RICS Practice Standards, UK

Sustainability and the RICS property lifecycle

1st edition, guidance note

RICS

the mark of property professionalism worldwide

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RICS guidance note

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Contents

Foreword

It is time we moved on from the acceptance of the science and man's accelerated effect on climate change, and now provide a clear response to the changing effects of our existence on our planet. It is also important that we can identify the risks and opportunities that climate change presents. Specifically within the surveying profession, it is important that surveyors are equipped with the necessary information, guidance and skills to make appropriate interventions that help us to adapt to climate change and mitigate its effects.

RICS members are at the forefront of accepting the effects of a changing climate in relation to land, property and construction and providing a response in terms of surveying professional advice.

Since 1868, the Royal Institution of Chartered Surveyors has been committed to setting and upholding the highest standards of excellence and integrity – providing impartial, authoritative advice on key issues affecting businesses and society. Our aim is to be the mark of property professionalism worldwide, monitor issues and provide support to members and also to the general public. Ensuring that we as a profession respond to the sustainability agenda is key to members being able to provide the quality of advice and level of integrity required by the market.

The RICS vision is to raise the status of the RICS 'mark' – *property professionalism worldwide* – so that our members are recognised in business as providing the highest standards of professionalism, skills and integrity in all matters covering the economics and management of land, property, construction and related environmental issues in line with the sustainability agenda. The Royal Charter states that surveyors must act in the interest of the public good.

Sustainability requires an approach to growth that understands, invests in and maintains not just financial resources, but human, social and environmental resources, all at the same time. By avoiding the damaging consequences of trading one off against the other can the real goal of sustainability be met. When presented with a wide range of options, the choices we make should be deliberate and seek to balance economic, environmental and social costs and benefits at a local and global level.

RICS recognises that sustainability should be considered throughout the property lifecycle. By considering the key stages of that cycle, we can clarify and develop understanding of sustainability and what advice may be appropriate at each stage of the *RICS property lifecycle*.

The interrelationships of the five phases in the *RICS property lifecycle* – greenfield and estate management, planning and procurement, new construction, occupation and use (including refurbishment and alterations), demolition and remediation – are critical to achieving sustainability for the surveying profession. By considering the consequences of decisions in relation to sustainability, as well as the impact decisions will have on the other phases of the *RICS property lifecycle*, it is possible to develop a better framework for decision making.

This guidance note details how sustainability can be embedded into the *RICS property lifecycle* and provides a resource for engaging our members in sustainability in promoting a positive contribution to our pursuit of sustainable land, property and construction. There can be little doubt concerning the important role that surveyors play at each stage of the building lifecycle, and the lifecycle's overlap with the three elements of sustainable development (the environmental, economic and social pillars in the 'triple bottom line' model).

The guidance note is intended to provide navigation to a specific sustainability intervention. It can also be viewed at each stage of the *RICS property lifecycle* stage to identify the role of the Professional Group with regard to the sustainability intervention.

The guidance note also defines 'sustainability intervention'. Whilst a surveyor may not be a specialist in the sustainability intervention detailed, it is important that with a level of sustainability competency and understanding this allows the recognition of an issue and intervention where necessary. The resulting property advice may subsequently involve a relevant specialist. 'Sustainability interventions' refer therefore to an understanding of the concerns and risks regarding sustainability and the practical solutions to mitigate these.

- This guidance note primarily examines the sustainability interventions and opportunities property professionals can put forward during the **design and construction of a building project**.
- The guidance note also forms a starting point for further guidance aimed at the *RICS property lifecycle* stages, principally:
  - **greenfield/estate management**;
  - **planning and procurement**;
  - **new construction**;
  - **occupation and use (including refurbishment and alterations)**; and
  - **demolition and remediation.**

Arlette Anderson

Head of Sustainability, RICS

RICS guidance notes

This is a guidance note. It provides advice to RICS members on aspects of their practice. Where procedures are recommended for specific professional tasks, these are intended to embody 'best practice', i.e. procedures which in the opinion of RICS meet a high standard of professional competence.

Members are not required to follow the advice and recommendations contained in the guidance note. They should, however, note the following points.

When an allegation of professional negligence is made against a surveyor, the court is likely to take account of the contents of any relevant guidance notes published by RICS in deciding whether or not the surveyor had acted with reasonable competence.

In the opinion of RICS, a member conforming to the practices recommended in this guidance note should have at least a partial defence to an allegation of negligence by virtue of having followed those practices. However, members have the responsibility of deciding when it is inappropriate to follow the guidance.

On the other hand, it does not follow that members will be adjudged negligent if they have not followed the practices recommended in this guidance note. It is for each surveyor to decide on the appropriate procedure to follow in any professional task. However, where members depart from the practice recommended in this guidance note, they should do so only for good reason. In the event of litigation, the court may require them to explain why they decided not to adopt the recommended practice. Also, if members have not followed this guidance, and their actions are called into question in an RICS disciplinary case, they will be asked to justify the steps they did take and this may be taken into account.

In addition, guidance notes are relevant to professional competence in that surveyors should be up to date and should have informed themselves of guidance notes within a reasonable time of their promulgation.

1 Introduction

For the Royal Institution of Chartered Surveyors (RICS) the principle of sustainability seeks to balance economic, environmental and social objectives, at global, national and local levels, in order to meet the needs of today, without compromising the ability of future generations to meet their needs.

It is about leaving the world a better place than we found it and about securing our long-term future, by following the four main tenets of sustainable development:

- protection of the environment;
- prudent use of scarce resources;
- promotion of access to services for the benefit of all; and
- production of a healthy local economy, including high levels of employment.

Increasingly clients are requesting improved sustainability performance from their buildings, over and above the regulatory requirements arising from changes in the Building Regulations. Methodologies such as BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design) are often used as the vehicle for achieving these improvements. However, these tools are largely environmentally biased, and it is important that the wider social and economic dimension of sustainability is also considered. We would strongly recommend that these issues are considered holistically at an early stage in estate management and project inception and taken forward in an integrated manner.

From a sustainability perspective, refurbishment projects are increasingly expected to achieve design standards expected of new build projects including:

- improved quality and value for money;
- reduced environmental impact and improved sustainability;
- healthy, comfortable and safe internal and external environments that offer high occupant satisfaction and productivity;
- low costs in use; and
- a flexible and future-proofed design.

With the introduction of Energy Performance Certificates and Display Energy Certificates, refurbishment offers an opportunity to improve the energy performance of the existing building stock, and setting out on a refurbishment or refit without ensuring that an improvement of energy performance is specified would be ill-advised as there are significant benefits to be realised both in cost reductions as well as reductions in carbon dioxide emissions.

Ultimately as property professionals we have a role and responsibility to ensure that we are maintaining and indeed contributing to increasing the value of client assets and, in what we believe to be an increasingly resource constrained and climatically challenging future, building sustainably is a pathway to assuring asset value.

2 How to use this guidance note

This guidance note identifies the key issues and interventions that can be undertaken by chartered surveyors throughout the *RICS property lifecycle* to ensure that sustainability is given due consideration. It is primarily aimed at those activities and interventions associated with the design and construction of a building project, however, it is important to recognise that surveyors working outside these stages will often be able to intervene and the authors have, where possible, identified what actions could be considered.

It is not the intention that this guidance note is read in its entirety, but rather that the navigation is used to guide the reader to a particular sustainability topic area in order to be able to understand the key issues relating to that topic at each of the *RICS property lifecycle* stages, or to a particular stage to identify the role and key intervention point for a given Professional Group.

The guidance note is divided into two main parts. The first describes the sustainability issue by *RICS property lifecycle* stage. The second describes the role and key intervention point for the Professional Group.

Each stage of the *RICS property lifecycle* is described, and for those working to or familiar with the RIBA Work Plan stages these are mapped overleaf to assist the reader with navigation through the relevant issues.

Immediately after the subheading of the *RICS property lifecycle* stage we have identified the RICS Professional Groups whose members are most likely to be in a position to provide a sustainability intervention. These Professional Groups are abbreviated as follows:

Building control	BC
Building surveying	BS
Commercial	Comm
Environmental	Env
Facilities management	FM
Geomatics	Geo
Machinery and business assets	MBA
Management consultancy	MC
Minerals and waste	M&W
Planning and development	P&D
Project management	PM
Quantity surveying and construction	QS
Residential	Res
Rural practice	RP
Valuation	Val

The following tables provide the navigation required to take the reader to the relevant section of the guidance note. The navigation matrix is used to guide surveyors to relevant interventions or issues pertinent to their role, the *lifecycle* stage or sustainability issue that they wish to understand. This ensures that the user is guided to specific sections of the guidance note only. It is important to recognise that the surveyor may not necessarily be an expert in a given specialist area but would be expected to have a level of competency that allows

the recognition of an issue and intervention where necessary. Often the action following from this intervention would be to involve a relevant specialist.

***RICS property lifecycle* stage**	***RIBA Outline Plan of Work* stage**	
Greenfield/estate management	No equivalent RIBA stage	
Planning and procurement	A, B	Preparation
	C-E	Design
	F-H	Pre-construction
New construction	J-K	Construction
Occupation and use (including refurbishment and alterations)	L	Post practical completion
Demolition and remediation	No equivalent RIBA stage	

Sustainability issue	Greenfield/ estate management	Planning and procurement	New construction	Occupation and use	Demolition and remediation
Amenities and recreation	10	10	11	11	11
Biodiversity	11	12	14	14	14
Climate change	15	15	16	16	16
Community	17	17	17	18	18
Crime and security	18	19	19	19	20
Cultural heritage	20	21	22	23	23
Drainage and flooding	23	24	24	25	25
Energy	25	26	28	29	29
Geology and soils	29	30	30	30	30
Health, safety and well-being	31	31	32	32	33
Human rights and ethics	33	33	33	34	34
Landscape and visual aspects	35	36	—	36	36
Land use	36	37	37	37	38
Material use	38	39	40	41	41
Pollution and nuisance	41	42	42	42	43
Shareholder and customer relations	43	44	44	44	45
Social inclusion and accessibility	45	45	46	46	46
Stakeholder engagement	47	47	47	48	48
Training and development	49	49	49	50	50
Travel and transport	50	51	52	52	52
Waste	53	53	54	54	55
Water use	55	56	57	57	57

Areas of professional activity	Greenfield/ estate management	Planning and procurement	New construction	Occupation and use	Demolition and remediation
Building control	—	68	78	81	—
Building surveying	60	68	78	81	—
Commercial	60	70	—	83	91
Environmental	62	70	78	84	92
Facilities management	62	71	—	85	—
Geomatics	62	71	—	—	92
Machinery and business assets	—	—	—	—	92
Management consultancy	63	—	—	—	92
Minerals and waste	63	71	—	86	93
Planning and development	64	71	—	86	—
Project management	64	72	78	86	93
Quantity surveying and construction	65	73	79	88	—
Residential	65	75	—	90	93
Rural practice	65	75	—	—	94
Valuation	66	75	—	90	94

3 Background

National governments have recognised the importance of sustainable development and have put in place policies, legislation and guiding principles aimed at delivering a more sustainable approach.

3.1 UK government approach

Within the UK Government's Sustainable Development Strategy are five guiding principles:

> **'Living Within Environmental Limits** – Respecting the limits of the planet's environment, resources and biodiversity – to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future regenerations.
>
> **Ensuring a Strong, Healthy and Just Society** – Meeting the diverse needs of all people in existing and future communities, promoting personal well-being, social cohesion and inclusion, and creating equal opportunity for all.
>
> **Achieving a Sustainable Economy** – Building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and in which environmental and social costs fall on those who impose them (polluter pays), and efficient resource use is incentivised.
>
> **Promoting Good Governance** – Actively promoting effective, participative systems of governance, in all levels of society – engaging people's creativity, energy and diversity.
>
> **Using Sound Science Responsibly** – Ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values.'

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Whilst there is a vast amount of legislation related to sustainability issues, arguably there are currently two key Acts of Parliament that are influential in directing the manner in which we address the challenges of future development in the UK.

Climate Change Act 2008

There are two key aims underpinning the *Climate Change Act* 2008:

- to improve carbon management and help the transition towards a low carbon economy in the UK; and
- to demonstrate strong UK leadership internationally.

This Act will, amongst other things, require the UK to:

- set binding CO_2 reduction targets;
- introduce a carbon budgeting system; and

- establish a committee on climate change to advise government on the level of carbon budgets and where cost effective savings could be made.

Planning Act 2008

The *Planning Act* 2008 aims to set up an Infrastructure Planning Commission (IPC) that will be responsible for determining significant planning projects. In addition, the Act:

- outlines details for setting up National Policy Statements;
- sets out the framework for the introduction of the Community Infrastructure Levy; and
- makes a number of changes to existing development control procedures.

For more information on environmental legislation go to NetRegs at www.netregs.gov.uk/netregs

3.2 RICS and climate change

RICS recognises the significance of the need to address those factors affecting climate change. As the foremost body for property professionals, RICS believes that members are well placed to consider mitigation in buildings. This does not mean that other climate issues (such as assets and infrastructure, transport, agriculture and spatial planning, and, of course, the whole subject of climate change adaptation) are being ignored.

RICS takes a serious approach to sustainability and specifically the effects of climate change. It established a President's Commission on sustainability in 2005, set the RICS Sustainability Policy Statement in July 2005, created a role of Head of Sustainability, developed an International Sustainability Framework approach and specifically set a low carbon built environment as a policy priority in 2007.

More details are available at www.rics.org/ccstrategy

4 Key sustainability issues

This section looks at the key sustainability issues likely to be encountered, when they are likely to be encountered and the outline actions and interventions that a chartered surveyor can take/make.

4.1 Amenities and recreation

4.1.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Provision of amenity and recreational space is a key element to providing vitality in any development. Most towns and cities have a myriad of parks and open space that can be used by the public. As well as providing the 'lungs' of a town or city, these areas are vital for the recreational pursuits of those who live and work in these areas – they are important for physical activity and well-being. In built-up areas, amenity and recreational areas also provide shade and cooling and help to mitigate urban heat island effect, a phenomenon caused by the absorption of heat by dark, non-reflective surfaces that proliferate in built-up areas. This heat absorption results in increased summer temperatures and impacts on thermal comfort in the warmer months of the year.

4.1.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that the provision of amenity and recreational space is designed into the development. This need not be restricted to residential areas. Most towns and cities have a myriad of parks and open space that can be used by the public and this can be incorporated in master planning stages of projects, whilst smaller schemes also provide opportunities for recreational and amenity use and this can be considered good design.

The choice of materials and substrates used for creation of this space can encourage many beneficial uses, not only for recreation. The use of more reflective materials or green/brown roofs, etc. whilst providing recreational space, will also:

- provide attenuation for rainfall;
- enhance ecology and biodiversity;
- provide thermal improvements to buildings; and
- contribute to improved thermal comfort within buildings and surrounding areas where employed.

As the design develops, the design team will start to formulate ideas around the use of space within and around the building and how this might be achieved.

It is recommended that amenity and recreation areas are safeguarded if at all possible during the construction process. The logistics and constraints of a particular development site may be such that there may be an impact on amenity and recreational space. If this land is in public ownership then it is likely that it will need to be compensated for and part of the scheme may incorporate or require provision of facilities elsewhere. This may or may not be

part of the main construction contract, but will need to be specified and tendered at some stage and the relevant documentation will need to be prepared.

4.1.3 RICS property lifecycle – NEW CONSTRUCTION

It is recommended that the contractor, if at all possible, avoids impact on recreational and amenity areas. However, it is likely that negotiation in relation to this would have been undertaken prior to the contractor appointment, although constructability assessments may have involved the contractor in some way in identifying logistical constraints that may have necessitated the use of such land. In other instances, the method of procurement may result in the contractor being involved directly in issues relating to temporary land-take for construction activities. Appropriate restoration is required on completion of the works.

4.1.4 RICS property lifecycle – OCCUPATION AND USE

At this stage of the *RICS property lifecycle* the issue of recreational and amenity space is most likely to be related to appropriate management and maintenance of these areas so that they can be enjoyed and those availing themselves of these facilities can maximise opportunities for enhancing their well-being. It is recommended that the Operations and Maintenance Manual includes this within its scope.

4.1.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to amenities and recreation at this stage of the *RICS property lifecycle* are largely the same as those experienced during new construction. It is recommended that the contractor, if at all possible, avoids impact on recreational and amenity areas. However, it is likely that negotiation in relation to this would have been undertaken prior to the contractor appointment, although constructability assessments may have involved the contractor in some way in identifying logistical constraints that may have necessitated the use of such land. In other instances, the method of procurement may result in the contractor being involved directly in issues relating to temporary land-take for construction activities. Appropriate restoration is required on completion of the works. An additional consideration may be the opportunity to seek enhancement of such facilities following demolition works. Ideally, after demolition and remediation work amenity and recreational areas would be reinstated rather than lost completely through new development.

4.2 Biodiversity

4.2.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Biodiversity is a term that is used to express the presence of fauna and flora not just in terms of the abundance of a given species but also the range of species that a habitat can support. Generally, stressed habitats have lower biodiversity and lower population numbers and this becomes particularly problematic for rare and endangered species. New construction projects provide an opportunity for the improvement of local ecology and biodiversity.

Greenfield sites, whether in urban or rural settings, all have ecological value. The ecological value of more rural sites is usually readily recognised by

individuals. These locations very obviously and visually demonstrate their ecology with an abundance of flora and fauna. The destruction of these areas for development usually raises concerns with regard to the impact on wildlife. The urban environment is often a less obvious habitat, but yet green spaces abound in the form of parks, small pockets of landscaped areas and suburban gardens.

As habitats come under increasing pressure through urban and rural development, there is a need to evaluate opportunities to compensate for, and where possible enhance, the local ecology.

Generally, the scale of construction that is the focus of this guidance would require that the planning application is supported with an Environmental Statement. This will identify (from the process of the Environmental Impact Assessment) the nature of the existing wildlife and its habitat, and the impacts that will occur as a result of the development. It will then propose mitigation (and increasingly enhancement) measures. The provision of new habitats is important as many species have adapted to living in urban environments, making homes in the nooks and crannies or roofs of buildings. These can include a myriad of fauna and flora ranging from birds, bats and insects, to lichens and mosses.

Greenfield and estate management requires the development of Ecology and Biodiversity Management Plans if the full value and potential of a site is to be realised. There is likely to be a need to conform to Local Biodiversity Action Plans (LBAPs) in managing these sites.

4.2.2 RICS property lifecycle – PLANNING AND PROCUREMENT

At the design brief stage the need to address biodiversity and transmit intent to the design team, and particularly the architect, is paramount. It is recommended that the synergy between ecological and biodiversity provision and potential benefits with regard to passive energy efficiency measures and storm water attenuation are also considered at this stage, although these issues will be considered and defined further in later stages. Consideration can be given here to green or brown roofs, although ecological provision may well consist of simpler solutions than this and include for habitats on the facade for bats, birds and other fauna and flora and/or the sympathetic treatment of ground level landscaped areas to promote ecological interest.

A brief that poorly describes the ecological and biodiversity aspirations for the development will invariably result in the omission of enhancement features in the design. Exceptions to this may occur if there are particular planning led considerations with regard to ecology and biodiversity as the site being developed was identified as having ecological value and mitigation measures have been included as part of the planning conditions.

The evolution of the design through this stage of the *RICS property lifecycle* is critical to decisions regarding measures to incorporate ecology and promote biodiversity in the development. Apart from the technical considerations and the value of incorporating ecology and biodiversity into the design to meet the aspirations of environmental evaluation methodologies (BREEAM, LEED, etc.), the impact on cost will also need to be considered at this stage. In considering this, the synergistic effects of incorporating such measures as green roofs on buildings with the energy efficiency measures and drainage and storm water control are important, and may well help the justification to include

these measures in the design. If this is accepted in an early cost plan in the planning and procurement stage then it has a high likelihood of being accepted within the overall project budget.

If the site/area is known to have considerable ecological interest then it is possible that there may be planning conditions that require particular measures to be incorporated or mitigation to provided elsewhere. The benefits for the development itself, however, can be attractive and do not necessarily need to consist of extensive green/brown roof solutions in order to accommodate or encourage ecology and biodiversity.

Ecology and biodiversity are increasingly under threat as a result of man's activities. This impact is particularly noticeable in urban areas, although sensitive treatment of developments can ensure that habitats are provided for both fauna and flora at little or no cost impact. It is likely that evaluation methodologies such as BREEAM and LEED are being used on the development and consideration of ecology and biodiversity can be used to gain additional credits.

