '24h' economy, ensuring high utilisation of spaces, through term time and holidays

Accessible Living Estate

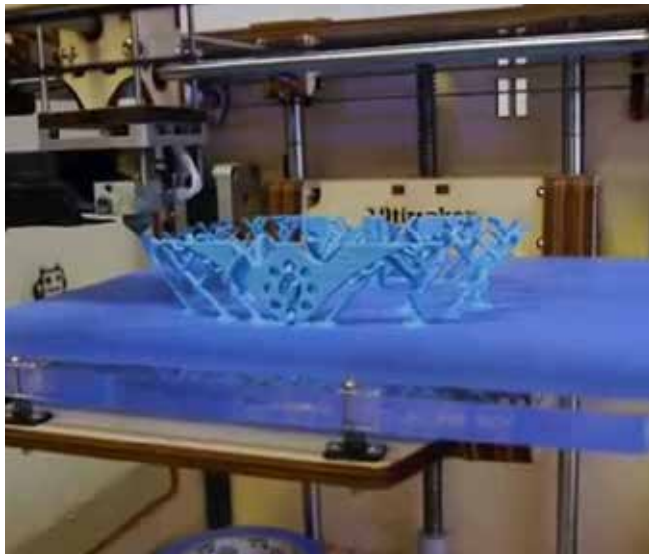
- Develop a programme of events that bring people into the campus from pop up markets and food stalls to outdoor cinemas and live music
- Create an open and playful public realm
- Provide clear sign posting and connections into and across the site
- Create a welcoming place identity in accordance with BCC spatial framework
- Install Place Makers in place of security guards, to welcome and direct visitors to the site
- Provide community facilities within the campus for example an orchard or growing areas, shops, creche, cafes, pharmacy or wellness centres
- Develop a TQEC 'Whats On' app
- Develop a public art programme
- Create buildings which are transparent, so that activities and events can be seen
- Develop outreach programme, to include educational events and TQEC site tours, linked to programmes of work

Health and Wellbeing

- Achieving high levels of internal comfort and access to daylight through optimisation of internal layouts
- Orientate buildings to prevent pollution canyons and minimising overshadowing, especially of public realm
- Ensure pollutant and noise sources are away from naturally ventilated areas
- Specify pollutant free materials and design out finishes
- Provide a mix of active and contemplative spaces in the development, internally and externally
- Soundscape approach to noise management
- Ensure lagging on pipes to avoid overheating
- Plan greenspaces to promote sense of wellbeing (refer to Environment objectives)
- Consider health aspects of living in taller buildings

A Good Neighbour throughout Construction

- Identify and mitigate environmental and social impacts from construction
- Provide construction-related jobs and apprenticeships
- Conduct site tours for local community representatives
- Appoint a Community Engagement Coordinator and provide regular updates to the community
- Ensure safe walking and cycling routes around the development during construction and promoting the use of cycle friendly construction vehicles
- Donate skills and surplus materials to community projects
- Implement consolidated and reverse logistics/take back schemes to reduce waste and transport impacts (refer to Resources objectives)



Rapid prototyping facilities at Fab Lab, London

Strong and Healthy Community

© Bristol Harbourside Market

Bristol harbourside pop-up market

© Thomas Matthews

London Olympic Legacy public roadshow included an interactive game for communities to try their hand at master planning the Olympic Park

© Commonplace

Digital tools to help engage harder to reach communities and generate a more comprehensive response to development proposals

© Studio Tilt

Collaborative design process, Studio Tilt

© John Sturrock

Granary Square, King's Cross – public realm which attracts all age groups

© King's Cross Central

Promoting health and wellbeing through community activities and programs

Strong and Healthy Community

© London & Partners

Multi-use outdoor amphitheater space for live entertainment and community events, The Scoop, MORE London

The Big Rig is an experiential learning platform aimed at building construction skills and sign posting career pathways

© Ash Sakula

Peckham co-design charette for the redevelopment of Peckham Rye Station

© Anderson Acoustics

Noise is beneficial in the landscape. Taking a layered approach to introduce good noise (bird song, play, fountains) can mask impacts of mechanical sounds (roads, railways)

© King's Cross Central

Creating a programme of public art in the landscape

© King's Cross Central

King's Cross estate management 'red caps' prioritise customer service over a security first approach.

2.4 Connectivity

- Sustainable Travel
- Digital Infrastructure

Connectivity

Context

New mobility technologies are predicted to have a $1 trillion impact on the global economy by 2025, according to a recent report by McKinsey. Electric vehicles, mobility as a service, smart logistics, on demand travel options and autonomous vehicles offer ways of reducing travel movements with wider environmental and economic benefits.

New standards are also emerging to promote the design of healthy neighbourhoods through the integration of active travel solutions. The NHS recommends at least 150 minutes of moderate activity every week, the equivalent of a 1.5km daily commute.

The most recent survey shows that, for the majority of the University of Bristol staff and students, walking and cycling are the preferred modes of travel. However, whilst the site is located in close proximity to Bristol Meads Station, the distance from current student residential locations mean that shared mobility services will be required to achieve a car free development.