Having by this stage made a commitment to making provision for ecology and biodiversity within the scheme, the actual requirements will start to be designed in more detail. Although solutions may include green/brown/sedum roofs which in turn will also provide additional benefits such as thermal efficiency and storm water attenuation and which may be delivered at little or no extra cost to the scheme, measures may be of a more modest nature. This could include treatment to facade to incorporate 'nooks and crannies' for invertebrates and some bird species, bat boxes, or consideration of ground level landscaping to provide more biodiversity interest. It is recommended that the designs are progressed with the involvement of a professional ecologist with experience in the local area and in full cognisance of documents such as the Local Biodiversity Action Plan (LBAP) and in consultation with local experts, who may often be amateur enthusiasts. This will ensure that the treatment for ecology is appropriate for the area and aligned with locally identified needs.

Detailed design is critical to decisions surrounding measures to incorporate ecology and promote biodiversity in the development. The synergistic effects of incorporating such measures as green roofs on buildings with the energy efficiency measures and drainage and storm water control may well have been considered to justify inclusion of these measures in the design. On this basis the commitment to including such measures may have been accepted within the overall project budget.

The development does not necessarily need to consist of extensive green/brown roof solutions in order to accommodate or encourage ecology and biodiversity and other design options to incorporate ecology and promote biodiversity within the constraints of the project would have been explored with the ecologist and been incorporated in principle by this point.

Detailed requirements need to be formulated at this stage in preparation for final specifications for construction. In collaboration with the landscape architect and structural engineer, the ecologist will need to specify substrate material and species composition. Species composition is more likely to consist of floral elements but translocation of fauna may also be required. If not, the substrate and flora will in time develop such that compatible fauna is encouraged to colonise. Consideration of ecology and biodiversity and

landscaping will increasingly need to factor in likely impacts of climate change and this will be particularly relevant in regard to irrigation requirements.

It is recommended that the contractor is required to produce an Ecology and Biodiversity Management Plan. It is important to provide all pertinent information for the site in terms of ecological interest, as well as detail on design features to improve biodiversity. The contractor will be required to incorporate this into the plan, with clear roles and responsibilities and management measures identified in addition to systems for monitoring and recording compliance during the works. It is important that the Plan also clearly identifies any legislative requirements.

4.2.3 RICS property lifecycle – NEW CONSTRUCTION

The contractor is required to undertake the construction as identified in the design drawings. It is important that the Ecology and Biodiversity Management Plan is followed and that it specifies controls and monitoring that are required to be in place to ensure that the natural habitat is protected during the works. The Plan will also contain details relating to any ecological aspects of the design and these would be referred to in conjunction with the design drawings to ensure that works are being carried out in accordance with legislation and best practice. It is important that programme implications of measures required are considered.

4.2.4 RICS property lifecycle – OCCUPATION AND USE

During occupation and use, aspects of ecology and biodiversity might relate to landscaped areas around the building as well as any specific features that have been incorporated into the building to provide habitat. Clearly these will need to be managed and the Operations and Maintenance (O&M) Manual for the building is the appropriate mechanism ensure that these requirements are included. Note that management does not necessarily involve any costly activities in terms of time or resources. It may simply be a matter of leaving these areas to their natural devices. This would need to be made clear in the O&M manual to ensure that there is no interference with these areas.

If specific ecological features are incorporated and are driven by planning requirements, for example, there is likely to be a need to provide monitoring to ascertain the success of the measures incorporated. This is likely to require the ongoing services of an ecologist. Building occupiers or owners may wish to undertake such monitoring in any case, particularly if they are committed to environmental improvements in the performance of their organisation, and may use this information for Corporate Social Responsibility (CSR) reporting purposes.

4.2.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

Prior to demolition and remediation activities on a site there will be a need to ascertain the ecological value of the site and also the presence of any rare or endangered species that may be protected. It is recommended that this forms part of the pre-demolition/remediation survey and is undertaken by a qualified ecologist. The necessary actions can then be identified and any specific requirements incorporated into contract documents. It is important that programme implications of measures required are considered.

4.3 Climate change

4.3.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Although there are still a number of doubters and detractors, there is now considered to be a significant and conclusive body of evidence to suggest that we are living in a time of climate change. Even if one was to doubt the influence of anthropogenic activity on climate change it is irrefutable that climate does change with time and there is compelling evidence to indicate that we are in a time of temperature rise to which we need to adapt. The main impacts of climate change have been identified as water scarcity, increased flood risk and the provision of thermal comfort. These are relevant to greenfield and estate management in a number of ways. For example, sites may be increasingly subject to flood risk, and species will need to adapt to changing climate. In terms of site management and planting strategies, consideration will increasingly need to be given to drought tolerance and to storage of water for irrigation purposes. Overall design and management of estates may need to consider how external thermal comfort can be promoted through, for example, planting, shading and encouraging air flow.

4.3.2 RICS property lifecycle – PLANNING AND PROCUREMENT

Ultimately, the construction of a building or piece of infrastructure is an investment – as an instrument of financial return or public asset and it would therefore appear prudent to ensure that during designed life expectancy the asset continues to function and is fit for purpose. Maintaining fitness for purpose is the key way in which asset value can be maintained. Therefore designing for thermal comfort, flood resistance and water scarcity, the three key identified impacts of climate change make good business sense and it is advisable that they form explicit requirements of the client brief.

Having ensured that there is a specific requirement in the design brief, it is recommended that these impacts are considered such that the design is able to mitigate climate change impacts. Designing for thermal comfort and flood risk may include a number of different design options, several of which may impact on the external shape, orientation and appearance of the building, and will therefore also be subject to planning approval. Early consideration of these issues at concept stage will negate the need for costly redesign later.

Key aspects of design to adapt to climate change will need to have been fixed by the end of the design development stage. It is recommended that low energy design is favoured as this will help to minimise carbon emissions if the energy source is fossil fuel based, and will in any case help to minimise cost where renewable energy sources may be incorporated as part of the design solution. These key areas focus on climate proofing the building in relation to thermal comfort, water scarcity and flood risk. The completion of the project brief by this stage means that any changes to follow subsequently are likely to involve considerable redesign and potentially architectural re-interpretation so are best avoided. Although there is an important and significant focus on energy efficiency and renewables, it is important not to understate the increasing stress on water resources as a consequence of climate change and to ensure that design incorporates efficiency measures.

At this stage the documentation produced needs to reflect the design in terms of its climate change adaptive features. An additional impact on climate change

is the choice of construction materials. These have embodied energy implications as most are extracted, processed and manufactured using largely hydrocarbon-based energy sources that emit carbon dioxide to the atmosphere. It is important that production information and other related documentation produced at this stage ensures that such impacts are considered in the choice of procured materials.

The contractor will be required to undertake the construction in accordance with the design but may have the freedom to choose from a selection of materials available from the supply chain. Some will have lesser carbon dioxide and equivalent emissions arising from their manufacture and it is advisable to encourage contractors to consider these.

The contractor's activities themselves will result in carbon dioxide and other potential climate change emissions. These impacts are likely to arise predominantly from the use of plant and machinery, and the transport of workers and materials to site. It is recommended that the contractor is required to produce an Energy Management Plan to demonstrate how the contractor intends to minimise this impact.

Water scarcity is another identified key impact of climate change and it is also important that conservation of water during construction is exercised. It is recommended that a Water Resources Management Plan is also required and used to demonstrate how the use of water on the project will be minimised.

4.3.3 RICS property lifecycle – NEW CONSTRUCTION

Given that there are energy and water use impacts during construction, it is recommended that the contractor is required to demonstrate conformance to the Energy Management Plan and Water Management Plan during construction. It is important that the plans clearly demonstrate how the contractor proposes to minimise water and energy usage during the construction process.

4.3.4 RICS property lifecycle – OCCUPATION AND USE

The design of a building to mitigate the impacts of climate change is likely to consist of both physical features and the need for a management regime to optimise the building's performance under increasingly varied climatic conditions. Many of these features may be controlled by a Building Management System. Human interventions may also be necessary. Optimising the building's performance will require a thorough management understanding of the controls and systems, so it is important that these details are made clear at handover and that they are comprehensively documented in the Operation and Maintenance Manual.

4.3.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

Energy and water use impacts may also occur during demolition and remediation, so it is recommended that the contractor is required to demonstrate conformance to the Energy Management Plan and Water Management Plan. It is important that the plans clearly demonstrate how the contractor proposes to minimise water and energy usage during the demolition and remediation process.

4.4 Community

4.4.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Aspects of community are covered in a number of the other headings within this section. However, most developments are ultimately about communities. Whether a place to live or work, the built environment is provided for people. Although a less quantifiable aspect of sustainable design, there is evidence to suggest that good design benefits communities in terms of the way they interact with one another. In residential settings, design features such as shared public space and home zones encourage people to make more use of outdoor space and interact more. Within urban areas, good design that has been achieved through consultation and incorporates features of architectural interest, well designed external space, and accessibility, can similarly lead to more calming environment where people can socialise and mix, contributing to a sense of community and ownership and improved productivity.

Access to green space has valuable benefits to the community where this land is publicly accessible. Management of these areas can help to provide different themes and feelings and in so doing promote different use and activities in these areas. Where privately owned, although access may be more limited, similarly the use of such space through good planning and management can be vital in promoting social interaction and engendering community cohesion.

4.4.2 RICS property lifecycle – PLANNING AND PROCUREMENT

Engaging with communities prior to any proposed new development is part of socially responsible behaviour and may provide dividends in terms of obtaining planning approval.

The outputs from the consultations held during the previous project stages would now be used to inform the design. In addition to consideration of this stakeholder consultation and feedback process, there are many social elements of design that have been well researched and best practice guidance and case studies of both successful and failed developments are available. An important source of information in this regard is the Commission for Architecture and the Built Environment (CABE).

Impacts on local communities can be significant during construction works. In areas where large scale regeneration works are taking place, for example, these impacts can be sequential and last for many years as one project is completed and another begins. Engagement with the local community during construction works involving proper consultation and consideration is required. It is recommended that the contractor is required to produce a Community and Stakeholder Management Plan for the works. It is important that any pertinent information is provided to the contractor in order to ensure that this information is incorporated into the Plan.

The contractor will be required to identify clear roles and responsibilities and management measures in addition to systems for monitoring and recording compliance during the works. It is important that the Plan also clearly identifies any legislative requirements.

4.4.3 RICS property lifecycle – NEW CONSTRUCTION

Having produced a Community and Stakeholder Management Plan, it is recommended that the contractor is required to demonstrate conformance to

its requirements. Maintaining communication and good relationships with the community through the construction process will help to avoid more confrontational issues that might occur through poor communication. Contractors can also work proactively by organising events that involve and engage the community. It is important that the contractor and client together ensure that an appropriate strategy is in place during construction to ensure that there is a consistency and clarity of communication and that ongoing concerns and issues are identified through consultation and dealt with. It is recommended that these activities are undertaken as part of a planned stakeholder management and communications strategy and not as a reactive or piecemeal exercise. Communications will be handled largely by trained PR professionals but it will be important that key management personnel are involved in these activities and are available for meetings, interviews, consultations, etc.

4.4.4 RICS property lifecycle – OCCUPATION AND USE

The presence of any building and its occupants, users and owners almost by default means that it is part of the community in which it is located. The development of good community consequently requires participation of individuals and corporations, and therefore an ongoing programme of communication and involvement is recommended. Increasingly it is necessary for larger organisations in particular to have PR professionals who are able to take a proactive strategic approach in managing the image of an organisation and ensuring that appropriate communications are maintained with the stakeholder community. An organisation that is committed to good corporate responsibility would ensure that this function is carried out in a sincere fashion and that there are properly defined processes for communication and consultation and for actions to be carried out and documented.

4.4.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to communitiy at this stage of the *RICS property lifecycle* are similar to those experienced during new construction. Maintaining communication and good relationships with the community through this stage will help to avoid more confrontational issues that might occur through poor communication. Contractors can also work proactively by organising events that involve and engage the community. It is important that the contractor and client together ensure that an appropriate strategy is in place during construction to ensure that there is a consistency and clarity of communication and that ongoing concerns and issues are identified through consultation and dealt with. It is recommended that these activities are undertaken as part of a planned stakeholder management and communications strategy and not as a reactive or piecemeal exercise. Communications will be handled largely by trained PR professionals but it will be important that key management personnel are involved in these activities and are available for meetings, interviews, consultations, etc.

4.5 Crime and security

4.5.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Issues of crime and security are very much related to health, safety and well-being. It is important that management of open space ensures that users

are not vulnerable to crime. This poses a dilemma in terms of design and management of these spaces and preserving a natural aesthetic. Estate management could, for example, include secluded or wooded areas which are not necessarily compatible with security. Equally provision of lighting, whilst dissuading crime, may be an issue for these areas if disruption to fauna is likely. Employing appropriate specialists in designing solutions to best deal with these conflicts may be required.

4.5.2 RICS property lifecycle – PLANNING AND PROCUREMENT

Crime and security need also to be considered at this early stage and requirements made clear in the brief. There can be fundamental conflicts between the need to provide permeability in developments (allowing people to move through space, for space to feel accessible and welcoming, and providing linkages) versus what can be termed defendable space where permeability may be less desirable. It is recommended that guidance such as the CABE document *Secured by Design* is referred to and measures incorporated into the design to ensure that buildings and developments are more welcoming, more secure and less intimidating. It is advisable that the design brief ensures that best practice in this area is incorporated into the design.

Research shows that *Secured by Design* can reduce burglary and car crime by 50% and criminal damage by 25%. It supports one of the government's key planning objectives – the creation of secure, quality places where people wish to live and work. Architects and other members of the design team can complete CPD qualifying training in this initiative and can have developments evaluated for awards under the scheme. During design development the principles of *Secured by Design* can be adopted. An important aspect of addressing issues of security is to ensure that local people are involved in the design process giving them a sense of ownership. The inclusion of home zones can also be part of a design solution which provides for improved social interaction and pedestrian-friendly areas whilst reducing crime.

Requirements relating to the design and finished project can be simply captured in the contract documentation. There is also a need to cover the issue of crime and security during the works, and in this regard it is recommended that the contractor is required to demonstrate how a crime-free site will be maintained.

4.5.3 RICS property lifecycle – NEW CONSTRUCTION

Issues of crime and security in construction often centre on theft, vandalism and graffiti. It is recommended that the contractor is required to demonstrate how these issues will be managed and controlled. There are obvious solutions such as CCTV, site security personnel and lighting, however, it is important also that these are not intrusive and that in the instance of security lighting, for example, that it is not causing nuisance. Initiatives that have helped to minimise graffiti have included running local competitions in schools and youth centres to design murals and other art works that can be displayed on site hoardings. This is a very positive way to engage the local community and helps with the wider stakeholder issues.

4.5.4 RICS property lifecycle – OCCUPATION AND USE

The actions taken during design will help to minimise the effects of crime during the operational part of the *lifecycle*, however, there is also a need to

ensure that appropriate surveillance and maintenance and management are carried out, and in this regard there is a significant role for asset and facilities managers. External refurbishment works, in particular, will often provide an opportunity to improve security measures for existing buildings and, where crime is an issue, it is advisable to address this as part of the overall improvements sought through the refurbishment scheme. It is important to consider ongoing dialogue and consultation with stakeholders, including building users and neighbours, so that pertinent issues can be addressed and rectified. Preventative and/or improvement measures may require physical changes, for which opportunities may arise during refurbishments, or may relate to behavioural or management and surveillance-based measures. The role of asset and facilities managers is crucial in this, and it is recommended that management measures are incorporated into the Operational and Maintenance Manual.

4.5.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to crime and security during this stage of the *RICS property lifecycle* are similar to those during new construction. Issues of crime and security during demolition and remediation often centre on theft, vandalism and graffiti. It is recommended that the contractor is required to demonstrate how these issues will be managed and controlled. There are obvious solutions such as CCTV, site security personnel and lighting, however, it is important also that these are not intrusive and that in the instance of security lighting, for example, that it is not causing nuisance. Initiatives that have helped to minimise graffiti have included running local competitions in schools and youth centres to design murals and other art works that can be displayed on site hoardings. This is a very positive way to engage the local community and helps with the wider stakeholder issues.

4.6 Cultural heritage

4.6.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

In choosing either brown or greenfield locations there is a significant risk of encountering historic features. On a small island such as the UK, over thousands of years very little of our urban and suburban areas have not been touched in some way by our ancestors. Areas around rivers have particularly been exploited by man for centuries, and there remain many artefacts that are vital to the archaeological community to enable a better understanding of how our forebears lived. These resources are protected by legislation but do not, in all but a few cases, prevent development. However, what is required is a thorough evaluation and the opportunity either to record and remove the artefacts, or to record and protect them in situ. There may also be opportunities to make artefacts a feature of the new development or to provide exhibition space for them within the new development.

The siting of a new building provides an important interplay with the existing built environment. In most of our cities, we see a patchwork of building ages and types – many of which are recognised as being important archetypes of their time. As such they contribute to the historic landscape of their environment. Any new building would ideally (and similarly) contribute to and enhance the local environment and not fundamentally detract from the overall balance of the area. This is not to say that each new building should

aspire to be iconic, but there is an opportunity for buildings to be architecturally designed in a manner that is in harmony with their surroundings, thereby helping to enhance the historic landscape.

Arguably, many developments that have gained planning approval in the past have not been planned or designed in a manner that is sympathetic to enhancing the existing built environment. Where these buildings exist and are likely to do so for some time opportunities for enhancement are likely to be minimal. However, as urban infill opportunities become available when these buildings reach the end of their useful life, this becomes an opportunity to plan and design more sympathetically in order to enhance the local heritage.

The maintenance and management of greenfield sites within an estate portfolio may encounter both planning restrictions that limit development in order to provide an appropriate balance of developed and undeveloped land, and also restrictions imposed due to artefacts related to our cultural heritage. These could be areas of archaeological value, for example, or land that provides important viewing corridors that link heritage sites. Preservation of these areas not only contributes to our cultural heritage but also serves as valuable areas of green space for recreation and for ecology and biodiversity. Where present in urban areas, they provide valuable access to green space and contribute significantly to health and well-being.

4.6.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that potential issues with site archaeology are highlighted early in the planning stage. It is likely that as the design progresses the fundamental issue of location has been considered and that the choice of site is fixed – although if the appraisal is still at a stage where business needs are being considered, it is possible that alternative sites may still be an option. If there are considered to be archaeological 'show stoppers', this can result in a significant impact on the granting of planning approval, the design and ultimately the programme. There have been numerous occasions where this has happened within urban locations due to the very nature of their evolution – these areas tend to be redeveloped over the centuries, with the artefacts and remains of previous generations literally lying underfoot.

Significant impact on a development programme can arise due to unexpected archaeological finds. It is likely that a thorough site appraisal at the planning stage would have identified the likelihood and extent of such finds, allowing appropriate mitigation to be identified and budget and schedule impacts to be evaluated.

The relationship of any new development in the context of the existing townscape or landscape would be considered in the planning stage. At the design brief stage the need to address this and transmit intent to the design team, and particularly the architect, is paramount. The design direction may to some extent be dictated by the planning process, particularly if the new development is in the vicinity of a nationally important historic building or monument. Otherwise the final solution is very much likely to be determined by the client brief and the empathy and understanding displayed by the architect.

A brief that poorly describes the cultural setting for a development or an unsympathetic architectural response may result in the derogation of the local

environment in terms of its feel and identity and may detract from the interest of buildings and locations that have important heritage value.

If there are any archaeological constraints on the site, then ideally they need to be known about by outline design stage. However, the reality, particularly within existing urban areas and where existing developments may exist, is that this may not be possible. This does signify a potentially large risk as it may not be until site clearance and foundation excavations that constraints are identified. If such constraints are found at a later stage, this can result in significant redesign for foundations and piling, and any on-site evaluation of artefacts can lead to programme delays. Opportunities do sometimes exist, however, to incorporate finds into a new development.

Despite the wealth of historical information available, unknown and unexpected archaeological finds can be encountered on construction projects. These will require some degree of cataloguing before removal. The developer will be required to fund the archaeological excavation and recording and may be required to contribute to the curation of finds. A more significant consideration for the developer is likely to be the impact on the design and the programme.

The architects would now be well advanced in the visual representation of the project. It is important to ensure that this is in keeping with the local setting and complements and adds to that locale. If the new development is in the close proximity of nationally important monuments or buildings then there may be planning-related conditions that affect the visual aspects of the building including elevation. If there are any particular issues with regard to impact on materials and overall facade treatment then it is important that this is considered.

The potential for restrictions on external appearance and height of buildings may be higher if they are near historic buildings or monuments. It is important that the impact of such constraints is considered in relation to issues such as material choice. The viability of the development if there are height restrictions or viewing line considerations, for example, may be an issue (although it is recommended that these are considered at earlier stages of the development).

It is recommended that the contractor is required to produce an Archaeological and Heritage Management Plan for all works unless it can be determined beyond doubt that no artefacts are likely to be encountered or that no buildings of heritage value are to be impacted. This may be the case, for example, on highly disturbed made ground where construction methods are not likely to penetrate to depth. However, some aspects of our architectural heritage may be more recent and may include industrial archaeological artefacts, for example, or pockets of recently undisturbed ground may persist.

It is important that all risk assessment and archaeological investigation data is provided to the contractor as part of contract documentation.

The contractor will be required to incorporate this into the Plan, with clear roles and responsibilities and management measures identified in addition to systems for monitoring and recording compliance during the works. It is recommended that the Plan also clearly identifies any legislative requirements.

4.6.3 RICS property lifecycle – NEW CONSTRUCTION

Having produced an Archaeological and Heritage Management Plan, the contractor will be required to implement it during construction. There will be

a need to implement a monitoring and auditing schedule to ensure that it is conforming, particularly in relation to legislative requirements. Where archaeological finds are known to be present or where there is a high likelihood of their being present, an archaeologist will need to be present during ground works and ensure that a watching brief is being undertaken. There may be a need to undertake archaeological work in tandem with construction works as it may not always be possible to undertake all investigations prior to the start of construction. It is important that the sequencing of these activities around the construction programme and protective measures to be employed are all identified in the Plan. Where heritage issues relate to surrounding buildings and monuments particular care and attention may be required and once again it is advisable to identify these measures in the Plan.

4.6.4 RICS property lifecycle – OCCUPATION AND USE

During operation and use, the key issue is the need to ensure that matters related to cultural heritage are clearly identified in Operations and Maintenance Manuals. Where, for example, listed structures or features may be part of a building or managed grounds, it is necessary to ensure that these are protected and maintained.

4.6.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The key issue at this stage of the *RICS property lifecycle* is likely to be whether or not the building to be demolished is designated in any way, either in its own right or by adding to the overall character of an area. This may be the case in a conservation area, for example. In such an area trees may be protected and this will need to be taken into consideration if remediation work is being undertaken, for example. If the existing buildings are listed in any way severe constraints are likely to be imposed, and indeed there may be a presumption against demolition or indeed any alteration to the building. It is important that any such constraints are identified as part of the planning process and, of course, no activities would be undertaken unless approved by the local planning authority. Any demolition and remediation works required on sites with such constraints would require close consultation and agreement on methodology with the Planning Authority and other statutory consultees such as English Heritage and the Environment Agency. Agreed methods of work would need to be communicated to the contractor and it is recommended that the contractor is required to incorporate these into site method statements and management plans.

4.7 Drainage and flooding

4.7.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Large tracts of land throughout the world are subject to flood risk, and this is likely to be exacerbated by the impacts of climate change. Furthermore, stress is likely to be placed on existing drainage systems, which are already under significant pressure in many urban areas due to worsening run-off from hard surfaces which offer little or no attenuation in storm conditions. Any given development site may be subject to flooding and drainage problems. Indeed the very fact that a site has not/is not being developed may reflect this propensity. Such sites may also be vital as sacrificial flood attenuation areas and restrictions may well apply with regard to their use for development. They may also provide valuable green space for communities as recreational spaces.

Whether in public or private ownership, greenfield sites will still require management – particularly to ensure that they continue to function effectively as flood storage areas if designated as such. In any event, good management of these sites will often require that drainage is well maintained to allow water to subside after flood events and to prevent water logging and other adverse conditions that may impact on water resources, soil condition and ecological damage.

Incorrect management of these areas may increase the risk of flooding of populated areas with consequential social impacts and economic loss.

4.7.2 RICS property lifecycle – PLANNING AND PROCUREMENT

The selection of a site for a project may be greatly influenced by the effectiveness of local drainage, both natural and man-made and the site's propensity to flood in periods of heavy or prolonged rainfall. It is important that any site evaluation carried out at this stage clearly identifies these issues and brings them to the fore. The planning process will require the developer to demonstrate that the scheme will not adversely affect drainage and flooding. Increasingly stringent requirements are placed on proposals for construction and development in flood plain areas and any planning application would be vetted by the appropriate environmental agency as part of the statutory consultation process. Often, and particularly when constructing in urban and brownfield sites, betterment may be sought, whereby any new development would need to ensure that additional mitigation measures are put into place to attenuate drainage and minimise flood risk. This may include solutions such as Sustainable Drainage Systems, green and brown roofs and underground temporary storm water storage. If sustainability is in the design intent, then it is important to clearly articulate this in the design brief such that issues such as this are considered early in the design evolution and properly costed.

Potential design and mitigation solutions would start to evolve at this stage and the design would need to develop more detail around solutions for drainage and flood risk. Any opportunities with regard to more sustainable solutions need to be considered as part of an integrated process.

It is recommended that the contractor is required to produce a Water Resources Management Plan, in which all pertinent information for the site in terms of surface and ground water resources and drainage systems and their potential vulnerability would be identified. The contractor would be required to incorporate this into the Plan, with clear roles and responsibilities and management measures identified in addition to systems for monitoring and recording compliance during the works. The Plan would also clearly identify any legislative requirements.

4.7.3 RICS property lifecycle – NEW CONSTRUCTION

Having produced a Water Resources Management Plan, the contractor will be required to implement it during construction. There will be a need to implement a monitoring and auditing schedule to ensure that it is conforming, particularly in relation to legislative requirements. Guidance on water resources management can be found via a number of documentary resources and most major contracting organisations will be used to developing these plans. Specific technical advice can be obtained from the Environment Agency and its equivalents in the devolved regions and through organisations such as CIRIA.

4.7.4 RICS property lifecycle – OCCUPATION AND USE

The design should have taken into consideration flood risk and future-proofing, therefore on a day-to-day basis the main consideration is likely to be one of maintenance of drainage systems. These may be 'hard' piped drainage systems or Sustainable Urban Drainage Systems (SUDS) type systems which help to attenuate flow. Both require a maintenance regime, although these will differ. It is recommended that these requirements are included in the Operation and Maintenance Manual for the development.

4.7.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

At this stage of the *RICS property lifecycle* it will be necessary to have accurate information on the nature of drainage systems and flood risk. For newer developments much of this material may be readily available, but for older buildings considerably more investigation and survey work might be required to ascertain drainage networks. These may need to be protected during demolition and remediation, and in any event it is likely that outfalls will need to be isolated or additional protection measures incorporated during this stage in order to prevent contamination of water resources via suspended solids or via organic and chemical contaminants.

4.8 Energy

4.8.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Energy usage in buildings has become a major concern, with the generally accepted opinion that we are living in a time of climate change and that there is a direct correlation with carbon dioxide emissions since the industrial revolution and rising global temperatures. Another significant driver that has the potential to accelerate building design in terms of both energy efficiency and renewable energy sources is increasing fuel prices and rising concern regarding security of supply. Currently, world energy sources for all uses are heavily dependent on hydrocarbon sources – coal, gas and oil. These resources have been heavily utilised during the past 150 years or so, and we are fast approaching a time when the extent of their depletion will lead to uneconomic abstraction. With oil, there has been much debate as to when 'peak oil' will be reached. What is certain is that as population increases and demands on these natural resources escalates so will their availability and price. It is recommended that the management strategy incorporates minimising the use of hydrocarbon based energy resources throughout greenfield and estate management. This may include the use of renewable energy sources for the operation of plant and equipment or changes to the management regime that will reduce reliance on energy usage.

Greenfield and estate management offers opportunities for investment in renewable energy. Subject to planning permission, it is possible that large open spaces can be developed to include wind turbines. For viability these typically require consistent wind velocities of at least 6m/s. Large scale photovoltaics may also be viable where the site is remote and there are high additional costs of grid connection or reinforcement. Biomass, biogas, biofuels and waste to energy technologies could be considered and a study to establish the supply and demand and development costs would need to be undertaken. Clients who do not wish to manage the development themselves may wish to enter into an

agreement with an Energy Services Company (ESCo) or Multi Services Company (MUSCO) to develop the opportunity on their behalf.

4.8.2 RICS property lifecycle – PLANNING AND PROCUREMENT

Development of the energy strategy will become more pertinent in subsequent stages, however, even at project inception and appraisal it is important that the client and the client's team are mindful of likely energy requirements and the available infrastructure and/or space requirements required within the land available to provide for both passive and active elements of the energy strategy.

The energy hierarchy of 'be lean, be green, be clean' refers to the practice of:

- minimising demand in the most cost effective way;

  before
- providing as much renewable energy as possible;

  before
- looking to procure energy from green sources from the energy grids.

If the energy infrastructure and strategy have not been considered at even a cursory level at this stage, the design may be advanced on an incorrect basis. For example, available land for the project may be found to constrain the inclusion of passive and active means of heating and cooling if a particular level of occupancy has been targeted and no consideration given to increased wall thickness due to enhanced insulation, or to external or basement space availability for locating boilers and/or fuel.

It is important that the client brief makes clear the requirement for energy efficiency and evaluation of renewable energy resource options. As the energy strategy develops in more detail it is vital that it adequately captures the client's aspirations with regard to the building's energy performance. This needs to be captured at an early stage if maximum benefits are to be gained and it is advisable that the design is predicated around low energy design incorporating appropriate passive or low energy ventilation and heating strategies. The strategy may well influence the choice of consultants that need to be engaged on the project at this stage, as the client may wish to seek confidence that they have a track record in delivery energy efficient buildings that exceed basic Part L requirements and that they are innovative in seeking design solutions.

As the design for structural and building services systems begins to evolve in more detail the outline specifications and preliminary cost plan will begin to emerge. This is a crucial time in the development of a new project as decisions at this stage may often be carried through into detailed design and implementation. Ensuring that the structural and MEP designers and engineers are alive to the requirements of the low energy strategy is vital, as is the understanding of the interfaces between the structure and the energy strategy.

The more passive the design of the building the less energy it is likely to consume. It is recommended that this is the starting point in a hierarchy that strives to minimise energy use before identifying the technology required to provide the energy that will be ultimately required for the building.

Often only the heating, ventilation and air-conditioning (HVAC) issues are prioritised, so it is important to ensure that the entire MEP requirements are considered at this stage (although optimisation may happen later).

Not addressing this issue in an integrated way at an early stage in the project will result in increasing difficulty to minimise energy requirements at a later stage. This may well result in a largely inefficient building in terms of energy usage, where any subsequent attempts to reduce energy use will require significant redesign and/or the incorporation of expensive renewables technology to reduce the overall operating carbon generation from the building. Additionally, the more complex and extensive the MEP plant and equipment the more expensive it is likely to be in both capital and operational and maintenance costs.

It is recommended that the integrated team identifies the passive heating and cooling measures that can be adopted on the scheme and consider the performance required of the building fabric with regard to heat loss/gain, i.e. its thermal performance. At this stage it is important to consider issues such as daylighting in order to reduce the need for artificial lighting and the overall energy performance of all MEP.

Typically several energy strategies may have been considered up to this point but in moving the design forward it is likely that only one will be costed at this stage and developed further, so it is important to put forward a sufficiently robust case. Any requirements with regard to renewable energy or decentralised technologies (dictated by planning conditions or the client brief) need to be examined and put forward. It is recommended that these options are evaluated in the light of both life cycle impacts (LCA) and Life Cycle and Whole Life Cost (LCC/WLC) and that an FM specialist is involved.

During the design development that takes place at this stage, the emerging design and the interplay between the ultimate energy consumption of the building, the way it will be used and occupied, and its internal and external environments, will come to the fore. This is the start of what is essentially the optimisation process and the design developed at this stage will be critical to the final performance of the building. Given the longevity of the building, typically 60 years, design life decisions made at this stage will have considerable impact on the lifetime performance of the project.

The more accurate the information collected at this stage in the design evolution, the greater the likelihood that the building will meet its performance targets. Information required would include proposed orientation and floor plate, usage, occupation density and hours, equipment use within the building, and noting high IT loads for trading floors, for example.

It is recommended that a dynamic model is always be used for energy modelling. This is increasingly the case although often in the past a product supplier's software may have been used for purely sizing equipment. Once a base case model has been established this can be manipulated as options are considered and decisions made with regard to reduction of building energy loads. It is advisable to adopt a strategy that uses the hierarchy of orientation, fabric/facade and technology/equipment.

It is recommended that strategies for heating and cooling consider the benefits of passive or mixed-mode measures.

A continued integrated approach to design remains vital, as often at this stage the MEP design issues can predominate and context within the overall design can be lost. Furthermore, the impact of issues such as accurate sizing can have significant knock-on impacts not only in terms of space occupation, but also

on ongoing operational costs. It is important at this point to consider the programming of activities such that rework is not required due to poor sequencing during construction.

The choice of energy provision would then be a secondary issue, such that, whatever the carbon intensity of the chosen energy technology, it is minimised. The choice of energy system and distribution requirements is detailed at this stage, so fundamental decisions around this are fixed beyond this point. A thorough evaluation of the suitability of the technology, its performance, operating costs and life cycle impacts needs to be understood before this stage is completed.

It is important to ensure that all design parties are in dialogue, constraints are identified, sizing is appropriate and construction sequencing issues are recognised.

It is recommended that the contractor is required to produce an Energy Management Plan detailing how energy usage is to be minimised during the construction process. Although we have not directly considered climate change as an issue for the contractor to cover, minimising energy usage will help to minimise carbon dioxide release to the atmosphere. The contractor will be required to incorporate these measures into the plan, with clear roles and responsibilities and management measures identified, in addition to systems for monitoring and recording compliance during the works. It is important that the Plan also clearly identifies any legislative requirements.

Requirements for commissioning of the systems are also vital here, and it is recommended that full commissioning is specified for all HVAC systems.

Energy is normally a specific criterion against which credits are awarded under building performance schemes including BREEAM, LEED and the *Code for Sustainable Homes*. All three schemes have mandatory or prerequisite credits that must be achieved if the building is to receive certain levels of certification under the schemes.

4.8.3 RICS property lifecycle – NEW CONSTRUCTION

A key aspect of a building's energy performance is that it is properly commissioned at completion. There are of course other aspects of building systems to which this relates and it is advisable to identify this in a clear scope.

Full systems commissioning is recommended for HVAC, electrical, mechanical and safety systems in particular. The process of commissioning will ensure that there is a documented record that the systems are in compliance with the specifications and design intent.

Typical systems include not only the HVAC but all associated controls, ducts, insulation, energy technologies, safety systems, electrical systems, lighting and lighting controls and any heat recovery or thermal storage systems.

During the construction it is recommended that the contractor is required to demonstrate that that the operation is minimising energy consumption in accordance with the Energy Management Plan.

The monitoring of energy consumption during construction is also part of the requirements to achieve credits under schemes such as BREEAM.

4.8.4 RICS property lifecycle – OCCUPATION AND USE

In use, the key issue is to understand how energy is being consumed. Good design would have taken this into account to a large extent, having modelled the building based on building type, information about its construction and its services, how it is to be used and comparing with performance in energy efficient buildings. However, modelling does not take into account the human factor, and the reality that buildings will be populated! Furthermore, the way in which they are used, density and hours of occupation may not be as expected or anticipated, so invariably real performance will be very different to that modelled. Capturing data from the Building Management System and evaluating real usage parameters for the building and using this to optimise performance is vital if the energy consumption of the building is to be minimised.

Investment in metering of energy use is essential for any form of energy management. It is recommended that the existing metering provision of the building is reviewed and, if necessary, new meters installed that allow energy consumption to be measured and broken down by location and service/activity.

The maintenance strategy would include consideration of improvement or upgrades to lighting, with greater use of compact fluorescent lamps, light-emitting diodes and induction lighting, all of which have significantly lower energy consumption than older filament lamps. Controls linked to variable speed drives will allow for greater control and managed energy loads. It is recommended that Building Management Systems that allow parts of the system to be shut down or ramped back out of hours or when they are not occupied are considered.

4.8.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to energy at this stage of the *RICS property lifecycle* are similar to that of new construction. It is recommended that the contractor, through an Energy Management Plan, demonstrates how the operation will minimise energy usage during the works.

4.9 Geology and soils

4.9.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

The earth's geology is fundamentally linked with all natural systems. From the rock that forms the earth's crust, the process of erosion and weathering breaks these materials down to form the mineral component of our soils. The soils themselves are a reflection of their mineral composition and, in the case of the overlying (or topsoil), are also a product of organic material that has accumulated within this mineral skeleton. This combination ensures that soils vary in terms of their acidity/alkalinity, moisture retention capability, texture, tilth and chemistry. The soil combinations in turn have a profound influence on the fauna and flora that they support.

The nature and quality of undeveloped sites is a function of this basic substrate, climatic conditions, water regime and management practices that maybe employed. Maintaining the diversity and interest of these sites whether greenfield or part of estate management is therefore of vital importance.

4.9.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that information on geology and soils is obtained as part of the appraisal stage. Geology has an impact on foundation design, as well as providing valuable information on groundwater regime in terms of its potential vulnerability and helping to evaluate ground and groundwater conditions with regard to suitability for renewable energy options such as ground source heat pumps. Soils, particularly subsoils and topsoils are a valuable resource and quantifying them at this stage will help in determining what can be retained and reused on site and what can be taken for third party use elsewhere. Geology and soils, of course, have a fundamental impact on the flora and fauna on a site, and therefore evaluation of the soils will also provide vital clues to the ecology and biodiversity of a site.

The concept design needs to start bringing this information together as this will start to inform the foundation design and any subsurface structures, basements, etc. of the proposed project, which will be further refined through to detailed design. Also at this stage the information on soils will start to inform the concept design and architectural intent with regard to incorporation of ecology and biodiversity in the design.

It is recommended that the contractor is required to produce a Management Plan relating to geology and the management of soils during the construction period. It is important that all pertinent information for the site in terms of ground conditions is provided, particularly if any contamination issues are relevant. Geology is intricately linked to groundwater resources in many instances, and therefore protection measures for this resource need to be identified. Soils, particularly subsoils and topsoils, are a valuable resource and it is important to conserve these wherever possible. There may be opportunities to reuse them on site; if not, opportunities for off-site beneficial use can be identified.

4.9.3 RICS property lifecycle – NEW CONSTRUCTION

It is recommended that the contractor is required to demonstrate implementation of a Soil Management Plan in order to preserve and protect these materials on site pending their reuse. If the development cannot accommodate these materials once excavated, then it is advisable to identify third party beneficial use on alternative sites.

4.9.4 RICS property lifecycle – OCCUPATION AND USE

At this stage, the issues relating to geology and soils in occupation and use are similar to those of greenfield and estate management. In essence a management regime needs to be established as part of the overall operation and management of the development.

4.9.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues of geology and soils at this stage of the *RICS property lifecycle* are once again similar to those during new construction. Where soils are not contaminated and can be protected then it is important that appropriate management measures are employed. Where contaminated and remedial measures are required, it will be possible in most cases to reuse many of these materials on site. Topsoils in particular are likely to have lost much of their function in the remediation process as this will often reduce organic matter

content and kill fauna. With amelioration and time, however, this function can be restored and may be an option as part of site retention. Geology in this context is important not just in terms of its influence in overlying soils, but in its link to hydrogeology and the potential for contaminant migration and subsequent groundwater contamination. Investigations need to ensure that the geological and hydrogeological regime is thoroughly understood and measures need to be put in place to minimise risk of contamination during ground works.

4.10 Health, safety and well-being

4.10.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Issues of health, safety and well-being at this stage of the *RICS property lifecycle* can be numerous and could be related to trip, fall and slip hazards, water hazards, chemicals used for grounds maintenance, machinery and equipment safety issues, pests and vermin. It is recommended that these issues are considered as part of an Asset and Facilities Management Plan.

4.10.2 RICS property lifecycle – PLANNING AND PROCUREMENT

At the briefing stage it is important for the client to articulate its intentions with regard to issues such as Indoor Environmental Quality (IEQ). Ensuring that this is a key issue for the client will set the tone for the ongoing design and will ensure that thought is given to ventilation strategy, material choice and final commissioning of the building. These issues are surprisingly often overlooked.

Issues of IEQ during building operation and use are significantly impacted on by the design choices. In addition to ventilation strategy, choice of materials used internally can result in prolonged 'off-gassing' and failure to minimise dust intrusion into duct work can lead to difficulties in obtaining good air quality once the building is commissioned. There is a diverse number of building materials in common use that have indoor air quality impacts, and this includes floor coverings, paints and finishes, adhesives, sealants, insulation, furniture and even less obvious components such as plasterboard.

There are also of course legal requirements arising from the *Construction (Design and Management) Regulations* 2007 (CDM Regulations) that will need to be adhered to.

The choice of materials, particularly for internal elements and fit-out as well as commissioning of the building, can influence indoor air quality and general feeling of health and well-being. The positioning of air intakes and exhausts in a mixed mode or mechanically ventilated building also needs to be considered as part of an appropriate strategy if the building is to be naturally ventilated.

The access to external views and the extent of daylighting are also considered important in engendering health and well-being, so issues such as size of floor plate, provision of atria, proximity to other buildings, etc. all need to be considered.