Whilst the city centre is only 20 minutes by foot, access to the site is challenging given rail, road and water infrastructure. Consideration should also be given to increasing permeability and access to surrounding neighbourhoods, particularly as they change over time.

There is a need to work with Bristol City Council to enhance the pedestrian and cycling access to the new development as part of a wider network of living streets. The masterplan identifies the potential to create new pedestrian connections through to Bristol Temple Meads Station and across the Floating Harbour.

Mobility needs are also influenced by local availability of services. Providing facilities on site, or near by, can shift travel patterns. Particularly as the surrounding enterprise zone takes shape, there is an opportunity to work with BCC to create a new hub of services.

Whilst student travel patterns favour public transport, staff travel has higher rates of car use. A key challenge will be how to make shared mobility services more convenient and ensure that there are no knock on impacts to local communities of promoting a car free development.

Vehicle movements associated with construction impacts and service delivery would benefit from a consolidation approach to reduce impacts to the community and environment.

Digital infrastructure creates an opportunity to connect in a variety of alternative ways, from online conferencing to sharing data and information, enabled by 5G networks and high speed fibre optics. Bristol already leads the way in digital infrastructure through the Bristol is Open programme and the TQEC should be a demonstrator project in this context.

Objectives

- A **car-free** development that promotes **active travel** solutions as the primary mode of access.
- **Fossil fuel free** servicing and logistics.
- Exceed the university's **sustainable travel targets**, consistent with a city centre campus.
- Create a platform for an **Internet of Things approach**, facilitating alternative ways of connecting and sharing information.
- Integrate with **Bristol is Open digital network**.

Performance Targets

Sustainable Travel

- Proportion of access to the campus by car is zero (with the exception of blue badge provision)
- Electric vehicles for all deliveries and site servicing
- Consolidated logistics in construction and operation
- At least 1 secure cycle parking space per 8 staff/ students

Digital Infrastructure

- Compliance with the Smart City Standard and Bristol is Open requirements

Connectivity

Design and delivery teams to:

Sustainable Travel

- Prioritise walkable streets and pedestrian access
- Explore opportunities to create strategic access points across the River Avon and through to Temple Meads Station
- Work with BCC to provide safe cycling and walking routes to the station, city centre, student precinct and local community hubs
- Explore ways to promote the mental and physical health benefits of active travel amongst staff and students
- Install whole journey navigation and signage (virtual and physical)
- Provide on-site shower facilities, bike storage and bike repair services
- Explore on demand electric shuttle to the city and to key local community hubs
- Provide bike hire and sharing opportunities
- Use consolidated logistics and servicing to reduce vehicle movements (see also Resources and Community sections)
- Provide electric vehicle charging points for service vehicles and blue badge holders
- Develop on demand multi-modal travel apps
- Carry out staff and student engagement to create a no car culture; this could include free credits for sharing travel platforms
- Undertake engagement with local communities to ensure the transport strategy brings community benefits
- Follow principles of Transit Orientated Development Standard

Accessible services

- Engage with staff, students, local communities and BCC on the provision of key services both within and local to the site
- Provide click and collect services
- Refer also to Community objectives

Digital Infrastructure

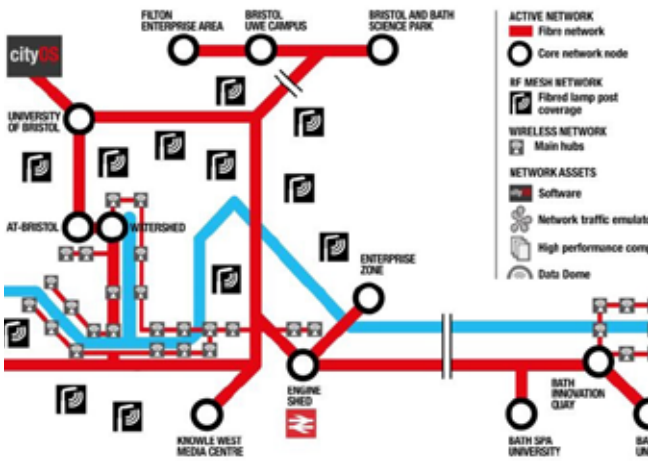
- Develop a reliable wireless 5G network
- Comply with the Smart City Standard and Bristol is Open requirements
- Provide multiple, scalable, redundant fibre network connections
- Provide infrastructure to support the university's ambitions around 'new ways of working' (agile)

Clear signage facilitates navigation and is part of creating an inclusive campus. The Richmond Building, UoB

Electric vehicle charging points for service vehicles and blue badge holders

Consolidated logistics and electric vehicle servicing can help cut pollution, reduce vehicle movements and facilitate packaging 'take back' schemes, Regent's Street