An indoor air quality expert needs to be included in discussions during the evolving design to ensure that any concern with regard to material specification and placement of exhausts and intakes is taken into consideration.

Daylighting and overall ventilation strategy are somewhat more fundamental and need to be considered very early in the process as they will be largely dictated by the specific location of a building and its viability within the development plot. Where a narrow floor plate is not possible, for example, other options for increasing light penetration into a building can be considered such as sunpipes or light shelves.

It is important for the interior designer to have bought into this to ensure, for example, that the choice of colour palette that will work in harmony with the building and increase reflectance and light penetration. A related issue is the consequent need for both functional and mood lighting, and the energy performance specification needs to be considered at this stage.

Building acoustics are another consideration in providing a productive and healthy internal environment, so it is important to consider the choice of materials and location of noise emitting sources both inside and outside the building.

At the detailed design stage more detail needs to be considered regarding ventilation rates, avoidance of glare whilst still providing sufficient light, specification of sound absorbing materials, strategy and provision for individual and local control of climate and specification of low VOC emitting materials (VOCs being volatile organic compounds).

Many requirements in this area during construction are now covered by legislation. However, it is advisable that the provision of appropriate facilities during construction works is accurately specified in the production of contract documentation. It is recommended that the contractor is required to provide a Health and Safety Management Plan to demonstrate that all risks have been identified and mitigated. It is important that all pertinent information produced during site investigation and project design is made available to the contractor.

4.10.3 RICS property lifecycle – NEW CONSTRUCTION

Approximately 2.2 million people work in Britain's construction industry, making it the country's biggest industry. It is also one of the most dangerous. In the last 25 years, over 2,800 people have died from injuries they received as a result of construction work. Many more have been injured or made ill.

Falls continue to be the biggest cause of fatal injury in Britain's workplaces. On top of this, over 4,000 major injuries such as broken bones or fractured skulls are reported to HSE each year by the construction industry. Over half of these serious injuries involve falls from height or from tripping over materials on walkways and are easily preventable. (Source: HSE, 2009)

To add to this, construction workers are regularly exposed to dust and chemicals and caustic substances and noise and vibration.

Ensuring that risks have been considered and designed out is a key requirement of the CDM Regulations, but there are still many risks that need to be controlled in the construction stage and it is the responsibility of the principal contractor to ensure that an effective health, safety and well-being system is being implemented.

4.10.4 RICS property lifecycle – OCCUPATION AND USE

Occupation and use may also have a significant element of construction-related activity during refurbishment, for example, so the issues arising during

construction identified above are all relevant. Many of these issues can also impact on users and occupiers of buildings and the asset and facilities manager has a key responsibility in ensuring a safe workplace. This is more readily understood and managed for issues such as trips, falls, lifting and posture, however, off-gassing from construction and fit-out materials and from IT equipment is not always recognised. These issues all need to be considered and choices made through appropriate specification and space utilisation to minimise or remove these potential ill effects. It is important to consider opportunities to improve indoor air quality and natural light during refurbishments and refits, as improvements can be made in a number of areas through consideration of layout and seating plans, choice of fit-out materials and products, introduction of better lighting or improving light penetration into the building.

4.10.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues related to health, safety and well-being at this stage of the *RICS property lifecycle* are similar to those experienced during new construction. Ensuring that risks have been considered and managed is a key requirement of the CDM Regulations, but there are still many risks that need to be controlled during this stage and it is the responsibility of the principal contractor to ensure that an effective health, safety and well-being system is being implemented.

4.11 Human rights and ethics

4.11.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Breaches of human rights and issues of ethics can be manifest in the construction supply chain, although these may not always be obvious. The issue of ethical timber sourcing has long been identified and numerous measures now in place include a profusion of certification systems that provide varying degrees of confidence over sustainable and ethical sourcing of timber. However, similar considerations can be extended to the raw materials and products that are sourced from throughout the world where not only would environmental practices be unethical but also working conditions may be in breach of human rights. These breaches may relate to health and safety, working hours, bonded labour and pay.

4.11.2 RICS property lifecycle – PLANNING AND PROCUREMENT

When specifying and procuring materials and products these considerations are unlikely to be at the forefront of the decision-making process. Closer to home, examples have come to light where subcontracted labourers have been paid below the London minimum wage.

It is recommended that contractors are required to demonstrate how they intend to avoid any such breaches.

4.11.3 RICS property lifecycle – NEW CONSTRUCTION

In selecting the contractor, consideration would have been given through pre-qualification and tendering as to how the contractor proposes to ensure that there are no human rights breaches or ethical issues during the construction period. Directly on site issues may pertain to employee wages and working hours, and there are many recorded instances of bonded labour and

payments at less than that of the accepted minimum wage in the construction industry, particularly amongst third tier contractors and construction support workers such as cleaners, catering staff, etc. It is recommended that contractors are required to demonstrate that they have undertaken appropriate checks to ensure that there are no malpractices being undertaken on their site. Human rights issues can also relate to those being impacted by construction work, such as the right to a good night's sleep that may be disrupted due to night-time construction work. Generally for building projects it is extremely unlikely that permission would be granted for night-time working, and certainly not for any extended period. However, this is more common for infrastructure projects where for reasons of engineering practicality night-time working may be the only reasonable or safe solution. Activities are clearly identified and methodologies need to be submitted for approval, including details on calculated noise outputs.

Supply chain issues can be harder to identify, particularly with the global procurement practices that are abundant in the construction industry. Increasingly information sources are available that identify the more common human rights transgressions, facilitated by the ease of access via the internet. It is recommended that contractors have procedures in place to demonstrate that they have questioned their supply chain on the origin of construction products and materials and that in turn have undertaken appropriate checks. Transgressions in this area can relate to bonded labour, long working hours and unhealthy and unsafe working environments. The industry is probably more familiar with the issues of sourcing materials such as timber, where concerns have been raised with regard to unsustainable timber production resulting in clear felling of internationally important rainforest with consequent impacts on fauna, flora, water resources and climate. Systems have been in place for a number of years to deal with this, including certification schemes, the most well known of which is certified by the Forestry Stewardship Council (FSC). Non-certified timber does, however, still find its way into UK construction projects, and it is recommended that contractors are required to demonstrate how they intend to minimise this risk. Similarly, the extraction and manufacture of other construction products may be being undertaken in an unsustainable manner in terms of impact on natural resources as well as on the workforce and it is advisable to question the supply chain regarding the systems that it is implementing to identify these issues.

4.11.4 RICS property lifecycle – OCCUPATION AND USE

The issues relating to ethical supply and human rights are very similar during the occupation and use stage of the *RICS property lifecycle*. In essence many of the activities are similar: there is a requirement for cleaning and catering services, the building may be subject to refurbishment and refit leading to the same issues arising from sourcing of materials and products, and there may be noise issues resulting from the use of the building or from construction activities associated with refurbishment. It is recommended that the procedures for checking on these impacts are therefore included as part of the overall operation and management during occupation and use.

4.11.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to human rights and ethics at this stage of the *RICS property lifecycle* are similar to those during new construction. In selecting the

contractor, consideration would have been given through pre-qualification and tendering as to how the contractor proposes to ensure that there are no human rights breaches or ethical issues during the construction period. Directly on site issues may pertain to employee wages and working hours, and there are many recorded instances of bonded labour and payments at less than that of the accepted minimum wage in the construction industry, particularly amongst third tier contractors and construction support workers such as cleaners, catering staff, etc. It is recommended that contractors are required to demonstrate that they have undertaken appropriate checks to ensure that there are no malpractices being undertaken on their site. Human rights issues can also relate to those being impacted by construction work, such as the right to a good night's sleep that may be disrupted due to night-time construction work. Generally for building projects it is extremely unlikely that permission would be granted for night-time working, and certainly not for any extended period. However, this is more common for infrastructure projects where for reasons of engineering practicality night-time working may be the only reasonable or safe solution. Activities are clearly identified and methodologies need to be submitted for approval, including details on calculated noise outputs.

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4.12 Landscape and visual aspects

4.12.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

The landscape and visual aspect of a development is a key consideration and one that would be controlled through the planning process. In fact the term landscape could be extended to townscape where, similarly, proposals for a new development would need to ensure that certain constraints are likely to be exercised. Many towns and cities will, for example, have viewing lines to prominent buildings and features of cultural interest and these would need to be maintained, and as such would impose constraints on new developments. It is important that a similar sensitivity is adhered to even in less urban areas.

4.12.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that the design brief is sensitive to landscape and visual aspects, even though this may be ultimately controlled by the planning consent. The brief could require, for example, that the design team works in sympathy with the surrounding landscape or townscape. In areas of undulating land this can be utilised beneficially where designing in harmony with the ground topography, for example, can help to minimise earth movements thus avoiding costs associated with excavation and removal.

Ideally, it is recommended that the concept design is sensitive to and reflects the land use issues. Ultimately they may be controlled by the planning consent so any deviation from this will necessitate redesign or extensive renegotiation at a later stage if not integrated by this time. Details around the landscape and visual elements would be well advanced at this stage.

It is important to make appropriate information on land use designation both within and external to the site available to the contractor. This is particularly important if sensitive uses are adjacent to or in close proximity to the site. Where sensitive land uses are present on the development site, it is recommended that the contractor is required to produce a plan to demonstrate how this will be managed during the works.

4.12.3 RICS property lifecycle – NEW CONSTRUCTION

Not applicable.

4.12.4 RICS property lifecycle – OCCUPATION AND USE

The main issue in relation to this stage is to ensure that any landscape and visual considerations identified during the design stage of a project are captured in the Operations and Maintenance Manual, such that an appropriate management regime can be put in place. It is unlikely that any modifications to a building that will impact on visual aspects will not require planning approval so the potential for non-conformance is low.

If the asset is already in existence, issues relating to landscape and visual impacts may not necessarily have been documented. It would be prudent to identify these at acquisition and ensure that these are recorded in order to promote best practice in ongoing maintenance.

4.12.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

At this stage in the *RICS property lifecycle* there is likely to be significant impact on a site in terms of its own landscape and visual impact. Inevitably damage will occur, but it is important to minimise this where possible through identification of parts of the site which can, for example, be cordoned off and protected. This will be particularly important if these areas have any designated landscape value or associated important ecology. It is important that appropriate surveys are undertaken to establish this prior to commencement of work.

4.13 Land use

4.13.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

The issue of greenfield in terms of land use is predominantly about ensuring that an appropriate maintenance regime is in place to allow the land to

continue its function. Natural habitats evolve when not managed, and therefore what most of us recognise as greenfield are usually subject to a significant maintenance regime. Sensitive management will ensure that that regime is appropriate, and designed to maintain or enhance the site's ecology and biodiversity value. Within estate management, outdoor areas can be planned and designed to work more in harmony with nature through consideration of habitat, provision of shade and cooling, Sustainable Urban Drainage Systems (SUDS), soil improvement and minimising irrigation requirements.

4.13.2 RICS property lifecycle – PLANNING AND PROCUREMENT

The issue of land use at this stage of a project is linked principally to its use designation. This ultimately defines the use to which that land can be put, although designation can be changed through the planning process. This mechanism is often used by government where there is a compelling need to release land for development as it is vital to the economy of the region through the need for additional commercial, residential or industrial capacity. The design brief and accompanying information for a project will normally be expected to contain information on land use, and it will be important to ensure that the development is in line with this. It is important that any sensitive land uses adjacent to the development are identified such that the design can take them into consideration. An adjacent land use may place a constraint on the new development due to a particular activity being undertaken, for example, and it would be better to identify at this stage how this might influence orientation of the new development than to redesign at a later stage. In this regard it is worth noting potential conflicts with such issues as building orientation, glazing and facade, and solar gain as the design develops.

As the concept design evolves the land use issues will become further refined. There will be a balance here between the physical building footprint and the commercial viability of the building based on the proportion of the site that can be built on and restrictions in terms of building height.

It is recommended that any information pertinent to land use on the development site or on adjacent land is made available to the contractor. It is important not to assume that the entire development site will be within a building footprint and also to explore opportunities to preserve undeveloped or green areas within the site boundary. Where site survey and construction logistics information is available to suggest that parts of the site can be retained, then it is advisable to reference this at this stage and to require the contractor to develop a management plan detailing measures for protection.

4.13.3 RICS property lifecycle – NEW CONSTRUCTION

Having produced a Management Plan, the contractor will be required to implement it during construction. There will be a need to implement a monitoring and auditing schedule to ensure that it is conforming, particularly in relation to legislative requirements.

4.13.4 RICS property lifecycle – OCCUPATION AND USE

It is recommended that the Operation and Maintenance Manual for the development includes appropriate information relating to land use and the regime required in order to retain its character and value.

4.13.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

Similarly to the new construction stage, during demolition where there is a possibility or requirement to retain undeveloped or green areas of a site then it is recommended that these are clearly identified and requirements put in place to ensure that these areas are protected. Complications can arise if remediation works are required and significant disturbance is expected. Natural land use is usually defined by factors such as soil conditions and characteristics, and climate, so there may be opportunities for selective removal and storage of soil materials until completion of remedial work, whereupon soils can be reinstated and some of the previous function re-established.

4.14 Material use

4.14.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Material choice has a fundamental impact on environmental resources and pollution through extraction and manufacturing processes. Increasingly clients are seeking options that minimise this impact and demonstrably contribute to their CSR. Commitment to a building assessment methodology will ensure that consideration of materials is taken into account as this will contribute significantly to the overall rating achievable. Material systems have been rated by organisations such as the BRE in its *Green Guide to Specification*, and this provides information on materials with lower overall environmental impact. The process by which materials are evaluated is known as Life Cycle Assessment (LCA) – a management tool that allows collection and evaluation of data on the inputs and outputs of materials, energy and waste of a product over its entire life cycle. By using it a product's possible impact on the environment can be calculated. Building systems are rated according to their overall impacts as analysed by this technique.

Transportation options are also an important factor, as transport-related impacts such as energy usage, noise, air quality and congestion all contribute to the overall impact of a construction material. In addition to considering this issue as part of best practice, depending on the nature and scale of a particular project, the local planning authority may impose conditions relating to transport movements servicing a construction site. A related issue considers another aspect of sustainability which is the use of the local supply chain to help the local economy. Also for reasons of planning or architectural intent there may be a use of vernacular design, where traditionally many materials may have been locally derived. As well as assisting the local economy such choices may also reduce the overall environmental impact of the material choice, although this does need to be evaluated on a material by material or product by product basis.

The choice of any construction material or product has an environmental impact. Applying decision making to material choice based on sound assessment methodology can help to ensure that impacts are kept to a minimum. Impacts start at the point of material extraction and continue through into the manufacturing process. Transport distances can have a profound overall impact and it is important that they are also considered. It is recommended that the choice of materials during any part of greenfield or estate management seeks to identify low impact options. Requirements and specifications can be incorporated into the procurement documents to ensure that products and materials conform to acceptable environmental standards.

Increasingly manufacturers display (or are able to provide) data on environmental performance and it is advisable to use this information during selection.

4.14.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that the design team is appraised of the client's intent and aspirations regarding material choice and transportation options and therefore it is advisable that this is explicit in the brief.

The architects are likely to have a fairly clear vision of what the final scheme will look like by this stage so it is important to have instilled into the design team the overall ethos behind material selection before now. However, opportunities still prevail, as a number of options may still be available that can reduce impact.

The choice of materials has implications on the impact of extraction of raw materials in terms of resource depletion as well as consequential implications to habitats and ecology. The manufacture of these raw materials into products can also have significant impacts in terms of energy usage and chemical pollutants that are discharged to water as effluents or as gases and particulates into the atmosphere. Additional impacts arise through transportation of materials and products to site (including carbon and other emissions) through fuel consumption, noise, congestion and potentially, dust nuisance if not controlled. Furthermore, as resources become more scarce, cost-related impacts are also seen.

As the construction industry operates a global supply chain, it is important that robust procedures are in place to ensure compliance with the specification and responsibility for checking this compliance is set out in advance. Product Certification Schemes such as the Forestry Stewardship Council (FSC) and other Eco Management and Audit Schemes (EMAS) can be specified as the means by which the integrity of the materials is assured. These types of schemes are recognised in BREEAM, LEED and *Code for Sustainable Homes* and contribute to the credits.

Designing with the intent of minimising overall material use is at the heart of sustainable building design. This has to be considered holistically, however, to ensure that basic building fabric is not compromised in terms of meeting proposed energy efficiency objectives or durability criteria. If this holistic approach is not considered, then energy use and repair and maintenance over the life of the building may negate any initial efforts to minimise material use. However, within these constraints there are opportunities to identify where parts of existing structures can be maintained and used within a new building, or if recovered material or products with recycled content can be used in the construction process. This requires the involvement of structural engineers and specifiers to agree that these opportunities will be developed as the design is progressed.

As the palette of materials is defined, it is recommended that Life Cycle Assessment is used as an analytical tool to develop an acceptable specification for materials. This will take into account issues such as embodied energy and wider environmental impacts of material production. An important consideration at this stage is also that of design for deconstruction as this can significantly reduce the life cycle impact of a construction material or product by increasing reuse potential significantly.

Designers are also advised to standardise wherever possible to minimise off-cuts and consequent wastage during on-site assembly. In this regard off-site manufacturing techniques are often more efficient in their use of materials, although fabrication of complex elements can hinder end of life reuse.

Guidance such as the *Green Guide to Specification* can help to inform material choices and increasingly developers are working with their design team and manufacturers to develop sustainable material specifications for their projects. Decisions around material specification are pertinent to all aspects of selection, such as concrete, brick, tile, steel and other metals, insulation and membranes, timber, plastics and composites, glazing, furniture and finishes, and lighting.

Another major and often overlooked factor in material choice at this time is related to ethical supply. Designs, particularly by architects, and subsequent specification may not consider the origin of materials and products to be used in the project. The proposed use of certain materials and early decisions around specification could well begin to influence their sourcing later in the *RICS property lifecycle* when contractors are procuring materials. In this regard questions may arise relating to working conditions (e.g. health and safety, working hours, salary, bonded labour) of those employed in their extraction and manufacture.

It is recommended that the contractor is required to produce a Materials Resource Management Plan. Typically, under legislation now passed in England and likely to be adopted in the devolved administrations, the requirements for this will be covered within a Site Waste Management Plan. However, best practice clearly identifies that the plan can be used as more than a vehicle for meeting legal compliance, and that it can be beneficially used from the design process onwards to minimise the generation of waste and therefore minimise materials usage in the construction process. Material procurement and use issues include the impact of packaging and so this also needs to be considered.

It is recommended that the contractor is required to incorporate these best practice measures into the Plan, with clear roles and responsibilities and management measures identified in addition to systems for monitoring and recording compliance during the works. It is also important that the Plan clearly identifies any legislative requirements.

Also associated with materials use is the choice of materials in terms of their wider environmental impacts, and it is advised that contractors are required to demonstrate that they are working proactively with their supply chain to identify and procure materials with low environmental impact. This can be achieved by formulating questionnaires to suppliers requesting environmental performance data.

4.14.3 RICS property lifecycle – NEW CONSTRUCTION

Under recent legislation in England and currently best practice in the devolved administrations, there is a requirement for the production of a Site Waste Management Plan for all projects in excess of £300,000. In minimising materials usage there is a need to address this issue at design stage, but on appointment of the contractor responsibility for the Plan is transferred. This then is likely to act as the prime vehicle for implementing measures to minimise the generation of wastes on site. Key aspects of this relate to logistics, material and waste segregation, procurement and take-back arrangements, and

sourcing of materials and products with recycled content. The latter can make a significant contribution to diverting material away from landfill as well as minimising the need for extraction of virgin materials – with its subsequent impact on resource depletion, water resources, ecology and biodiversity and energy usage in extraction and manufacture (so-called embodied energy). There are also a myriad of other environmental impacts arising from the choice of construction materials and increasingly information about these impacts is available via technical data sheets provided by manufacturers. This agenda can be client led, but there is a significant opportunity for the contractor to implement best practice measures in this area and in so doing maximise cost savings as well as promoting good environmental practice.

4.14.4 RICS property lifecycle – OCCUPATION AND USE

During occupation, there will inevitably be a need to undertake refurbishments, refits, and extensions, and the issues of material choice and subsequent impacts will arise. The issue here is the same as in earlier *lifecycle* stages where materials are being specified during the design phase or procured by the contractor during construction. It is recommended that the same investigatory processes are undertaken during occupation and use to ensure materials of low environmental impact are being sourced, procured and used.

4.14.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

In relation to material use, it is important that demolition and remediation activities are seen as an integrated part of the project *lifecycle* that leads to the design and construction of new buildings on the site in question. By taking a more seamless approach to this it is often possible to maximise the benefits that can arise from the demolition stage. The industry has produced best practice guidance that promotes pre-demolition audits. Best practice promotes the use of materials by value, employing a hierarchy that begins with opportunities to utilise all or parts of existing structures in the new build. Failing this there may be value in salvaging materials with reuse on or off site, followed by on-site reuse of materials as structural or general fill, or off-site use. The option of last resort would be disposal to landfill. In using materials in this way, cost benefits can accrue and there are also consequent environmental benefits from a reduction in the use of virgin materials.

4.15 Pollution and nuisance

4.15.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Issues of pollution and nuisance may relate to existing or former land use. Pollution may include contamination of land and water resources from previous land uses or emissions from off-site activities. Nuisance may include issues such as noise, vibration and dust from both on and off-site activities. Where these impacts may arise from on-site management activities, it is recommended that appropriate management plans are employed to minimise their impact. Greenfield/estate management may require use of chemicals such as pesticides and fertilisers and therefore their proper use and storage would be an important consideration at this stage. Application of such chemicals needs to be in accordance with the prescribed usage, and care needs to be taken to avoid spillage and to ensure that risk to pollution of water resources is

minimised. Vandalism can often result in indiscriminate disposal of stored pesticides and fertilisers into the environment, hence the need to ensure that they are safely and securely stored.

4.15.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that site appraisal and suitability take factors such as pollution and nuisance into account, as these may be particularly pertinent to value if the new development is a commercial or residential scheme. Information obtained at this stage is pertinent to the feasibility studies undertaken at this time, particularly as they may impact on cost and viability of the scheme.

It is possible that the proposed development itself may be the cause of potential pollution and/or nuisance. However, such a proposal is likely to be strictly vetted by the planning process and in any event influenced by land use zoning, which would limit such a potential project to an area zoned for industrial use. Additionally, requirements for clean technology for most polluting activities would ensure that such impacts were minimised and kept within legally acceptable limits.

Pollution and nuisance is unlikely to arise unless the proposed scheme or project is industrial in nature, and this being the case it will be subject to stringent regulatory requirements. The consequent design will incorporate the appropriate features required to ameliorate potential impacts.

It is recommended that the contractor is required to produce a Management Plan relating to noise, vibration, dust and air quality. It is important that all pertinent information for the site and surrounding use and sensitivity are provided. The contractor will be required to incorporate this into the Plan, with clear roles and responsibilities and management measures identified, in addition to systems for monitoring and recording compliance during the works. It is recommended that the Plan also clearly identifies any legislative requirements.

4.15.3 RICS property lifecycle – NEW CONSTRUCTION

Construction activities themselves can have significant pollution and nuisance implications and invariably do, particularly in the latter case. One of the most significant nuisance impacts during construction is noise. Vibration can also be an issue during operations such as driven piling and movement of large construction plant and machinery. Badly maintained plant and machinery can also contribute to poor air quality through emissions, and inadequate measures during dry periods can lead to dust nuisance. It is recommended that the contractor is required to develop Management Plans for mitigating these impacts, and demonstrate that the Plans are being implemented appropriately. Instances of nuisance can lead to investigation by the enforcing authorities, usually the Local Authority or Environment Agency (and its equivalents in the devolved administrations), and can result in an order to cease a particular activity or, in extreme cases, shut down a site.

4.15.4 RICS property lifecycle – OCCUPATION AND USE

Unless the use of a particular building or development is industrial, it is unlikely to result in any unacceptable polluting emissions (unless there is a malfunction in, for example, the operation of a hydrocarbon fuelled boiler or a significant spillage of stored fuel oil). In preparation for either eventuality, it is

important that there are procedures in place to ensure that these impacts are quickly identified and dealt with via an Emergency Response Plan. Similarly aspects of nuisance can also be attributed to polluting events so it is important that these are also covered. Such an impact may result from unacceptable noise from alarm systems, broken or damaged plant or building users. In the latter case, although not entirely preventable, users could be asked to sign up to codes of conduct that require them to maintain acceptable levels of noise within unsociable hours.

4.15.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

Issues relating to pollution and nuisance at this stage of the *RICS property lifecycle* are similar to those in new construction. Demolition and remediation activities themselves can have significant pollution and nuisance implications and invariably do, particularly in the latter case. One of the most significant nuisance impacts during demolition and remediation is noise. Vibration can also be an issue during operations such as movement of large construction plant and machinery. Badly maintained plant and machinery can also contribute to poor air quality through emissions, and inadequate measures during dry periods can lead to dust nuisance. It is recommended that the contractor is required to develop Management Plans for mitigating these impacts, and demonstrate that the Plans are being implemented appropriately. Instances of nuisance can lead to investigation by the enforcing authorities, usually the Local Authority or Environment Agency (and its equivalents in the devolved administrations), and can result in an order to cease a particular activity or, in extreme cases, shut down a site. The additional risk of pollution attributable to remediation activities does, however, require additional evaluation and stringent controls designed to prevent polluting events during the works.

4.16 Shareholder and customer relations

4.16.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

A decision to invest in land or a new project, be it a building or infrastructure will be determined by need. Therefore this will be underpinned by a business case that justifies the need for the scheme on the basis of factors such as it being a profit-making investment, of importance to a nation's economy or a requirement for more space for the functioning of public sector, educational or health needs. The mechanisms by which these can be procured, either as public sector assets or through the private sector are numerous and it is not the purpose of this guidance note to define these. In maintaining shareholder value and demonstrating good corporate responsibility to customers, the management and use of these assets is increasingly of importance. Relations need to be maintained on an ongoing basis and a degree of transparency is required in order to do this effectively and to get the agreement and buy-in of these interested parties with regard to the value of an organisation, its assets and its ultimate success.

For an organisation responsible for initiating the project (whether the developer, funder or ultimate user or occupant), it is likely that shareholders and indeed a wider number of stakeholders would need to be satisfied with regard to what are the social responsibility implications for that project. Suffice to say here that they may impact significantly on the value and reputation of

the organisations concerned, so it is prudent that an appropriate evaluation of risk is undertaken that indicates these broader social and environmental concerns. This will inevitably require a degree of consultation with shareholders, stakeholders and customers – particularly if any identified risks are to be mitigated. Much of this is likely to occur at the pre-acquisition/acquisition stage of the *RICS property lifecycle.*

4.16.2 RICS property lifecycle – PLANNING AND PROCUREMENT

Maintaining relations is an ongoing process and is particularly key up to the point at which a planning application is submitted. Ensuring that stakeholder, customer and indeed the wider stakeholder community needs have been considered will ensure that there are less obstacles to overcome during planning approval.

It is advisable to incorporate any specific requirements relating to shareholder, customer and wider stakeholder concerns into contract documentation.

4.16.3 RICS property lifecycle – NEW CONSTRUCTION

The proper conduct of contractors during the construction period is vital, as poor performance in relation to issues of corporate responsibility will not only affect their organisations but is likely to be reflected on the client with consequent impacts on the shareholder and customer community. This potential impact exemplifies the need to ensure that all relevant information is captured and provided to the contractor as part of the document handover at start of construction. It is important that the contractor and client together ensure that an appropriate strategy is in place during construction to ensure that there is a consistency and clarity of communication and that ongoing concerns and issues are identified through consultation and dealt with. It is recommended that these activities are undertaken as part of a planned stakeholder management and communications strategy and not as a reactive or piecemeal exercise. Communications will be handled largely by trained PR professionals but it will be important that key management personnel are involved in these activities and are available for meetings, interviews, consultations, etc.

4.16.4 RICS property lifecycle – OCCUPATION AND USE

Shareholder value and customer perception is increasingly being influenced by corporate behaviour, and therefore the way in which we chose to occupy and operate our buildings can impact significantly. A good organisation would ensure that communication is maintained with shareholders, customers and wider stakeholders and would share information on sustainability performance. This could be done through its annual reporting process, and increasingly it is necessary for larger organisations in particular to have PR professionals who are able to take a proactive strategic approach in managing the image of an organisation and ensuring that appropriate communications are maintained with the stakeholder community. An organisation that is committed to good corporate responsibility would ensure that this function is carried out in a sincere fashion and that there are properly defined processes for communication and consultation and for actions to be carried out and documented.

4.16.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

As with the occupation and use stage of the *RICS property lifecycle*, it is important to communicate regarding divesting of assets or demolition and remediation activities. Of course such activities can be just as, if not more, disruptive than new construction activities, and once again many of the issues that arise during new construction will be pertinent here. Furthermore, this part of the *lifecycle* is usually the precursor to redevelopment and as such some may regard it as an integrated part of the new construction process.

4.17 Social inclusion and accessibility

4.17.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Some aspects of social inclusion and accessibility are covered in some of the other subsections contained within this section, as many are inevitably interrelated. Issues of social inclusion are often associated with suburbs and other residential areas where poor design principles may have been employed that fragment communities and form barriers to movement, be they real or perceived, they may have poor accessibility and are often associated with poor health due to their unattractive environments that do not encourage people to use outdoor space for leisure and exercise. Examples include children who may be restricted to the home, elderly and infirm residents lacking transport access, council tenants in outer estates, people who are depressed or unemployed and low income people seeking employment.

Accessibility covers two fundamentally important aspects of a building's, facility's or infrastructure's ability to perform and be inclusive. One aspect is accessibility in relation to transport links. Ideal locations for buildings are those that are near public transport, although exact distance from stops or transport terminals is dependent on mode of transport. Access by road for vehicles to a point close to the development is also likely to be desirable, particularly for deliveries, and there may be needs for those with mobility impairments. There is a strong link here with the section on travel and transport (see 4.20), although accessibility also and importantly does include the need for consideration of access to and within the building or infrastructure for the mobility impaired.

In the UK, requirements in this area are increasingly being met through legislation and in particular the *Disability Discrimination Act* (DDA). Requirements under the Act are more easily dealt with in new projects. Retrofitting can be more problematic, although refurbishment provides a perfect opportunity to ensure compliance. The issue of accessibility is no better highlighted than in the case of the London Underground. This extensive system, much of which dates back to Victorian times has very few stations located at ground level, and therefore platforms are accessed by stairs or escalators, with very few having lifts. New stations on the underground do have this facility and as part of a large scale modification of the system, more stations will have step-less access to platforms. Mobility impairment is not confined to those with permanent disability – anyone carrying bulky or heavy items, carrying a child or with a pushchair, for example, may benefit from improved access.

4.17.2 RICS property lifecycle – PLANNING AND PROCUREMENT

The issue of social inclusion at this stage of a project relates very much to design principles. It is important that activities during the appraisal and design

brief stages ensure that scheme designs are cognisant of these issues such that the development does not become a barrier to social inclusion.

The Commission for Architecture and the Built Environment (CABE) note that, until recently, discussion about equality and the built environment focussed principally on physical access, or the lack of it. As physical access has improved, the discussion has widened to address cultural and economic access, recognising that design plays a vital role in including, and often excluding, communities.

Key guidance in this area includes *Inclusion by design*, which sets out CABE's position on equality, diversity and the built environment. It offers everyday examples from urban living, demonstrating how good design can help create places that work for everyone. The fact remains that the poor and disadvantaged live in poor environments and the design of new schemes and refurbishments offer an opportunity for planners and designers to improve this situation.

In the context of the pre-construction and construction phase, issues around social inclusion are likely to focus on under-represented members of the community or those who are unemployed. Construction is a significant employer and contributes hugely to the national economy. It therefore provides significant opportunities to engage with minority ethnic, unemployed and disadvantaged members of the community and provide them with skills and training for the future. It is recommended that contractors are required to demonstrate how they would intend to promote social inclusion during the construction stage.

4.17.3 RICS property lifecycle – NEW CONSTRUCTION

Accessibility may be considered to be more of a design consideration with regard to the completed works. However, it is also an issue during the construction stage and the provision of temporary site accommodation. Mobility impairment for those working on a construction site may include those with a physical impairment, but can also include visitors and those temporarily impaired when they may be transporting loads, for example. This means that consideration needs to be given to access ramps, door opening and closing and width and DDA compliance for toilet and shower facilities.

4.17.4 RICS property lifecycle – OCCUPATION AND USE

The actions taken during design will help to improve inclusion and accessibility during the operational part of the *lifecycle*. However, there is also a need to ensure that appropriate surveillance, maintenance and management are carried out and in this regard there is a significant role for asset and facilities managers. Refurbishment works in particular will often provide the opportunity to improve measures for existing buildings where many issues which today are considered important may not have been so in the past. Depending on the nature of the development, the issues associated with inclusion and accessibility can be very different and are therefore difficult to summarise here, but the CABE guidance *Inclusion by Design* provides an excellent starting point.

4.17.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues around social inclusion and accessibility at this stage of the *RICS property lifecycle* are similar to those during the new construction stage.

Accessibility may be considered to be more of a design consideration with regard to the completed works. However, it is also an issue during the demolition and remediation stage and the provision of temporary site accommodation. Mobility impairment for those working on a construction site may include those with a physical impairment, but can also include visitors and those temporarily impaired when they may be transporting loads, for example. This means that consideration needs to be given to access ramps, door opening and closing and width and DDA compliance for toilet and shower facilities.

4.18 Stakeholder engagement

4.18.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Maintaining the value and utility of property requires stakeholder involvement even if it is not related to any development project. Many green spaces are in the public realm and their use is a careful balance between nature and the need for people to have access and enjoy these spaces. Even when in the private realm, if there is no access to these areas they cannot be enjoyed. Consultation and stakeholder engagement can ensure that a regime is in place that creates a balance of access to the public and sanctuary to fauna and flora. Engagement with the public in this way can ensure that they have a voice in the decision-making process such that they are more likely to respect the outcome.

4.18.2 RICS property lifecycle – PLANNING AND PROCUREMENT

The importance of stakeholder engagement prior to commencement of a project cannot be underestimated. Depending on the scale of a project, many new developments are likely to fall within the requirements for a statutory Environmental Impact Assessment (EIA). The output of this process will be an Environmental Statement that accompanies the planning application. If a project is deemed to have significant impacts then an EIA will be required. Size thresholds and location criteria will be used to make this decision and projects as small as half a hectare within urban locations have required an EIA. Even if not a legal requirement it would be considered good practice to undertake a non-statutory environmental appraisal as well as identifying social and economic impacts for the development. This can be scoped similarly to that required for the formal process. Discussing these findings openly with stakeholders and identifying mitigation measures, highlighting the benefits of a proposed development and accommodating input from them can help to ensure that the emerging project is less likely to face objection during the planning approval stages.

It is recommended that the contractor is required to produce a Community and Stakeholder Management Plan for the works. It is important to provide the contractor with any pertinent information in order to ensure that this information is incorporated into the Plan.

4.18.3 RICS property lifecycle – NEW CONSTRUCTION

Impacts on local communities can be significant during construction works. In areas where large scale regeneration works are taking place, for example, these impacts can be sequential and last for many years as one project is completed

and another begins. Engagement with the local community during construction works involving proper consultation and consideration is required.

The contractor will be required to identify clear roles and responsibilities and management measures in addition to systems for monitoring and recording compliance during the works. It is recommended that a Community and Stakeholder Management Plan is produced and that it clearly identifies any legislative requirements.

The construction period can be extremely traumatic to local residents, and it is recommended that the contractor ensures that environmental control plans are being implemented that control issues such as noise and vibration, dust and air quality and vehicle movements in particular. It is important that these requirements have been captured in contract documentation and the contractor demonstrates through a system of audits that this is being complied with. Stakeholder engagement at this stage, and in particular with the local community, will help to ensure that issues are being raised in an open forum and solutions are jointly identified, thus providing a sense of ownership of the outcome.

4.18.4 RICS property lifecycle – OCCUPATION AND USE

Stakeholder issues are just as pertinent during the operational life of a building or asset. Stakeholders will include investors, users and occupiers and local residents who are impacted by the scheme. Ongoing opportunities for consultation can ensure that issues are addressed in a proactive way and do not lead to confrontation. Many organisations provide for feedback through a variety of means, including help lines, websites, questionnaires and open-day type events where stakeholders can air their concerns and views. It is recommended that these public events are always attended by senior management within an organisation who are empowered to make decisions otherwise a sense of frustration and anger can ensue. Similarly, landlords often organise periodic events for tenants where once again issues can be openly discussed and resolved.

4.18.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to stakeholder engagement during this stage of the *RICS property lifecycle* are similar to those identified during new construction.

Impacts on local communities can be significant during demolition and remediation works. In areas where large scale regeneration works are taking place, for example, these impacts can be sequential and last for many years as one project is completed and another begins. Engagement with the local community during the works involving proper consultation and consideration is required.

The contractor will be required to identify clear roles and responsibilities and management measures in addition to systems for monitoring and recording compliance during the works. It is recommended that a Community and Stakeholder Management Plan is produced and that it clearly identifies any legislative requirements.

The works period can be extremely traumatic to local residents, and it is recommended that the contractor ensures that environmental control plans are being implemented that control issues such as noise and vibration, dust and air

quality and vehicle movements in particular. It is important that these requirements have been captured in contract documentation and the contractor demonstrates through a system of audits that this is being complied with. Stakeholder engagement at this stage, and in particular with the local community, will help to ensure that issues are being raised in an open forum and solutions are jointly identified, thus providing a sense of ownership of the outcome.

4.19 Training and development

4.19.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Increasingly training courses in greenfield and estate management recognise the sustainability agenda and ensure that elements of the training programme include good practice requirements and opportunities in this area. When selecting training courses, property professionals involved in this stage of the *RICS property lifecycle* are advised to be mindful of the need to ensure that they are adequately skilled in sustainable estate management. Where in-house training may be provided or where courses are selected on behalf of employees, it is important to ensure that sustainability modules or content are integrated into the course.

4.19.2 RICS property lifecycle – PLANNING AND PROCUREMENT

Increasingly, obtaining planning permission for major projects includes stipulations regarding providing training and development opportunities for the workforce. This could be for an existing workforce and for new workers taken on for particular construction projects. There are significant opportunities to provide jobs and skills to local unemployed members of the community and a proactive approach to embracing these opportunities is now being adopted by many of the major contractors as part of their Corporate Social Responsibility. It is recommended that contractors are required to demonstrate how they intend to address this issue.

4.19.3 RICS property lifecycle – NEW CONSTRUCTION

Although many planning authorities would seek to ensure that requirements for training and development are incorporated into the delivery of major construction projects, this is not always the case, and certainly is not for many smaller scale construction projects. However, increasingly, many of the larger contractors have instigated programmes to train and develop their existing workforce and also that of temporary employees and second tier contractors that form the majority of what is a fragmented and itinerant industry. Whether required through a material consideration in the planning approval or as a voluntary initiative, the benefits to an organisation can be significant in terms of its corporate responsibility and shareholder value. Also, at a time where there are increasingly stringent requirements on building performance, there is recognition that this requires considerable upskilling in the construction industry. The provision of training programmes as part of the construction programme can help the contracting organisation to develop the skills it requires for the present commission and for future work. Ability to demonstrate the availability of the skills base in tendering for future opportunities is likely to help provide a competitive edge.

4.19.4 RICS property lifecycle – OCCUPATION AND USE

Increasingly, training courses in asset and facilities management recognise the sustainability agenda and ensure that elements of the training programme include good practice requirements and opportunities in this area. When selecting training courses, property professionals involved in this stage of the *RICS property lifecycle* are advised to be mindful of the need to ensure that they are adequately skilled in sustainable buildings management. Where in-house training may be provided or where courses are selected on behalf of employees, it is important to ensure that sustainability modules or content are integrated into the course.

4.19.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to training and development at this stage of the *RICS property lifecycle* are similar to those at the new construction stage. Many of the larger contractors have instigated programmes to train and develop their existing workforce and also that of temporary employees and second tier contractors that form the majority of what is a fragmented and itinerant industry. Whether required through a material consideration in the planning approval or as a voluntary initiative, the benefits to an organisation can be significant in terms of its corporate responsibility and shareholder value. Also, at a time where there are increasingly stringent requirements on performance, there is recognition that this requires considerable upskilling in the construction industry. The provision of training programmes as part of the demolition and remediation programme can help the contracting organisation to develop the skills it requires for the present commission and for future work. Ability to demonstrate the availability of the skills base in tendering for future opportunities is likely to help provide a competitive edge.