Connectivity

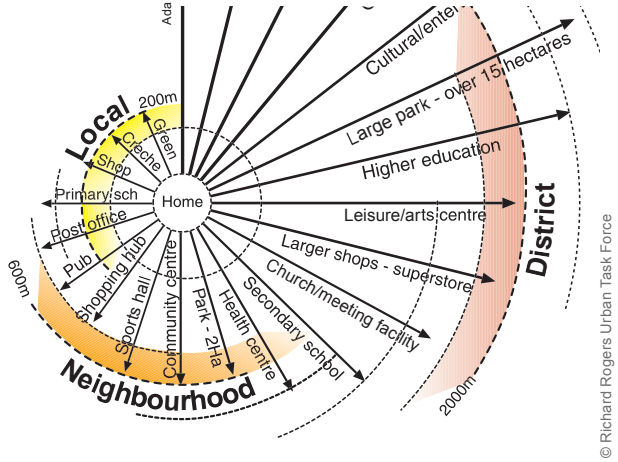


© Bristol is Open

'Bristol is Open' ultra-high speed fibre network and connectivity nodes


© Southwark Council

TfL's Quietways create a network of cycle routes which provide safe, accessible routes for cyclists



© Richard Rogers Urban Task Force

Considering accessibility rather than mobility. Providing on site or near by services can reduce needs to travel


© RAFFA

Bicycle storage and sharing system concept for design competition, Copenhagen

Shared space at Exhibition Road, Kensington

Seasonally shaded walkable streets, prioritising pedestrian access, Clerkenwell

Connectivity

© EPoS

Click and collect services, Waitrose

© Google

High definition video conferencing services

© City24/7

Smart screens in New York replace old telephone booths and provide the public with information about news, local events, travel, entertainment and safety.

© Tuup

On demand multi-modal travel service, Helsinki

© Bristol is Open

Smart cities and Internet of Things, Bristol is Open

© Moda Living

Moda Living collaborated with Uber to reduce car ownership by offering residents a monthly Uber credit in exchange for not having a parking space

2.5 Building Long Term Value

- Operational Performance
- Design for Whole Life
- Lifecycle Value
- Living Lab

Building Long Term Value

Context

The TQEC will become home to businesses and research invested in developing digital technology. Smart City innovations are likely to be a core focus for TQEC. Creating an environment comprising of both physical and virtual platforms for testing innovation, could be a key feature of the new campus. Digital infrastructure provides a platform for an Internet of Things approach to operating the development. This might include tracking recycling collection and optimising space use, to responsive conditioning of internal space and communicating with staff and students.

Spaces within the enterprise buildings will need to grow and adapt to changing business and technology needs. The re-design of buildings and spaces should minimise the cost and use of natural resources associated with adapting them. A stripped-back approach to expose the structure and improve access to services is encouraged as part of an agenda to reduce maintenance and enable easy reconfiguration of services.

At each stage of project development, solutions should be explored which prioritise long-term value as well as meeting the initial budget. Project teams must consider not just the financial performance of the design, but the wider value of sustainable buildings, including environmental and social aspects of development. An important, early consideration to reduce costs and resource use is to size assets appropriately to ensure their high utilisation now and in the future as the university grows. This is a key sustainability goal and core tenet of the sharing economy.

The design and management of buildings should seek to increase productivity and reduce operating costs for organisations occupying them. Quality internal environments should ensure the comfort and wellbeing of those working and living in TQEC buildings. Another priority should be to address the 'performance gap' and ensure buildings perform as well as predicted. Adopting a Soft Landings process is a core requirement. Ensuring quality of construction will be iportant to achieving building performance objectives.

Objectives

Operational Perfromance

- Increase **productivity and wellbeing** of occupants.
- Achieve **high space utilisation.**
- Close the **building performance gap.**
- Integrate BIM construction model with building operation to enable **BIM-driven facilities management and post occupancy evaluation**

Design for whole life

- Specify materials and technologies which are **robust, durable and easy to maintain.**
- Design buildings that have 'layers' so they can be easily reconfigured or repurposed at the end of life, in accordance with **Circular Economy principles.**
- Design buildings that are **resilient** to climate change, demographic change, more stringent legislation and less certainty about the availability and price of resources.

Lifecycle descision support and appraisal

- Minimise operational cost including resource, maintenance and replacement costs over the life of the development and use **life cycle appraisal** to inform decision making.
- Consider **whole of life value** rather than just financial outcomes when building the business case for development options.

Smart campus/Living Lab

- An examplar of an **Internet of Things Approach**

Performance Targets

Operation performance

- In use energy, water and waste costs
- Maintenance and refurbishment costs
- Exceed best practice benchmarks for occupant satisfaction with internal environment
- Space utilisation rate for enterprise buildings to be 50% and frequency of teaching space to be in excess of 70%
- Energy consumption no more than 10% greater than predicted design (in accordance with TM54)

Design for whole life

- Residual Values (Resale or Salvage Values or Disposal Costs)
- Award winning development

Lifecycle decision support and appraisal

- Whole life value appraisal used in decision making

Smart campus / Living Lab

- New IP generated on campus

Building Long Term Value

Design and delivery teams to:

Operation performance

- Adopt Soft Landings process throughout design, delivery and operation
- Commit to undertaking a full Post Occupancy Evaluation 1 year after occupation
- Ensure policies and systems in place for commissioning, hand-over, maintenance and post occupancy evaluation
- Engage with FM teams and end users at each stage of the project process
- Use smart technology to actively manage space and resources
- Explore options for sub-letting unoccupied space to other organisations on a short-term basis
- Create a highly visual Building User Guide supported by TQEC app
- Undertake condition monitoring of key assets
- Ensure quality of construction to support building performance aims

Design for whole life

- Design and specify adaptable spaces and furniture
- Use plug-and-play servicing to facilitate technology upgrades
- Priortitise distributed servicing to facilitate reconfiguration of internal spaces
- Design demountable facades
- Explore options for self-cleaning windows
- Explore options to use self-healing materials
- Ensure enduring design
- Undertake peer design review

Lifecycle decision support and appraisal

- Undertake Life Cycle Costing to appraise value of key design choices
- Explore approaches to quantify social value of the development, eg. Social Value accounting, New Economy
- Use metrics such as Net Savings (or Net Benefits), Savings-to-Investment Ratio (or Savings Benefit-to-Cost Ratio), Internal Rate of Return, and Payback Period to inform design and delivery decisions

Smart campus / Living Lab

- Through engagement with academic staff and the University's Operations Team, develop a strategy for embedding sensors into the campus and buildings, and subsequent data collection.
- Embed project within Bristol is Open and as part of the IoT mesh
- Create a sensored landscape to measure air quality, temperature and happiness
- Develop intelligent street lighting
- Explore open access servicing to re-plug buildings
- Engage with University of Bristol research teams on Living Lab programmes

Hello Lamp Post, a program initiated in Bristol which brings the city's infrastructure to life as part of a playable city

Polak building at Erasmus University Rotterdam is a flexible and enduring design which provides multi-use spaces combining all aspects of university life

Building user guides helps occupants understand features and functionality of their building

Building Long Term Value

© Changing Environments

Soofa “smart” furniture with PV powered charging, integrated sensors and wifi connectivity

© Useful Projects

Designing building layers so they are optimised for their lifecycle and retain their value

© Pinpoint Thermography

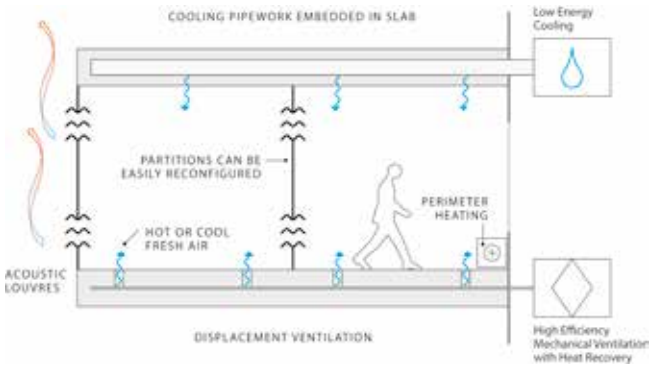
Thermographic surveys can be used to check quality of construction and identify defects such as areas of missing insulation

© Allies and Morrison

Faculty of English building at Cambridge applied a Gibbsian approach to size seminar rooms to best fit the uncertainty of future activities

© Philips Lighting

The Edge in Amsterdam uses an IoT approach to manage space utilisation user interaction with building systems.



© Useful Projects

Distributed building services at UCL New Student Centre allows internal spaces to be easily reconfigured.

3. Delivery Process

- Overview of delivery approach
- Key actions at each RIBA Stage
- Key responsibilities

3.1 Delivering in Practice

To support the delivery of our sustainability vision for TQEC, we have identified key actions that need to be undertaken by the design and delivery team at each RIBA Stage.

The concept design stage will be particularly important for exploring opportunities for innovation. The design and delivery team must allocate time within Stage 2 to carry out research, engage with key stakeholders and community representatives, and to engage with the supply chain.

The design and delivery team should report progress against sustainability goals through RIBA Stage Reports, highlighting results of feasibility studies and lifecycle appraisal of options. These will be required for Stage Gate Approvals by the Programme Board.

Monitoring and reporting should continue throughout construction, commissioning and into operation.

It will be especially important for design principles and sustainability objectives to be embedded in the procurement process.

Soft Landings has been highlighted as a key approach to ensuring sustainability objectives are secured throughout the construction and commissioning programme.

The key actions against RIBA Stages are illustrated in section 3.2, with detailed actions set out in the Appendix. Section 3.3 sets out the roles and responsibilities of the design and delivery team. Section 3.4 highlights key risks that will need to be managed throughout the design and delivery process. It will be important to assign responsibility for specific objectives across the design and delivery team.

While process and clear assignment of responsibility is important, it is equally important to establish a culture of collaboration and draw on expertise within the university to help develop creative approaches.

3.2 Sustainable Delivery Process - Key Actions

	RIBA STAGES							
	0: Strategic Definition	1: Preparation and Brief	2: Concept Design	3: Developed Design	4: Technical Design	5: Construction	6: Handover	7: In Use
UoB Gateways / Process	Stage Report to the project board	Stage Report to the project board	Stage Report to the project board	Stage Report to the project board	Stage Report to the project board	Stage Report to the project board	Stage Report to the project board	Stage Report to the project board
Key Actions	**Develop TQEC Sustainability Brief and agree with the Programme Board. Embed sustainability into the Design Team Procurement Process.**	**Share Sustainability Brief with the design and delivery team and ensure consultant scopes are aligned. Identify and scope any additional feasibility studies. Establish process and budget for innovation. Assign responsibility for delivery of objectives.**	**Research opportunities to meet the Sustainability Brief, undertake stakeholder engagement and engage with the supply chain. Test design concepts against Sustainability Objectives and finalise Performance Targets.**	**Continue to test and appraise approaches through design development. Use feedback from stakeholder engagement to inform developed design approach. Ensure design meets sustainability objectives and review performance against targets.**	**Develop designs to meets sustainability objectives and Performance Targets. Embed requirements into specifications, procurement documents and contractual terms. Appoint delivery partners with shared commitment to sustainability.**	**Identify additional opportunities and risks for sustainable construction. Embed sustainability requirements within contractors' supply chain. Contractor to report on sustainability progress.**	**Ensure a smooth handover to tenants by adopting Soft Landings principles. Carry out full and seasonal commissioning of systems. Capture achievements and lessons learnt.**	**Provide ongoing support to ensure buildings and space perform as per the design intent and sustainability vision Report actual performance agains sustainability targe and capture lesson learnt.**
Key Deliverables	TQEC Sustainability Brief	Sustainability actions integrated within the programme. Scope of feasibility and options studies. Community and stakeholder engagement programme developed.	Results of options studies and agreed performance targets.	Sustainability statement setting out how design meets overall objectives.	Tender documents which clearly set out sustainability expectations and associated scoring criteria	Regular reporting against sustainability brief and targets. Site Waste and Resources Management Plan, Construction Management Plan. Handover and commissioning plan. Draft Building User Guide.	Handover Report. Building User Guide. Commissioning report and certificates.	Regular performanc updates and POE Report after 1 year.
Responsibility	University of Bristol Project Manager	University of Bristol Project Manager	Design Team & Sustainability Advisor	Design Team & Sustainability Advisor	Design Team, Project Manager & Sustainability Advisor	Project Manager, Contractor & Sustainability Advisor	Contractor & Sustainability Advisor	University of Bristol Project Manager

3.3 Key Roles and Responsibilities

We have identified the following key roles and responsibilities for delivering the TQEC Sustainability Objectives.

UoB Programme Board

- Approve Sustainability Brief and Performance Targets
- At Board Approvals, ensure sustainability objectives and whole life value is included in decision making
- Assume overall responsibility for ensuring sustainability objectives are met

Research and Innovation Sub Programme Board (SPB)

- Promote engagement with university research teams as part of a Living Lab approach
- Create conditions for innovation across sustainability objectives and manage associated risks

Site Development SPB

- Ensures sustainability objectives are embedded into project delivery

Education and Skills SPB

- Champions community objectives for identifying opportunities to build local skills through construction and operation

Engagement SPB

- Promotes engagement across stakeholder groups including harder to reach communities
- Work with the Lead Designer to develop the community engagement and codesign programme
- Ensure that the results of engagement are reflected in development proposals

Campus Development SPB

- Ensure engagement with facilities managers is undertaken through the design process
- Engages with the Project Design Team at the earliest opportunity to help define development needs
- Promote a Soft Landings approach including budgets for commissioning and handover
- Scope and champion Building User Guides
- Champion sustainability objectives on Building Long Term Value

UoB Sustainability Managers

- Provide client oversight through the delivery programme
- Facilitate engagement with key stakeholders
- Responsibility for ensuring operational objectives are met

UoB Project Managers

- Ensure Consultant Scopes are aligned with this Brief
- Ensure sustainability requirements are embedded in the project management processes
- Ensure that the procurement approach will support the delivery of sustainability objectives

Project Design Team

- Proactively seek opportunities to meet targets and objectives as set out in this Brief
- Report back to project managers at each of the key stages on progress against objectives and targets
- Identify any key risks that sustainability objectives will not be met and proactively managed
- Consult with the UoB Sustainability Team at the beginning and end of each design phase
- Engage with key UoB stakeholders including FM, academic partners, end users and commissioning team

Sustainability Advisor

- Assurance role in seeing the project delivered according to this Brief
- Proactively engage the design team in opportunities
- Work with client team to ensure sustainability objectives are embedded within the programme
- Carry out additional research as required to support the design team

Cost Consultant

- Ensure life cycle costing approaches used to inform design and procurement decisions
- Take a proactive approach to identifying whole of life value in opportunities

Procurement Consultant

- Work with Sustainability Advisor in the evaluation of procurement options
- Ensure that sustainability objectives are embedded within the procurement process

Project Managers

- Manage and implement the Sustainability Brief in collaboration with Sustainability Advisor
- Embed sustainability objectives into Programme Board reports at key gateway stages

Contractors and their Supply Chain

- Proactively engage with the design team to bring forward innovation and approaches to delivering sustainability objectives
- Responsible for ensuring development is built to highest quality standards and ensuring that construction approaches do not compromise meeting sustainability objectives
- Engage with UoB Sustainability Team at the beginning of construction and at key milestones throughout the delivery process
- Deliver the buildng in a state of operational readiness in line with Soft Landings requirements and by engaging with FM teams during commissioning and handover.