4.20 Travel and transport

4.20.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Accessibility to the chosen site can impact significantly on the transport-related impacts of a building's operation. In city centres or locations supported by good transport infrastructure and hubs, the travel-related environmental impacts of an operational building can be hugely reduced through the use of public transport systems. Locations within reasonable walking distance from such hubs/transport interchanges can command a rental premium but contribute significantly to the accessibility of the building whilst minimising the impacts of traffic congestion, carbon emissions, noise and air quality impacts. Where a short walk is required from the transport interchange to the building this may contribute to health benefits from aerobic exercise and is promoted by a number of transport authorities. Typically, an 800m walk (10–12 minutes) is considered an acceptable walking distance from a major transport interchange. In considering access to greenfield sites and estate management, issues relating to transport connectivity are most likely to relate to ease of access of these sites for recreational uses. There will also be issues of accessibility to estate management staff, although by their very nature many of these sites may not necessarily be near public transport links. The environmental impact of estate management staff travel may be relatively small. However, if these sites are accessible to the public for recreational use, arrival by car is likely to have an impact. It is recommended that the

management strategy for the site considers if there are opportunities to make the site more easily accessible to the public if it is for recreational use. It may be possible, for example, to introduce a dedicated bus service, agree alterations to existing bus routes, or to publicise safe cycling routes in order to encourage alternatives to the use of private motor vehicles.

4.20.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is likely that at this stage the fundamental issue of location has been considered and that the choice of site is fixed, although if the appraisal is still at a stage where business needs are being considered, it is possible that alternative sites may still be an option. If the location is fixed, then the building is constrained by the existing transport provision. It may be that the transport provision is good and that the site is close to transport interchanges or hubs and therefore not problematic. However, it could be suboptimal, or indeed could be sufficient at time of building completion but may be stretched in the future, depending on growth forecasts.

It is also likely that discussions may still be ongoing with the local planning authority and transport operator, particularly if the development is likely to add significant demand to the existing transport infrastructure.

It is important to consider the issue of transport, or indeed mobility, in the context of those who may have impairment. Typically this could be an individual who has a permanent disability but anyone can be temporarily impaired if, for example, they are injured, carrying a heavy load or pushing a pram. The location and access to a building would also take this into consideration.

It is advisable that other decisions taken at this time include the overall transport and access strategy for the development (e.g. provision of car parking spaces, priority spaces for alternatively fuelled vehicles, cycling provision, etc.). If the development is for an owner-occupier or there are significant levels of pre-let then consideration can also be given to overall travel planning related issues.

Motorised transport is still largely fossil fuel powered and impacts on air quality and carbon dioxide emissions. Furthermore, in urban areas the use of private vehicles contributes significantly to congestion. Reducing reliance on such modes of transport is beneficial and can be viable if the building location is well serviced with public transport alternatives. A journey that combines a degree of physical exercise, such as walking or cycling, and a public transport option can be beneficial to health as well as relieving congestion and demand on fossil fuel resources. Developments that are well provided for by public transport can command a premium in value.

Key decisions may already have been made with regard to the location of the project, particularly if it is a building, and the consequent impacts and benefits of available transport connections. These will now be fixed through the design, and where improvements have been required through the planning process then these would also be incorporated.

The issues of traffic can be quite acute during the construction programme and it is recommended that this too is evaluated and mitigated. Impact arises from vehicle movements associated with carrying materials to and from the site and from workforce travel. Measures such as utilising construction consolidation centres, optimising vehicle size, and agreement of transport

routes with the planning authority can all contribute to minimising transport impacts during construction. It is recommended that a Transport and Traffic Management Plan is provided by the contractor that demonstrates how these impacts will be identified and managed. It is important that the Plans also include measures for transportation of the workforce. This might include individual travel plans for staff, for example. Any pertinent information arising from the planning approvals process needs to be made available to the contractor.

4.20.3 RICS property lifecycle – NEW CONSTRUCTION

The impact of transport during construction can be considerable. A major construction project will have a myriad of vehicle movements associated with site worker commuting and with delivery of construction materials and removal of materials from the site. The impact of these vehicle movements relate to safety, increased congestion, noise, atmospheric emissions and dust. The contractor will, through a requirement to produce a Transport and Traffic Management Plan, demonstrate how these impacts will be minimised. Measures would include green travel plans for site workers, and exploration of opportunities to use non-road access (such as rail), and would consider use of construction consolidation centres and of lower emissions vehicles. It is also likely that approved vehicle routes will need to be agreed with the local planning authority as will restrictions on hours during which deliveries can be made. The use of consolidated logistics centres and 'just in time' deliveries can reduce vehicle movements and the introduction of a 'clean vehicle programme' can reduce emissions associated with vehicles.

4.20.4 RICS property lifecycle – OCCUPATION AND USE

The original choice of site location to a large extent pre-determines transport options available during the occupation and use period. In urban and particularly city centre areas, accessibility to a good public transport network is generally easier, but for suburban and rural locations provision may not be available or adequate. The developer would have been required to demonstrate how the needs of the building would be met by existing or additional measures and these would need to have been put in place for the occupation and use of the building, however, the facilities managers and occupiers may still have the opportunity to further influence travel-related decisions or provide more sustainable means of transport. Many organisations have green travel plans that have been developed in association with the landlord and local public transport provider. Grants and loans may be available to organisations and individuals for provision and/or use of alternative transport options such as bicycles, for example. Landlord and tenants can ensure that they continue to have a proactive dialogue with the local public transport provider to ensure that they are aware of any proposed changes to transport provision and can also use these opportunities to ensure that any changes in the need for transport usage for the development are identified.

4.20.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to transport during this stage of the *RICS property lifecycle* are similar to those experienced during new construction. The impact of transport during demolition and remediation can be considerable. A major project will have a myriad of vehicle movements associated with site worker commuting and with delivery of materials and removal of materials from the

site. The impact of these vehicle movements relate to safety, increased congestion, noise, atmospheric emissions and dust. The contractor will, through a requirement to produce a Transport and Traffic Management Plan, demonstrate how these impacts will be minimised. Measures would include green travel plans for site workers, and exploration of opportunities to use non-road access (such as rail), and would consider use of consolidation centres and of lower emissions vehicles. It is also likely that approved vehicle routes will need to be agreed with the local planning authority as will restrictions on hours during which deliveries can be made. The use of consolidated logistics centres and 'just in time' deliveries can reduce vehicle movements and the introduction of a 'clean vehicle programme' can reduce emissions associated with vehicles.

4.21 Waste

4.21.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

The issue of waste is in many ways quite simple. The more wastage there is, the more likely it is there will be an impact on the bottom line – let alone environmental consequences. The construction industry has been traditionally wasteful despite low profit margins, however, until recently very little has been done to address this. Recent work by the Waste and Resources Action Programme (WRAP) has made a considerable impact in getting the construction industry to recognise the magnitude of waste and provide it with tools to analyse, monitor, measure and manage this wastefulness. One of the quoted examples is that the cost of waste to one of the UK's major contractors in 2007 was equivalent to its operating profit for that year. The cost is the summation of the costs of waste disposal, labour to fill skips and other site receptacles and the value of the materials contained within them.

Much of the wastage seen on site is a consequence of design decisions, where little or no consideration is taken with regard to the dimensions of construction materials and products, resulting in very wasteful processes on site where off-cuts are legion.

Greenfield and estate management, although not consuming as much material as construction and refurbishment projects, still contributes to wastage. Wherever there is a need for material procurement, it is important to investigate options as to how this can be minimised. It is also important, where a need is identified, to evaluate and implement the measures to be taken to minimise waste arising from their use.

Waste from agricultural or forestry activities can be used as a feedstock for some renewable energy technologies, notably biomass and ethanol production – although it is important to consider the business and indeed sustainability case for this carefully before any decision is made.

Technological developments have occurred over the past few years, with more consideration being given to Waste to Energy Technologies. This can be in the form of direct combustion, gasification or techniques such as pyrolysis. Depending on the waste stream from estate management and its calorific value, this type of technology may prove a cost effective option.

4.21.2 RICS property lifecycle – PLANNING AND PROCUREMENT

At this stage in the project, this issue can be simply addressed by ensuring that there is an explicit requirement for the design team to consider waste in the design process.

Much of the wastage seen on site is a consequence of design decisions, where little or no consideration is taken with regard to the dimensions of construction materials and products resulting in very wasteful processes on site where off-cuts are legion. Minimising waste in design needs to start at the concept design stage. The design team will now have much more definition around the components and elements of the design, the materials that might be used and what the potential 'downstream' impacts of those choices might be. This information can be used at this stage to begin to quantify what those downstream waste impacts will be and the design team can consider what options are best employed to reduce wastage.

It is recommended that the contractor is required to produce a Materials Resource Management Plan. Typically, under legislation now passed in England and likely to be adopted in the devolved administrations, the requirements for this will be covered within a Site Waste Management Plan. However, best practice clearly identifies that the plan can be used as more than a vehicle for meeting legal compliance, and that it can be beneficially used from the design process onwards to minimise the generation of waste and therefore minimise materials usage in the construction process. Material procurement and use issues include the impact of packaging and so this also needs to be considered.

It is recommended that the contractor is required to incorporate these best practice measures into the Plan, with clear roles and responsibilities and management measures identified in addition to systems for monitoring and recording compliance during the works. It is important that the Plan also clearly identifies any legislative requirements.

Also associated with materials use is the choice of materials in terms of their wider environmental impacts, and it is recommended that contractors are required to demonstrate that they are working proactively with their supply chain to identify and procure materials with low environmental impact. This can be achieved by formulating questionnaires to suppliers requesting environmental performance data.

4.21.3 RICS property lifecycle – NEW CONSTRUCTION

The construction process is notorious for wastage with figures of 14% wastage of materials quoted for a number of construction sectors. Recent evaluation by the Environment Agency has shown that up to 4% of construction cost is associated with waste. Much waste can be designed out, however, waste will inevitably be produced on site and it is therefore important to include appropriate clauses in the contract to ensure that the contractor will establish best practice in minimising waste through setting and monitoring of targets. It is recommended that the contractor is required to work in accordance with a Site Waste Management Plan and to ensure that a system of auditing is being implemented to monitor performance and legislative compliance.

4.21.4 RICS property lifecycle – OCCUPATION AND USE

The potential for the most significant waste generation is clearly during the construction of a major project. However, large volumes of waste can be generated during occupation and use as a consequence of day-to-day office-type activities and more periodic activities such as refits and refurbishments. It is recommended that management of these construction-related impacts are dealt with in a similar manner to that of waste

during initial design and construction, with measures identified and implemented to reduce it. Day-to-day waste generation occurs as a consequence of the use to which a building is being put, but inevitably includes paper, plastic and food-related wastes. Minimising such wastage can be considered systematically through the implementation of Environmental Management Systems, but in any event would be included within the remit of the asset and facilities manager and be covered within the scope of an Asset and Facilities Management Plan for the building.

4.21.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The issues relating to waste during this stage of the *RICS property lifecycle* are similar to those experienced during new construction. Additional benefits can be realised if the demolition and remediation stage is viewed as a part of the overall project *lifecycle* and opportunities are sought to evaluate options for:

- retaining existing buildings;
- ascertaining salvage value; and
- reuse of materials or components in the new build, or off-site reuse opportunities.

4.22 Water use

4.22.1 RICS property lifecycle – GREENFIELD/ESTATE MANAGEMENT

Water resources are increasingly under stress in large parts of the world. Even in the UK, surprising as it may sound, the UK has areas that are drier than parts of the near East and have less available water per person than Sudan and Syria. Water is even scarce in parts of Scotland, Wales and Northern Ireland. If predictions for climate change are correct, this change will put increasingly more pressure on water resources, be it in the UK or elsewhere on the planet. Given the extensive treatment and distribution infrastructure also needed to provide water, the energy required to make it potable, and concerns regarding energy security and price, the conservation and prudent use of water is vital.

Water has many applications in buildings, from its use as drinking water to toilet flushing, washing applications and irrigation purposes. In the UK, just two per cent of the water supplied by our extensive potable network is used for drinking purposes. A significant volume is used for toilet flushing and irrigation where potable water is not required.

The infrastructure required to provide this water is significant both in terms of the engineering and raw materials that are used in their construction, the pipe infrastructure to transport it to point of use and the energy required for treatment.

Greenfield and estate management provides an opportunity to recycle rainwater for non-potable uses such as flushing of toilets and landscaping irrigation, due in part to the economies of scale that are available and the land use/building area available for water storage.

Many fitments in buildings pay little or no heed to consumption. Progressively building standards in some countries have introduced specifications for volumes of water that can be used in cisterns for toilet flushing, but little other controls are exercised. In some countries the conservation of water is purely a

behaviourally-driven response, as there just isn't enough available water and this has led to thrift in its everyday use without specific water control measures or technologies being introduced.

In recent years, even the more temperate regions of the world have increasingly suffered from periods of drought, and longer term predictions for climate change indicate that there will be increasing stress on available water resources. Designing for less use is therefore be a primary consideration, as is identifying opportunities to decrease reliance on potable water supply. This is just as relevant to greenfield and estate management where there may be a need for water usage in grounds maintenance. Given increasing concern relating to climate change impacts and pressure on water resources, there is a need to seek solutions that require less water usage. This may, for example, require a strategic rethink in the choice of species for planting and the extent of hard surfacing. It is important that this is evaluated strategically and included within documentation for the overall maintenance regime.

4.22.2 RICS property lifecycle – PLANNING AND PROCUREMENT

It is important that the client's aspirations with regard to designing for water efficiency are made explicit in the design brief, as consideration of alternative water conservation and use methods will need to be developed from an early stage if they are to be part of an integrated design.

At this stage in the design, it is advisable that the MEP designer engenders thinking into the design team to ensure that rainwater or grey water harvesting facilities and reuse scenarios are factored in and that efficient water fitments and appliances (where these may be part of the procurement package) are considered. The optimisation that will be taking place at this stage needs to start considering more specific measures for achieving water efficiency. If options such as rainwater or grey water harvesting are to be used then it is likely that dual plumbing will need to be accommodated to separate these flows from the potable water supply at this time. It is recommended that the integration of these capture systems with irrigation needs is considered early in the design, although specifications relating to fixtures and fittings in bathrooms and kitchens, etc. will need to be considered further during detailed design.

Dynamic water analysis programmes are available and it is advisable that they are used to inform the design.

In detailed design, measures need to be specified with regard to water efficiency – specification of low flow systems, low flow cisterns and taps may be considered. Waterless urinals may also be considered in non-domestic buildings, as can the introduction of presence detectors and controls. Use of non-potable water for flushing would need to have been accommodated in earlier design stages as this would require duplicate plumbing systems and this would need to have been considered earlier for space planning purposes.

Decisions need to be finalised on the use of non-potable water via rainwater and grey water harvesting. The incorporation of both is technically feasible but space planning and plant maintenance will be relevant factors. The intended reuse of the harvested water also needs to be considered, with the simplest being irrigation.

Depending on site location, there may also be opportunities to decentralise water discharge by on-site treatment facilities. These could be small-scale batch reactors for brown water, or constructed wetlands for 'polishing' of grey water prior to discharge.

Minimising water use is a criterion within the Building Performance Assessment Schemes, BREEAM, LEED and *Code for Sustainable Homes*.

It is recommended that the contractor is required to produce a Water Management Plan. This may be incorporated or combined with other aspects of site water management such as surface and groundwater management. The conservation of water in the construction process is vitally important as the industry is water intensive in the manufacturing of many construction materials and products as well as on-site water usage. The contractor will be required to identify clear roles and responsibilities and management measures in addition to systems for monitoring and recording compliance during the works. It is important that the Plan also clearly identifies any legislative requirements.

4.22.3 RICS property lifecycle – NEW CONSTRUCTION

It is recommended that the contractor is required to demonstrate compliance with the Water Management Plan. This can be done through a system of auditing, with performance compared to target levels of water consumption during construction. Where water usage is unavoidable, it may be possible for the contractor to negotiate with the relevant water company and the Environment Agency (or equivalent in the devolved administrations) for abstraction licences to extract water from the aquifer. Although overall volume of consumption may not be any less, this is usually recognised as preferential as there is less embodied energy associated with its use. Water use in construction can be benchmarked against industry data such as that compiled by Constructing Excellence.

4.22.4 RICS property lifecycle – OCCUPATION AND USE

Water will be required during use for a number of applications from potable water requirements, to washing, toilet flushing, cleaning and irrigation. These issues would have been considered in design, but there is also a significant awareness and behavioural aspect to water use in occupation. It is important to capture the optimised use of water relating to design in the Operations and Maintenance Manual, whilst opportunities to improve performance and reduce water usage would be considered during the refurbishment and replacement cycle. Application of life cycle costing methodology can be hugely helpful in presenting a justifiable business case for more water efficient fittings during these replacement cycles.

4.22.5 RICS property lifecycle – DEMOLITION AND REMEDIATION

The main implication on water usage during this stage of the *RICS property lifecycle* is the need to use water as a dust suppressant during demolition and remediation activities. As such this is a similar issue to that experienced during certain phases of construction. It is important that appropriate measures are put in place and are captured in a Water Management Plan and an auditing regime. This can include attenuation and storage measures using, for example, silt traps and interceptors.

However, it is also worth noting that many contaminated sites have linkages to surface and groundwater resources and, as such, an integral part of the remedial solution will be to ensure that these linkage pathways are closed by containment measures or the source of contamination removed through treatment or excavation. Groundwater remediation may also be required as part of the overall decontamination work.

5 The RICS property lifecycle and sustainability interventions

RICS property lifecycle stage 1 – Greenfield/estate management

Description of the lifecycle stage

Much of the work undertaken by chartered surveyors is not necessarily associated with a construction project but this is not to be interpreted as not being involved in the property sector. Within the *RICS property lifecycle* this stage recognises the activities undertaken during acquisition or the management of greenfield areas and estates.

During this stage appropriate social interventions can result in a safe, secure integrated development, rural regeneration and the provision of access rights. Environmental interventions can help to maintain and enhance natural amenity and biodiversity and the use of land as flood plains. Through economic interventions, land and asset values can be improved, local investment is stimulated and the intrinsic value of non-tangible assets enhanced.

Decisions made at this stage will influence the impact a building has throughout its entire life and therefore it is crucial to methodically review and appraise any and all sustainability issues as a part of the due diligence activities that take place during the negotiations for an acquisition of a property.

Key Professional Groups affected: BS, Comm, Env, FM, Geo, MC, M&W, P&D, PM, QS, Res, RP, Val.

Which key issues are likely to be encountered at this stage of the project?

- Amenities and recreation;
- biodiversity;
- climate change;
- community;
- crime and security;
- cultural heritage;
- drainage and flooding;
- energy;
- geology and soils;
- health, safety and well-being;
- human rights and ethics;
- landscape and visual aspects;
- land use;
- material use;
- pollution and nuisance;
- shareholder and customer relations;

- social inclusion and accessibility;
- stakeholder engagement;
- training and development;
- travel and transport;
- waste; and
- water use.

Roles, actions and interventions

Building surveying

At this stage of the project building surveyors may often undertake a variety of services including building and measured surveys. They may provide specific advice on potential issues of asset management, insurance, feasibility, property, and landlord and tenant, amongst other things.

The advice provided to the client at this stage on soil reports could consider contaminated land and pollution and the actions necessary to mitigate or remediate, or the appointment of specialists to provide further advice.

During the site visit the building surveyor can carry out initial inspections of existing ecological features that may need to be retained and protected during any future work, noting also the location of the building, the surrounding landscape, local heritage and its visual impact, local transport provision and local social conditions, including crime and security.

Where the building surveyor is required to advise the client on demolition, strip out, etc. this can also include the potential for a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

Commercial

Surveyors involved in commercial property practice can be expected to undertake a variety of roles and services, each of which may, at some time, provide the opportunity for intervention.

During the purchase, sale and leasing of real estate, where the surveyor is acting as an agent, broker or auctioneer in the purchase, sale and leasing of commercial real estate, consideration can be given to researching and identifying those key sustainability aspects of the real estate which could be considered by the purchaser. These include:

- the energy use and carbon emissions of the building (important for those organisations participating in Emissions Trading Schemes);
- the Energy Performance Certificate;
- water consumption (and any technologies introduced to reduce this);
- pollution and nuisance, light, dust, etc.;
- potential traffic disruption from operations, etc.; and
- the provision of alternative public transport (not just car parking spaces).

Where the surveyor is involved in a management role involving the management of all property resources – including both the human and financial implications of property – ranging from day-to-day management to integrated asset management, then consideration can be given to energy and water consumption, waste and recycling, maintenance regimes and the

potential for replacement with more efficient equipment and components derived from a thorough life cycle cost or whole life value analysis. Consideration can be given to locally sourced labour and sustainable materials, including those that have been recycled.

Where activities relating to landlord and tenant are involved, including rent reviews, lease renewals and preparing submissions for dispute resolution, consideration can be given to 'green leases' where both parties are incentivised to improve the performance of the building, reducing its carbon emissions, water use and waste generated.

Corporate real estate involving the strategic management of/advice on operational real estate in a multi-asset portfolio has the opportunity for interventions in a number of areas from sustainability audits, energy and carbon management (including carbon footprinting) to renewable energy generation opportunities, waste management and recycling, labour standards for outsourced services, local labour and materials, green travel plans and promoting the use of public transport.