3.4 Risks and Mitigation Strategy

In developing the sustainability brief, we have identified a number of risks which will need to be managed by the design and delivery team. We expect that additional risks will be added as the design progresses.

Risk	Mitigation
Procurement of accommodation building through a design and build approach may compromise ability to achieve sustainability objectives	Engage with potential suppliers and shortlist those with proven experience of delivery
Uncertainty over the provision of a city-wide heat network and when it will be delivered	Test alternative scenarios ensuring that options don't preclude future connection or result in undue costs or material impacts
Compatibility of a flexible building with M&E services, especially in the context of creating closed as well as open spaces that may be required to develop IP	Adopt distributed and flexible servicing arrangements
Unintended consequences of regeneration on local communities, eg. gentrification	Develop a strong community engagement programme that continues beyond design and construction to provide opportunities
Impacts during construction on a constrained site	Use of offsite manufacture, consolidated and reverse logistics to minimise vehicle movements
Tight delivery programme means opportunities could be lost	Ensure design workshops to focus on priority sustainability themes are included in the programme
Open brief for enterprise buildings makes it challenging to develop specific design solutions	Test different scenarios and engage with end users. Create a simple building with accessible servicing and flexible spaces
Flood mitigation strategy requires construction of a podium which will have material, waste and construction impacts	Identify sources of waste materials to build up the podium
Car free development causes off site parking issues	Work with local communities and BCC to take a systemic approach to sustainable travel
Innovative approaches deemed too risky in the context of a conservative construction sector	Take a shared approach to risk management, use rapid prototyping and virtual reality to test options. Engage with the supply chain

4. Appendix

- List of Performance Targets
- Specific RIBA Stage Actions

4.1 List of Performance Targets

Resources and the Circular Economy

Carbon and Energy

- On-site generation or agreed off-site generation is greater than operational emissions (regulated, unregulated including fleet transport)
- DEC A ready - Target Display Energy Certificate A rating from the outset of design Passivhaus Standard for all buildings
- All internal and external lighting (fittings and bulbs) meet or exceed the Energy Technology List (ETL) criteria for high efficiency lighting units

Materials and Waste

- Reduce embodied carbon by 30% from industry average standard practice (as defined by RICS and without compromising durability or whole of life carbon)
- 90% materials with a responsible sourcing certification and 100% FSC/PEFC timber
- Achieve ≤ 1.6 m^3 or ≤ 1.9 tonnes waste/100m^2 during design and construction
- Zero waste to landfill during demolition and construction with 10% reuse, 70% recycling and 20% other (incineration, anaerobic digestion etc..)
- Zero virgin fill material imported to site
- Zero waste to landfill in operation
- Waste management practices in accordance with UoB Circular Economy Policy
- Over ordering no more than 2% during construction

Water

- Water Consumption less than 0.38m^3/year/m^2 NIA in academic buildings and less than 80l/person/day in accommodation buildings.
- Reduce demand for irrigation and meet 70% of irrigation demand through rainwater harvesting.

A Restorative Approach to the Environment

Ecological enhancement

- Greenspace accounts for 50% of total developable plan area, to include green roofs, tree canopy etc.
- An increase of six local plant species in accordance with the Bristol Biodiversity Action Plan
- Development to be at least ‘air quality neutral’ and not lead to further deterioration of existing poor air quality (as defined in the GLA London Plan)

Climate change adaptation

- No increase in off-site flood risk
- Summer temperatures 2°C cooler compared with city centre sites
- Critical infrastructure serving the site is resilient to extreme events
- Planting strategy resilient to climate change

Strong and Healthy Community

Local Economy

- Employment and business opportunities created, including for disadvantaged and minority groups
- Community enterprise opportunities
- Positive impact on quality of life (QoL) of local residents
- Make a measurable positive impact on the skills and employability of target communities against a 2017 baseline

Accessible Living Estate

-
- Exemplary on BCC Place Print Tool (see BTQEZ Making People-friendly Streets and Spaces - A Public Realm Guide)
- Number of visitors to the site
- Participation in cultural and social events

Health and Wellbeing

- WELL Standard Silver or equivalent
- Follow Sport England Ten Principles of Active Design
- Average 300-500 lux for 2000 hours per year or more (in offices and teaching spaces)
- Summer and winter comfort temperatures to be adaptive to climate and in accordance with CIBSE Guide A
- Overheating limited to CIBSE TM52 criteria
- CO_2 levels below 800ppm, minimum ventilations rate of 12l/s/p and total volatile organic compounds (TVOC) below 500µg/m^3
- Acoustic levels in offices and teaching spaces to be below a maximum noise rating of 35 and meet standards in Building Bulletin 93
- Achieve external noise levels set out in BS8233
- Outdoor sunlight criteria as set out in BRE209 guidelines