Where surveyors are involved in all real estate issues relating to developing telecommunications networks, infrastructure issues such as land use, noise pollution, energy use, use of sustainable materials and labour can be considered.

Commercial property surveyors need to have knowledge of valuation and whilst this is covered by the *RICS Red Book*, it is recommended that consideration is given to, for example, the corporate responsibility policies, goals and objectives of potential tenants and purchasers.

When surveyors are commissioned to provide advice on investment, opportunities exist for consideration of sustainability issues affecting investment appraisal, performance measurement and analysis, and portfolio management. Life cycle costings and whole life value analysis can be considered at this stage.

When involved in planning and development activities, advising developers, funders, occupiers and the public sector on potential demand, rental levels and valuation, consideration can be given to:

- the impact of site location;
- landscape and visual impact;
- biodiversity;
- noise;
- dust;
- provision of public space and amenities;
- travel and transport;
- local economic impact;
- cultural heritage;
- training and development of skills;
- climate change impact through energy reduction and adaptation measures;
- the introduction of cost-effective low and zero carbon technologies in developments;
- showcasing exemplar technologies and processes;
- prudent use of natural resources;

- water use;
- flood mitigation; and
- adaptation measures.

Real estate finance and funding for the ownership or development of real estate would include applying and appraising different finance and funding structures (including 'green funds').

Environmental

The environmental surveyor specialises in environmental management, land use and contaminated land, environment auditing and assessment, particularly in development, regeneration, town planning and residential and/or commercial work, and is advised to be cognisant of more than just environmental issues throughout this stage. This can include the use and application of life cycle costing and whole life value analysis in appraisals and business cases. Knowledge of economic sustainability issues includes local economic impact and supply chain, and social sustainability issues includes travel and transport, crime and security, health and well-being (which is particularly important when considering contaminated land and waste), landfill site remediation and Environmental Impact Assessments.

Facilities management

A chartered surveyor involved in facilities management is often involved in ensuring compliance with legal responsibilities, including health and safety, building regulations, fire regulations, access and security.

When advising on business relocation, procurement, property management, strategic planning and advice during this stage, consideration can be given to issues such as pollution and the potential implications and risks and measures to reduce pollution of land, water, air (noise, light and dust), the current condition of materials and equipment and their capability of being operated efficiently to reduce energy and carbon emissions, and water use.

Geomatics

Geomatics is the science and study of spatially related information focusing on the collection, interpretation/analysis and presentation of information on the natural, built, social and economic environments. The work of the chartered surveyor in this area, whilst not initially obvious, may include the following sustainability issues.

During land surveying important ecological features can be identified so that they can be protected during any development.

During hydrographic surveying consideration can be given to silt disturbance, erosion and aquatic biodiversity, which can be fed into Environmental Impact Assessments.

Measurement of land and property and the provision of as-built/detail surveys of existing buildings can provide data for benchmarking purposes and for the production of Energy Performance Certificates and Display Energy Certificates.

Cartography, spatial and land use mapping can identify specific areas liable to flooding, areas of Special Scientific Interest and areas of pollution, which can

be fed into Environmental Impact Assessments. Ocean bed and resource surveys can identify areas of resource depletion prompting further mitigating actions.

Management consultancy

Management consultancy chartered surveyors are skilled in economics and business management. During this stage they may become involved in developing real estate strategies, in which case the cost and value aspects of potential sustainability issues can be taken into consideration in the financial business case.

When developing acquisition strategies it is important to recognise that decisions made at this stage will influence the impact a building has throughout its entire life and therefore it is crucial to methodically review and appraise any and all sustainability issues as a part of the due diligence activities that take place during the negotiations for an acquisition of a property.

There are essential due diligence activities related to sustainability that need to be taken into account to ensure informed decisions about cost and risk are made. When making an investment decision there are those issues that can attract legal liabilities and/or substantial cost and can influence the decision about whether to invest capital or not. Similarly, when considering valuation decisions, sustainability performance can affect how a building is valued for its rental or sale potential and there are decisions to be made around the cost of improving a building to enhance its sustainability performance and balancing this against the potential for recovery of this investment through capital or rental income.

When developing business cases it is important to consider all issues. For example, climate change may be considered by undertaking an initial overview of the building and site to assess potential climate change adaptation issues such as increased global temperatures, increased frequency of rainfall, greater risk of floods and how they might need to be addressed. For drainage and flooding it may be necessary to assess whether the site is liable to flooding and consider any flood protection measures that may be needed such as Sustainable Urban Drainage Systems (SUDS). The site may be affected by crime and require security measures.

The scale of the due diligence necessary to maintain a holistic approach to sustainable refurbishment depends on the issues and the level of risk.

Minerals and waste

The prudent use of natural resources and the safe, efficient and effective management of waste are significantly important from a sustainability perspective. Chartered surveyors operating within the minerals and waste Professional Group are ideally placed to identify the issues likely to be encountered and develop a plan to address them. It is important to ensure that the issue is addressed in everything they do, whether that relates to extracting minerals and managing waste to the ultimate restoration and after-use of each site.

During this stage this can involve negotiation and consultation with landowners, the general public and other professionals, such as planners, environmental specialists, lawyers and accountants, ensuring they are made

aware of all the issues affecting the site/development, including the implications of current and emerging legislation, particularly that affecting minerals extraction (the Aggregates Levy), waste and groundwater.

It is important to give particular consideration to environmental control systems and aftercare and restoration measures. During extraction this can include addressing issues such as pollution, noise, dust, traffic congestion, and biodiversity. During reclamation this can include biodiversity, provision of public space and amenities, and travel and transport.

Where land use opportunities occur, consideration can be given to the potential introduction of low or zero carbon, or renewable energy, technologies (e.g. wind turbines, solar panels). After reclamation has been undertaken, consideration could be given to the potential of landfill gas extraction and power generation.

Where waste management opportunities exist, consideration can be given to investigating waste-to-energy technologies.

Minerals and waste surveyors are advised to promote and be advocates for the **waste hierarchy – reduce, reuse, recycle** – and to aim to promote reclamation and reuse of materials and encourage maximising of recycling opportunities.

Planning and development

Planning and development affects not only the physical aspects of the built environment but the social and environmental aspects as well. As an area of practice it is of strategic importance, as governments are placing more emphasis on the design and quality of the built environment, urban and rural regeneration, the impact of IT, climate and demographic change, transport and sources of (renewable) energy. Planning and development surveyors are playing a vital role in promoting the use of effective land management and administration as one of the primary drivers behind sustainable development.

Planning and development surveyors have to ensure that sustainability of the built environment is integrated into every aspect of a development proposal for them to receive planning consent and consequently are extremely influential in this area. It is therefore important they are fully aware of the subject to be able to provide sound advice avoiding ill-informed and/or unachievable or excessively costly decisions being made.

When carrying out development appraisals, consideration can be given to all sustainability issues including, for example, the costs and benefits of the impact of site location, biodiversity, cultural heritage, provision of public space and amenity, development of better public transport, training and development of skills, climate change impact through energy reduction and adaptation measures, the introduction of cost-effective low and zero carbon technologies in developments, showcasing exemplar technologies and processes, prudent use of natural resources, water use, flood mitigation and adaptation measures.

Project management

Where project management surveyors are required to provide services for building projects, it is important to ensure that sustainability issues are considered. These include energy use, water consumption, waste generation, biodiversity, travel and transport, and local skills. They have an important role

in assisting the client when setting requirements for adopting a building design assessment methodology, such as BREEAM or LEED.

Quantity surveying and construction

Where quantity surveyors are employed to provide advice on the financial implications of developing or acquiring different sites, it is important to recognise that decisions made at this stage will influence the impact a building has throughout its entire life. Therefore it is crucial to ensure that all sustainability issues are reviewed as a part of the due diligence activities that take place during the negotiations for an acquisition of a property or the preparation of development appraisals.

There are essential due diligence activities related to sustainability in appraisals and business cases that need to be taken to ensure informed decisions about cost and risk are made. They include issues of legal liabilities and/or substantial cost that affect the decision to invest or affect how a building is valued for its rental or sale potential.

Residential

When undertaking the purchase and sale of residential property, whether acting as an agent, broker or auctioneer, knowledge of the sustainability implications are important if a well-informed decision is to be made. This can include much of what is already disclosed but may not have been considered as relating to sustainability, for example, location, access to public transport, the level of energy efficiency of the property, potential hazardous substances in the vicinity, location of local space/amenity, and issues of noise, waste and other potential disturbances. The information sought and declared during lettings and management can involve discussions around likely running costs, energy efficiency of the building, and proximity to local transport. Landlord and tenant activities including rent reviews and lease renewals can consider landlord/tenant improvements to the energy efficiency of the building, and access to public transport and may be developed into a 'green lease'. Landlords can benefit from potential higher market or rental values, reduced void periods due to greater demand, working closely with tenants and compliance with corporate responsibility commitments. Tenants benefit from reduced operating costs, working closely with landlords and an appeal to their personal values. Valuations undertaken in the case of residential property are mostly for loan security, although the introduction of ethical funds/mortgages may require greater understanding of the potential issues and ways to address/mitigate them. See also valuation later in this stage. Investment advice on investment appraisal, performance measurement and analysis, and portfolio management can consider the costs and benefits of the current and future state of the property and the opportunities available to improve its 'sustainability credentials'.

Rural practice

Rural surveyors may find themselves working in such areas as rural estate management, agriculture, planning, valuation, auctioneering and asset management.

This stage of the *RICS property lifecycle* is key in the activities of rural surveyors. They need to be able to provide strategic advice on land use,

management practice, and management of specific habitats and species, to advise on planning related to the natural environment and to have knowledge of procedures for protecting landscape, natural habitat and natural resources.

Rural surveyors will need to understand the sustainability issues affecting development appraisals that are used to advise on the acquisition, disposal or valuation of development sites.

The surveyor needs to understand the cost implications of sustainability and be able to provide reasoned advice to a client. This would include (but not be limited to) protection and enhancement of biodiversity, general land use and ecology, implications of flooding and drainage, cultural heritage, geology and soils, waste and the potential for the introduction of renewable energy technologies.

This knowledge and understanding of the financial implications of sustainability would be capable of being conveyed to the client and other members of the project team.

For specific projects and developments, surveyors would be expected to understand the application of environmental law and policy and planning policy as they relate to sustainable development.

Valuation

The *RICS Valuations Standards* (the *Red Book*) guide the valuation surveyor. Whilst the standards do not explicitly require the valuer to apply a value to the level of sustainability addressed in or by the assets being valued, the valuer should nevertheless ensure that when it is 'properly marketed' there is full disclosure of sustainability information to ensure that the parties can act knowledgeably, prudently and without compulsion (the *RICS Red Book*, p42, see Market value). This information would include (but not be limited to):

- environmental issues, such as levels of energy performance, levels of water consumption, levels of pollution (land, water, air, noise, light), ecological value, cultural heritage and flooding;
- social issues, such as local traffic and transport, diversity of the area, provision of public space and amenity, and accessibility; and
- economic issues, such as potential local supply chains, levels of skills and employment in the area, and potential local economic impact.

An important aspect of developing sustainably refurbished buildings is the promotion of collaboration between landlord and tenants. This relationship can be enhanced through the use of 'green leases'.

RICS property lifecycle stage 2 – Planning and procurement

Description of the lifecycle stage

Throughout this stage of the *RICS property lifecycle* there are significant opportunities to ensure that sustainability is addressed and embedded in the development. This is the key stage during which it is possible to minimise energy demand, to design a cost effective renewable energy supply, and to minimise the environmental impact of design through the prudent use of natural resources and the incorporation of recycled materials and ethically sourced products.

From a social perspective this stage can impact on the provision of local labour, the development of local skills through training initiatives, quality urban design, public realm, and the planning of sustainable communities and community involvement.

Economically this stage can influence local economic generation and the development of responsible and profitable growth, and can act to attract investment and build local capital.

Design

Any approach to sustainable design would, amongst other things, consider minimising carbon emissions, flexibility, design for manufacture and deconstruction, the end user, and would adopt life cycle costing and whole life value analysis in making business decisions.

Passive measures to reduce CO_2 emissions associated with buildings are usually more cost effective per tonne CO_2 than investment in renewable energy technologies. It is therefore important to follow the energy hierarchy of be lean, be clean and be green, minimising demand, ensuring efficient and effective equipment and low and zero carbon renewable energy technologies.

Key Professional Groups affected: BC, BS, Comm, Env, FM, Geo, M&W, P&D, PM, Res, RP, QS, Val.

Which key issues are likely to be encountered at this stage of the project?

- Amenities and recreation;
- biodiversity;
- climate change;
- community;
- crime and security;
- cultural heritage;
- drainage and flooding;
- energy;
- geology and soils;
- health, safety and well-being;
- human rights and ethics;
- landscape and visual aspects;
- land use;

- material use;
- pollution and nuisance;
- shareholder and customer relations;
- social inclusion and accessibility;
- stakeholder engagement;
- training and development;
- travel and transport;
- waste; and
- water use.

Roles, actions and interventions

Building control

Building control surveyors ensure that Building Regulations are observed in the planning and construction stages of new buildings and most property extensions and conversions. For complex projects they may be involved at the pre-applications stage to offer advice on design issues. This is particularly important in relation to sustainability, as they have a key advisory role to play in ensuring that environmental standards are met, particularly with respect to Part L compliance. It is also important to understand and have knowledge of other sustainability issues beyond Part L.

When providing preliminary advice to architects at design conception, consideration can be given to issues such as flooding, minimising water use, limiting heat gains and losses, system controls and information, and health and well-being.

When required to review new building materials and assess their suitability for use in construction, the sustainability impacts of those materials need to be understood, including where they have been sourced from, their transportation requirements, their recycled content, their environmental impact and their disposal requirements.

Building surveying

Building surveyors often undertake a variety of services at this stage of the project including construction, building and measured surveys, asset management, insurance, feasibility, property, and landlord and tenant, amongst other things.

Building surveyors appointed for construction during the design stage are required to prepare outline proposals including outline costs and recommendations for the client's approval. Costs need to include whole life costing/whole life value analysis to cover all sustainability issues. During liaison with the professional team in preparing detailed design proposals, consideration would be given to the client's corporate objectives and targets, local planning requirements/restrictions, BREEAM/LEED levels of performance, energy use, carbon emissions during use, embodied carbon within materials used in the construction, likely water use and potential technologies to reduce this, including rainwater harvesting, grey water recycling and black water treatment. Material selection would include sustainable, locally sourced products. Where surveyors are required to provide advice and recommendations on the technical feasibility of the works, it is

important that they have knowledge of sustainable materials, low and zero carbon equipment and renewable energy technologies.

When providing cost information surveyors are advised to be familiar with life cycle costing and whole life value analysis techniques.

For construction-related activities at this stage the core services include determining the client's requirements and developing the client's brief. At this stage consideration could be given to the client's overall business objectives, particularly any corporate sustainability targets likely to affect the project. This may include targets for building assessments using, for example, BREEAM or LEED.

The advice provided to the client at this stage on soil reports could consider contaminated land and pollution and the actions necessary to mitigate or remediate, or the appointment of specialists to provide further advice.

Other specialists appointed at this time could include an ecologist to evaluate the ecological value of the site and identify ways to conserve or enhance it, or an archaeologist to provide advice on cultural heritage.

During the site visit the building surveyor can carry out initial inspections of existing ecological features that may need to be retained and protected during any future work, noting also the location of the building, the surrounding landscape, local heritage and its visual impact, local transport provision and local social conditions, including crime and security.

Where the building surveyor is required to advise the client on demolition, strip out, etc. this can also include the potential for a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

When advising on suitable tenderers for the building works, the evaluation criteria would include the ability to respond to client's corporate targets as they have been set for the project. The potential tenderers can be evaluated against all of the appropriate sustainability criteria. It is recommended that there are ongoing reviews of the ability of the project to meet the client's sustainability objectives and targets. Any pre-construction report which includes costs would consider life cycle costing/whole life value analysis. Upon receipt of tenders, it is important to ensure that full consideration has been given to the project's sustainability targets and costed accordingly.

The procurement of demolition and enabling works and specialists could include evaluation criteria that include a company's sustainability credentials. Specialists would be required to contribute to meeting the client's objectives and the project targets in the key sustainability areas.

Where the services include advising on cost of alternative design and construction options, it is recommended that decision-makers are encouraged to consider options such as low/zero carbon, water minimisation, local materials and labour, recycled/reclaimed materials, and to minimise transport disruption, congestion and pollution.

It is recommended that any advice on the programme for the design and construction of the project gives due consideration to the impact of specialist sustainability activities, including surveys, pre-demolition audits and reclamation activities, lead-in/mobilisation times and renewable/low environmental impact materials.

For building and measured surveys the building surveyor can provide information in sufficient detail to satisfy the requirements of the *Energy Performance of Buildings Directive* and the provision of Energy Performance Certificates and Display Energy Certificates.

For insurance assessments and insurance claims the activities can include identifying cost effective alternative sustainable materials, and salvage/reuse opportunities for existing materials.

For other property matters sustainability interventions can include the preparation of, or appointment of a specialist to produce, a sustainability strategy or statement identifying how the development will address sustainability. This would be more than just an energy assessment and would include possible targets and actions relating to all appropriate issues.

Commercial

Surveyors involved in commercial property practice can be expected to undertake a variety of roles and services, each of which may, at some time, provide the opportunity for intervention.

When providing advice on the possible purchase, sale and leasing of a building being considered at this stage, surveyors would be expected to have knowledge of issues such as the impact of the energy use and carbon emissions of the building, water consumption (and any technologies introduced to reduce this), pollution and nuisance, light, dust, etc., potential traffic disruption from operations, etc. and the provision of alternate public transport (not just car parking spaces).

It also necessary to consider the influence the design will have upon the potential rental or market value of a building. A view will need to be taken on how much investment is to be committed to a refurbishment project, whether this will improve the level of rental per square metre of area or the open market value and whether this investment can be recovered sufficiently when a tenant is secured or when the property is sold.

Environmental

The environmental surveyor specialises in environmental management, land use and contaminated land, environment auditing and assessment, particularly in development, regeneration, town planning, and residential and/or commercial work.

This is arguably one of the most critical stages in terms of the involvement of the environmental surveyor. At this stage the potential interventions include ensuring that:

- an appropriate level of environmental investigation has been carried out to support the planning application (this may include the requirement for a formal Environmental Impact Assessment and submission of an environmental statement with the planning application or ensuring that on smaller projects a non-statutory environmental appraisal is undertaken); and
- a commitment has been made to an environmental assessment methodology – also considering broader sustainability criteria in relation to social and economic aspirations.

The environmental surveyor, whilst not necessarily being an expert in all areas of sustainability, would be expected to be able to identify key impacts and ensure that appropriate due diligence is being undertaken through the design and procurement process to ensure sustainable design and also sustainable construction. The latter would include social and economic impacts of construction procurement in addition to the more commonly recognised environmental implications.

Facilities management

The way in which a building can be effectively managed can be determined at the design stage. Facility managers (where the end user is known) would be expected to contribute to the overall design through choice and location of rooms, storage, etc., routes of access and egress (particularly for deliveries and waste removal), impact on cleaning regimes of material selection and impact on planned maintenance regimes of technology selection.

Geomatics

Geomatics surveyors may be appointed during this stage for a number of surveying activities. The interventions or issues to address can include identifying important ecological features to be protected during any development, flooding drainage, erosion and biodiversity, areas of Special Scientific Interest and areas of pollution.

Mineral and waste

Surveyors operating in this area at this stage may be required to provide advice on the site conditions and the implications this can have on design. They are able to consider legislative impacts as well as impacts and issues resulting from local conditions.

Planning and development

When carrying out development appraisals, consideration would be given to all sustainability issues, including the impact of site location, landscape and visual impact, biodiversity, noise, dust, traffic congestion, accessibility to public transport, provision of public space and amenity, travel and transport, local economic impact, low/zero carbon/renewable energy technologies (e.g. wind turbines, solar panels).

Throughout the planning process consideration would be given to benefits accruing from addressing such issues as biodiversity, cultural heritage, provision of public space and amenity, development of better public transport, training and development of skills, climate change impact through energy reduction and adaptation measures, the introduction of cost-effective low and zero carbon technologies in developments, showcasing exemplar technologies and processes, prudent use of natural resources, water use, flood mitigation and adaptation measures.

The identification of the issues and how the development plans to address them are often included within an Environmental Impact Assessment accompanying the planning submission and certain activities may be subject to Section 106 Agreements.

Project management

Surveyors responsible for the preparation of the project timetable will need to consider the client's overall business objectives likely to affect this. This may include planning implications, corporate responsibility policies and targets, tenant/occupier requirements, etc.