A good neighbour through construction

- Considerate Constructors Scheme – score 7 or more points in each of the five sections
- 100% of apprenticeships leading to full time employment
- Zero complaints during construction

Connectivity

Sustainable Travel

- Proportion of access to the campus by car is zero (with the exception of blue badge provision)
- Electric vehicles for all deliveries and site servicing
- Consolidated logistics in construction and operation
- At least 1 secure cycle parking space per 8 staff/ students

Digital Infrastructure

- Compliance with the Smart City Standard and Bristol is Open requirements

Building Long Term Value

Operation performance

- In use energy, water and waste costs
- Maintenance and refurbishment costs
- Exceed best practice benchmarks for occupant satisfaction with internal environment
- Space utilisation rate
- Energy consumption no more than 10% greater than predicted design (TM54)

Design for whole life

- Residual Values (Resale or Salvage Values or Disposal Costs)
- Award winning development

Lifecycle decision support and appraisal

- Whole life value

Smart campus / Living Lab

- New IP generated on campus

4.2 Specific RIBA Stage Actions

This section sets out an indicative list of actions to be carried out at different design stages. This is not intended to be a comprehensive list; we have identified actions and activities which, from our experience, are often missed in the design and delivery of buildings.

Owing to the time constrained nature of the programme, there may need to be some flexibility around when specific actions are carried out.

Briefing Stage (RIBA 1)

Action	Responsibility
Appoint Sustainability Advisor and assign responsibility for sustainability within client team.	UoB PM
Ensure consultant scopes and contracts are aligned with sustainability brief	UoB PM & SA
Identify any scope gaps within the project team	UoB PM & SA
Issue sustainability brief to project team	UoB PM & SA
Hold kick off meeting with project to identify any additional strategic opportunities	UoB PM & SA
Scope out any additional feasibility studies	UoB PM & SA
Identify owners of Performance Targets within the design team	UoB PM & SA
Identify stakeholder groups and develop an engagement programme	UoB Community Engagement & Lead Designer
Establish approach to Soft Landings	UoB PM & SA
Initial engagement with end users and FM Teams to establish whole of life needs	Lead Designer
Ensure design programme includes sufficient time for research, testing, feasibility studies, supply chain and stakeholder engagement	UoB PM
Embed sustainability objectives into project management processes including design management, Gateway Reviews, Programme Board Approvals, Risk Management, Value Engineering and Change Management to ensure sustainability strategies are not lost.	UoB PM & SA

Deliverables	Responsibility
Scope of feasibility studies to be undertaken	UoB PM
Community engagement and codesign programme aligned with key stages of the design process	UoB PM
Programme with sustainability actions integrated	UoB Community Engagement & Lead Designer

Concept Stage (RIBA 2)

Action	Responsibility
Workshops for each sustainability theme to be programmed at the start of Stage 2 Programme	UoB PM
Soft Landings Inception and Briefing Stage Workshop	SA
Commission any additional feasibility studies or research	UoB PM
Engage with the supply chain to identify innovation opportunities	Lead Designer & Design Team
Set embodied carbon budget	SA
Test design concepts against sustainability objectives and Performance Targets	Lead Designer & Design Team
Engage with FM teams to understand requirements and feed into design and specification.	PM
Evaluate options based on whole-life value and performance against sustainability objectives; present key decisions made in a transparent way.	Lead Designer & Design Team
Hold Soft Landings workshop	SA
Engagement with academic partners on sustainability opportunities	Lead Designer & Design Team
Review lessons learnt (design, procurement and construction) from relevant past projects and feed into design team briefing.	UoB PM
Early contractor engagement on options for achieving sustainability objectives	UoB PM, Design Team, Contractor
Carry out BREEAM Pre-assessment	SA

Deliverables	Responsibility
RIBA Stage 2 Report: Identify approach to achieving sustainability objectives and performance targets for each theme. Preferred solutions should be supported by appraisal of whole life cost, carbon and wider sustainability value options reviewed.	Lead Designer & Design Team & SA
Review of design against Sustainability Performance Targets	SA
Whole lifecycle costing and value appraisal	Cost Consultant &SA
BREEAM Pre-assessment	SA

Detail / Technical Design Stage (RIBA 3-4)

Action	Responsibility
Clearly communicate innovative sustainability approach in Planning Application.	Design Team & SA
Ensure sustainability objectives and performance targets are embedded in specifications.	PM & Design Team
Carry out life cycle costing to inform detailed design / specifications.	Cost Consultant
Include sustainability data in BIM model	Design Team
Soft Landings: Review design proposals for commissionability, maintainability, usability and manageability.	SA
Demonstrate how non-financial values and benefits are considered in detailed design.	Lead Designer & Design Team
Ensure any value engineering takes account of whole of life considerations and takes a holistic perspective of value.	Design Team & Contractor
Develop Site Waste Management Plan (SWMP) / Resource Management Plan (RMP).	Design Team & Contractor
Include sustainability approach in Draft Construction Management Plan.	Design Team & Contractor
Include sustainability scoring criteria in tender evaluation process for construction supply chain.	UoB PM & SA
Ensure sustainability objectives and targets are included in the tender documents	UoB PM & SA
Embed Sustainability Performance Requirements into construction supply chain contracts	UoB PM & SA

Deliverables	Responsibility
Design Stage BREEAM Assessment.	SA
Site Waste Management Plan / Resource Management Plan	Design Team & Contractor
Draft Construction Management Plan with sustainability embedded, and Environmental Management Plan with performance targets for construction delivery (energy/CO_2, waste, water etc)	Contractor
Tender and specification documentation incorporating sustainability standards and requirements for contractors, and which includes sustainability in scoring criteria.	UoB PM & SA
Contract for construction including Sustainability Performance Targets	UoB PM & SA
Draft Commissioning, Handover and Maintenance Plan	Contractor
RIBA Stage Report stating how design meets sustainability objectives and performance targets including any further options appraisal.	Lead Designer & Design Team
Review against Sustainability Performance Targets	SA

Construction Stage (RIBA 5)

Action	Responsibility
All construction team to review and familiarise themselves with the Sustainability Brief and agreed Performance Targets. Construction team should identify additional opportunities and risks for sustainable construction.	Contractor & Supply Chain
Finalise Construction Management Plan and Environmental Management Plan and ensure processes are put in place to deliver sustainability objectives and targets.	Contractor
Ensure any design changes are compatible with sustainability requirements and targets.	Contractor & UoB PM
Regular review of progress against targets and objectives with contractor and sustainability advisor	SA
Report against Site Waste Management Plan (SWMP) / Resource Management Plan (RMP), Environmental Management targets and sustainability objectives	Contractor
Ensure rigorous quality control measures are established especially in relation to energy performance objectives	Contractor
Register for Considerate Constructors Scheme (CCS) and report on performance	Contractor
Continue to build positive relationships with community during construction	Contractor & UoB Community Engagement
Soft Landings: Prepare handover and commissioning plan including protocols for energy and environmental reporting. Prepare draft Building Users Guide.	Contractor

Deliverables	Responsibility
Final Construction Management Plan	Contractor
Site Waste Management Plan (SWMP) / Resource Management Plan (RMP)	Contractor
Handover and commissioning plan.	Contractor
Building User Guide (draft)	Contractor
Contractor Reporting against sustainability objectives and construction environmental performance	Contractor
Construction Stage BREEAM Assessment	SA

Handover Stage (RIBA 6)

Action	Responsibility
Carry out post-construction review and capture achievements and lessons learnt	Contractor & UoB PM
Implement Commissioning, Handover and Maintenance Plan	Contractor
Appoint Post Occupancy Evaluation Consultant	UoB PM
Carry out migration planning to coordinate move-in with site continuing activities	UoB PM
Soft Landings Initial Aftercare Stage. Follow actions below and refer to BSRIA Soft Landings Core Principles and Soft Landings Framework for further information	SA
Provide visible and accessible home for the aftercare team during the initial post-handover phase	SA
Appoint building services maintenance contracts to ensure there are no gaps in support	UoB PM
Carry out full and seasonal commissioning of building services systems and control systems (including thermostats and BMS). Review commissioning records to verify adequacy	Contractor
Commence environmental and energy logging	UoB Sustainability
Finalise Building User Guide to include ‘as built’ construction information and issue to building occupants	Contractor
Engage building users and facilities managers in a ‘graduated handover’, providing training as required	Contractor
Conduct site walkabout with key stakeholders and provide on-site support to liaise with building users and coordinate troubleshooting and fine-tuning	Contractor
Carry out tours for local community and hold associated opening events	UoB Community Engagement
Incorporate whole life performance design intent within Building User Guide	Contractor
Post-Construction BREEAM Assessment	SA

Deliverables	Responsibility
Commissioning reports and certificates	Contractor
Building User Guide (final)	Contractor
Confirmation of BREEAM rating	SA
Handover stage report of project outcomes against this brief	Contractor

Operation Stage (RIBA 7)

Actions	Responsibility
Appoint representative(s) responsible for championing sustainable operation and performance	UoB Sustainability & UoB PM
Monitor performance for 1 year (minimum)	POE Consultant
Continue to monitor energy consumption against relevant performance indicators	UoB Sustainability & UoB PM
Coordinate ongoing/ seasonal commissioning as necessary	UoB Customer Services Manager
Review materials, water and waste outcomes and capture lessons learnt	PM
Conduct post occupancy evaluation (POE) after 1 full year of occupation and feed lessons learnt into future projects. POE to cover: In-use performance feedback from building users to inform operational processes, recommendations for maintaining or improving productivity, health, safety and comfort, and any required re-commissioning activities	POE Consultant
Continue to monitor internal environments against relevant performance indicators (e.g. light levels, internal temperatures)	UoB Sustainability & UoB PM
Consider whole life cost and carbon when appraising overall project outcomes and apply lessons learnt to future projects	UoB Sustainability & UoB PM

Deliverables	Responsibility
POE report and lessons learnt	POE Consultant
Operation stage report of project outcomes against this brief	UoB PM & SA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