When carrying out the duties on a project, the project management surveyor is advised to consider holding a workshop of key clients and stakeholders to develop a common understanding of what sustainability means for this project or programme, and to translate the client's key corporate responsibility targets into project targets. Examples could include energy in use, embodied energy, user comfort, air tightness, percentage of local materials, precentage of recycled materials, percentage of local labour, habitat and species protected or enhanced, percentage reduction of site waste, and life cycle costs of key building elements.

Project management surveyors can provide advice to the client that can affect how the budget is spent in relation to energy efficiency and carbon reduction principles. It is recommended that project execution plans developed at the early stages of a project specifically address energy strategies, targets and responsibilities. Knowledge of the main environmental assessment schemes such as BREEAM, LEED or the *Code for Sustainable Homes* is an advantage.

When the project management surveyor is required at this stage to liaise with the client and professional team to determine the client's initial requirements and to develop the client's brief, consideration can be given to the client's overall business objectives, particularly any corporate responsibility targets likely to affect the project.

In advising the client on demolition and enabling works the project management surveyor is advised to consider carrying out a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

The procurement of demolition and enabling works could include evaluation criteria that consider a company's sustainability credentials. Specialists would be required to contribute to meeting the client's objectives and the project targets in the key sustainability areas.

Where project management surveyors have been employed to liaise with the professional team and coordinate the preparation of alternative viability studies, feasibility studies, sensitivity studies and investment appraisals, it is important to recognise that decisions made at this stage will influence the impact a development has throughout the entire *lifecycle* and therefore it is crucial to ensure that all sustainability issues are reviewed as a part of the key activities.

Where the client's objectives include achieving ratings/levels under BREEAM, LEED or the *Code for Sustainable Homes*, surveyors would be expected to familiarise themselves with the specialists that need to be appointed both to carry out the assessment and to provide the necessary reports required by the schemes.

Where the activities relate to CDM Regulations, surveyors need to be aware of Site Waste Management Plans.

A site visit can identify issues likely to affect the project, including existing buildings on site (including cultural heritage), existing ecological features on site that may need protecting to achieve BREEAM credits, local road layouts that could create traffic congestion and noise, existing watercourses and the implications for storm water control and attenuation, and areas of the site liable to flooding.

When procuring consultants and contractors, it is important to ensure that the process matches the brief aspiration, to undertake an outline appraisal of life cycle costs and benefits, to exploit opportunities to use existing sites or to make use of recoverable materials.

As part of the liaison process to establish quality, cost and programme management, structure and procedure, surveyors are advised to consider reporting on key sustainability indicators identified as part of the project brief.

Surveyors would be expected to be aware of the sustainability issues as they affect other disciplines throughout this stage and to be able to challenge and contribute to discussions on the subject.

When preparing a risk management strategy, consideration would be given to identifying sustainability risk including, for example, targets for energy, water and waste reduction, achieving BREEAM credits, renewable energy generation, local employment, sustainable materials, and use of local materials.

When advising on tendering and contractual procurement options, consideration would be given in pre-qualification documentation to evaluation of the bidder's response to sustainability issues, particularly those affecting the project. Surveyors are advised to ensure that sustainability is addressed in the pre-construction and tender report.

Quantity surveying and construction

At the design stage the surveyor needs to be aware of the drivers for sustainability and the impact these have on capital and life cycle costs, as well as the technical requirements of sustainable buildings, so that these are developed into realistic costs and not arbitrary percentage additions.

When the surveyor is required at this stage to liaise with the client and professional team to determine the client's initial requirements and to develop the client's brief, consideration can be given to the client's overall business objectives, particularly any corporate responsibility targets likely to affect the project.

In advising the client on demolition and enabling works, the surveyor is advised to consider carrying out a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

The procurement of demolition and enabling works could include evaluation criteria that consider a company's sustainability credentials. Specialists would be required to contribute to meeting the client's objectives and the project targets in the key sustainability areas.

Where the activities relate to CDM Regulations surveyors need to be aware of Site Waste Management Plans.

Where the client's objectives include achieving ratings/levels under BREEAM, LEED or the *Code for Sustainable Homes,* surveyors would be expected to

familiarise themselves with the specialists that need to be appointed both to carry out the assessment and to provide the necessary reports required by the schemes.

In advising on the cost of the project, sustainability implications of alternative design and construction options need to be understood. It is recommended that cost estimates include cost/m^2 information for indicative low and zero carbon and renewable energy schemes and material selection as required by the *RICS new rules of measurement.*

Costing of issues not generally associated with building design is extremely important, for example, those actions identified in an Environmental Impact Assessment or the implications of a green travel plan, and the quantity surveyor would be expected to understand or be able to undertake Life Cycle Assessment for the whole development not just the building.

A site visit can identify issues likely to affect cost, time or method of application, including existing buildings on site (including cultural heritage), existing ecological features on site that may need protecting to achieve BREEAM credits, local road layouts that could create traffic congestion and noise, existing watercourses and the implications for storm water control and attenuation, and areas of the site liable to flooding.

Advising on the likely effect of market conditions can involve looking at the possible level of employment and skills in the area, and the levels of crime that might affect the site.

The project costs at this stage can influence a financial appraisal and surveyors are advised to ensure they understand what is to be priced in order to provide a level of accuracy and avoid substantial cost increase at a later date.

In addition to considering the effects of site usage, shape of the building, alternative forms of design, procurement and construction, etc. the surveyor would be expected to be able to proactively advise on the sustainability implications of various low and zero carbon technologies, renewable energy installations and material selections. The surveyor would also be expected to be able to advise on the cost implications of other sustainability issues, including possible construction waste, levels of local employment and skills, traffic and transport.

In advising on tendering and contractual procurement options, it is recommended that consideration is given in pre-qualification documentation to evaluation of the bidder's response to sustainability issues, particularly those affecting the project.

It is important to ensure that the client's and project's sustainability requirements that were incorporated into the project brief have been reflected in the tender documents and to ensure that the documentation also includes a responsible approach to sustainability in the contractor's operations, preliminaries and temporary work.

Note: BREEAM credits are available if the contractor signs up to and achieves a certain level of performance under the Considerate Constructor's Scheme. If this, or other targets, have been set it is important to ensure these are reflected in the tender documentation.

Where bills of quantities are required, it is important that every effort is made to adequately measure all sustainability-related products and technologies, avoiding where possible provisional and prime cost sums.

It is important to ensure that the tender report identifies the sustainability issues/risks affecting the project and the bidder's response to them. Surveyors are advised to carry out an analysis of contractor's sustainability costs, to compare it with benchmarks and to report on this.

Residential

Those surveyors involved in residential property practice can be expected to undertake a variety of roles and services, each of which may, at some time, provide the opportunity for intervention.

When providing advice on the possible purchase, sale and leasing of a building being considered at this stage, surveyors would be expected to have knowledge of issues such as the impact of the energy use and carbon emissions of the building, water consumption (and any technologies introduced to reduce this), pollution and nuisance, light, dust, etc., potential traffic disruption from operations, etc. and the provision of alternate public transport (not just car parking spaces).

It also necessary to consider the influence the design will have upon the potential rental or market value of a building. A view will need to be taken on how much investment is to be committed to a refurbishment project and whether this will improve the level of rental per square metre of area or the open market value and whether this investment can be recovered sufficiently when a tenant is secured or when the property is sold.

Rural practice

Rural practice surveyors may be called upon to provide advice to clients relating to planning applications. Knowledge of Environmental Impact Assessments is particularly important where the surveyor is required to justify environmental and other impact assessments. Similarly, knowledge of the potential impact of Section 106 Agreements is equally important.

For specific projects, surveyors would be expected to understand aspects of environmental law and policy, to be able to interpret environmental reports and to be able to provide advice on cost and programme implication to clients.

Knowledge of renewable and low/zero carbon technologies will allow a surveyor to provide advice on sustainable design solutions for projects.

Valuation

It is possible that the design of a building will affect what someone will pay for it and consequently affect its value. This needs to be considered, particularly when making investment decisions. Valuers can provide that information at this stage of a project to avoid unnecessary costs being incurred.

Note: When contractors are being considered during the tender stage, it is important to ensure that they have the experience, knowledge and skills to support the project's sustainability objectives. By selecting tenderers with this knowledge there is less likelihood of an unrealistically high tender pricing because of perceived risks due to lack of understanding and clarity as to the design intent.

It is also advisable to consider ensuring that the supply chain has the experience of working under environmental management regimes or holds an

environmental management system accredited to ISO 14001 with, amongst other things, robust waste management systems and processes.

Where the design has taken on board design for manufacture, an early appointment may be needed to integrate sustainable construction techniques and processes.

RICS property lifecycle stage 3 – New construction

Description of the lifecycle stage

It is at this stage that the contractor is appointed, is given access to the site and carries out the work until practical completion.

General

Project requirements as well as legislation require contractors to ensure that sustainability issues are managed and mitigated on site.

These include Site Waste Management Plans (SWMP), where all waste streams and volumes must be monitored. Clients have a duty to consider waste at design stages, see earlier, and to appoint a principal contractor to run the SWMP. As landfill tax increases it makes good commercial sense to mitigate landfill waste at source and recycle more – as a developer can end up paying for an element of waste by virtue of the choice of design and materials specified.

Where projects set performance targets, including, for example, BREEAM, the contractor is required to address sustainability within the site activities. These include the requirement for energy, waste and water to be monitored and for opportunities for reduction to be identified and actioned, good house-keeping to be implemented, storage and handling measures to minimise the production of waste, mitigation of contamination of any surface water, groundwater or sewerage systems to address pollution and the minimisation of risk of dust, smoke, vapours, gases and odours to address air quality and emissions.

Key Professional Groups affected: BC, BS, PM, Res, QS.

Which key issues are likely to be encountered at this stage of the project?

- Amenities and recreation;
- biodiversity;
- climate change;
- community;
- crime and security;
- cultural heritage;
- drainage and flooding;
- energy;
- geology and soils;
- health, safety and well-being;
- human rights and ethics;
- land use;
- material use;
- pollution and nuisance;
- shareholder and customer relations;
- social inclusion and accessibility;
- stakeholder engagement;
- training and development;
- travel and transport;
- waste; and

- water use.

Roles, actions and interventions

Building control

Building control surveyors must ensure that Building Regulations are observed during the construction stage. Key sustainability issues that will be part of this stage will be Building Regulations Part L and Part F.

Building surveying

Building surveyors often undertake a variety of services at this stage of the project, including construction, building and measured surveys, asset management, insurance, feasibility, property, and landlord and tenant, amongst other things.

Building surveyors are advised to ensure that any variations/change orders issued during this stage do not affect the project's ability to achieve the required sustainability objectives and targets.

Where the services include advising on cost of alternative design and construction options, it is recommended that decision-makers are encouraged to consider low or zero carbon, water minimisation, local materials and labour, and recycled or reclaimed materials, and to minimise transport disruption, congestion and pollution.

Environmental

The environmental surveyor specialises in environmental management, land use and contaminated land, environment auditing and assessment, particularly in development, regeneration, town planning, and residential and/or commercial work. Good environmental management during the construction process is an important aspect of any project. Major projects, in particular, can last for many years, creating nuisance impacts via noise and vibration, dust and air quality issues, in addition to impacts on local environmental and heritage resources, and ecology and biodiversity. Ensuring that robust management systems are in place is a key responsibility that could be in the remit of the environmental surveyor.

The implementation of Environmental Management Systems (ISO 14001) during construction activity is increasingly becoming a 'must have' in order to demonstrate that issues are being identified and managed in a systematic way. The environmental surveyor may have a role in developing and implementing such systems.

Project management

Project requirements, as well as legislation, require contractors to ensure sustainability issues are managed and mitigated on site.

These include Site Waste Management Plans (SWMP), where all waste streams and volumes must be monitored. Clients have a duty to consider waste at design stages, see earlier, and to appoint a principal contractor to run the SWMP. As landfill tax increases it makes good commercial sense to mitigate landfill waste at source and recycle more – as a developer can end up paying for an element of waste by virtue of the choice of design and materials specified.

The contractor may also be required to comply with an Ecology and Diversity Management Plan and the project manager will need to understand the requirements of the plan and be required to check that compliance.

One action resulting from a stakeholder management and communication strategy may involve the contractor registering the project with the Considerate Contractor's Scheme.

It is important to ensure that targets relating to sustainability and reflecting clients' requirements are set, and are monitored and reported on.

It is also important to ensure that particular attention is paid to the commissioning and handover stages at the end of a project to ensure complete and successful operation for the end user.

At this stage more time may be needed for certain activities, for example, sourcing of local materials and labour, and implementing BREEAM requirements.

Quantity surveying and construction

It is important to ensure that variations with sustainability implications are valued and agreed.

RICS property lifecycle stage 4 – Occupation and use (including refurbishment and alterations)

Description of the lifecycle stage

The ongoing use of the building needs to be carried out responsibly if sustainability targets set at the early stages of the design and achieved during construction are to be maintained.

As the operational costs can be significantly more than the initial capital costs of construction or refurbishment, addressing sustainability issues in all areas becomes increasingly important.

It is important that operational activities have a 'green' thread which works with the building design to minimise occupational costs in-use by raising awareness of occupiers of economic, social and environmental issues. It is advisable to maintain a facilities management regime which continually assesses opportunities for improvement and to put procedures in place for targeting and monitoring energy, water and resource use.

Note: When contractors are being considered during the tender stage, it is important to ensure that they have the experience, knowledge and skills to support the project's sustainability objectives. By selecting tenderers with this knowledge there is less likelihood of an unrealistically high tender pricing because of perceived risks due to lack of understanding and clarity as to the design intent.

It is also advisable to consider ensuring that the supply chain has the experience of working under environmental management regimes or holds an environmental management system accredited to ISO 14001 with, amongst other things, robust waste management systems and processes.

Where the design has taken on board design for manufacture, an early appointment may be needed to integrate sustainable construction techniques and processes.

RICS has championed the SKA Rating Scheme which was developed collaboratively by an industry team with the leadership of Skansen. The scheme is a new environmental labelling method, designed to rate and compare the environmental performance of fit-out projects. Its aim is to encourage good practice in fit-out work. Other assessment methodologies such as BREEAM and LEED also offer options to evaluate fit-out works.

Key Professional Groups affected: BC, BS, Comm, Env, FM, M&W, PM, QS, Val.

Which key issues are likely to be encountered at this stage of the project?

- Amenities and recreation;
- biodiversity;
- climate change;
- community;
- crime and security;
- cultural heritage;
- drainage and flooding;
- energy;

- geology and soils;
- health, safety and well-being;
- human rights and ethics;
- landscape and visual aspects;
- land use;
- material use;
- pollution and nuisance;
- shareholder and customer relations;
- social inclusion and accessibility;
- stakeholder engagement;
- training and development;
- travel and transport;
- waste; and
- water use.

Roles, actions and interventions

Building control

Building control surveyors ensure that Building Regulations are observed in the planning and construction stages of new buildings and most property extensions and conversions. For complex projects they may be involved at the pre-applications stage to offer advice on design issues. This is particularly important in relation to sustainability, as they have a key advisory role to play in ensuring that environmental standards are met, particularly with respect to Part L compliance. It is also important to understand and have knowledge of other sustainability issues beyond Part L.

When providing preliminary advice to architects at design conception, consideration can be given to issues such as flooding, minimising water use, limiting heat gains and losses, system controls and information, and health and well-being.

When required to review new building materials and assess their suitability for use in construction, the sustainability impacts of those materials need to be understood, including where they have been sourced from, their transportation requirements, their recycled content, their environmental impact and their disposal requirements.

Building surveying

Building surveyors often undertake a variety of services at this stage of the project including construction, building and measured surveys, asset management, insurance, feasibility, property, and landlord and tenant, amongst other things.

Building surveyors appointed for refurbishments and alterations are required to prepare outline proposals including outline costs and recommendations for the client's approval. Costs need to include whole life costing/whole life value analysis to cover all sustainability issues. During liaison with the professional team in preparing detailed design proposals, consideration would be given to the client's corporate objectives and targets, local planning requirements/ restrictions, BREEAM/LEED levels of performance, energy use, carbon

emissions during use, embodied carbon within materials used in the construction, likely water use and potential technologies to reduce this, including rainwater harvesting, grey water recycling and black water treatment. Material selection would include sustainable, locally sourced products. Where surveyors are required to provide advice and recommendations on the technical feasibility of the works, it is important that they have knowledge of sustainable materials, low and zero carbon equipment and renewable energy technologies.

When providing cost information surveyors are advised to be familiar with life cycle costing and whole life value analysis techniques.

For refurbishment and alteration related activities at this stage the core services include determining the client's requirements and developing the client's brief. At this stage consideration could be given to the client's overall business objectives, particularly any corporate sustainability targets likely to affect the project. This may include targets for building assessments using, for example, BREEAM or LEED.

The advice provided to the client at this stage on soil reports could consider contaminated land and pollution and the actions necessary to mitigate or remediate, or the appointment of specialists to provide further advice.

Other specialists appointed at this time could include an ecologist to evaluate the ecological value of the site and identify ways to conserve or enhance it, or an archaeologist to provide advice on cultural heritage.

During the site visit the building surveyor can carry out initial inspections of existing ecological features that may need to be retained and protected during any future work, noting also the location of the building, the surrounding landscape, local heritage and its visual impact, local transport provision and local social conditions, including crime and security.

Where the building surveyor is required to advise the client on strip out, etc. this can also include the potential for a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

When advising on suitable tenderers for the building works, the evaluation criteria would include the ability to respond to client's corporate targets as they have been set for the project. The potential tenderers can be evaluated against all of the appropriate sustainability criteria. It is recommended that there are ongoing reviews of the ability of the project to meet the client's sustainability objectives and targets. Any pre-construction report which includes costs would consider life cycle costing/whole life value analysis. Upon receipt of tenders, it is important to ensure that full consideration has been given to the project's sustainability targets and costed accordingly.

The procurement of demolition and enabling works and specialists could include evaluation criteria that include a company's sustainability credentials. Specialists would be required to contribute to meeting the client's objectives and the project targets in the key sustainability areas.

Where the services include advising on cost of alternative design and construction options, it is recommended that decision-makers are encouraged to consider options such as low or zero carbon, water minimisation, local materials and labour, recycled or reclaimed materials, and to minimise transport disruption, congestion and pollution.

It is recommended that any advice on the programme for the design and construction of the refurbishment and alteration project gives due consideration to the impact of specialist sustainability activities, including surveys, pre-demolition audits and reclamation activities, lead-in or mobilisation times and renewable or low environmental impact materials.

Building surveyors are advised to ensure that any variations or change orders issued during this stage do not affect the project's ability to achieve the required sustainability objectives and targets.

Where the services include advising on cost of alternative design and construction options, it is recommended that decision-makers are encouraged to consider low or zero carbon, water minimisation, local materials and labour, and recycled or reclaimed materials, and to minimise transport disruption, congestion and pollution.

For building and measured surveys, the building surveyor can provide information in sufficient detail to satisfy the requirements of the *Energy Performance of Buildings Directive* and the provision of Energy Performance Certificates and Display Energy Certificates.

For asset management, the activities can include obtaining energy consumption data and calculating carbon dioxide (CO_2) emissions from the building. This may become increasingly important as organisations wish to monitor the CO_2 emissions from their asset portfolio and legislation may require mandatory reporting and may apply potential financial penalties for avoidable emissions. Water consumption and the volume of waste generated may also be established and reported on. The preparation of a programmed maintenance plan can include life cycle analysis of replacement materials and the introduction of increasingly more efficient equipment.

For insurance assessments and insurance claims, the activities can include identifying cost effective alternative sustainable materials, and salvage or reuse opportunities for existing materials.

For other property matters, sustainability interventions can include the preparation of, or appointment of a specialist to produce, a sustainability strategy or statement identifying how the development will address sustainability. This would be more than just an energy assessment and would include possible targets and actions relating to all appropriate issues.

For landlord and tenant appointments, reports that include costs would be expected to consider whole life cost or whole life value analysis and 'green leases', and may include performance improvement or CO_2 reduction targets in repairing covenants.

Other miscellaneous services activities may include grant advice, which can include renewable energy or improved insulation. With insolvencies it is important to consider social implications.

Commercial

Surveyors involved in commercial property practice can be expected to undertake a variety of roles and services, each of which may, at some time, provide the opportunity for intervention.

When providing advice on the possible purchase, sale and leasing of a building being considered at this stage, surveyors would be expected to have knowledge

of issues such as the impact of the energy use and carbon emissions of the building, water consumption (and any technologies introduced to reduce this), pollution and nuisance, light, dust, etc., potential traffic disruption from operations, etc. and the provision of alternate public transport (not just car parking spaces).

It also necessary to consider the influence the design will have upon the potential rental or market value of a building. A view will need to be taken on how much investment is to be committed to a refurbishment project, whether this will improve the level of rental per square metre of area or the open market value and whether this investment can be recovered sufficiently when a tenant is secured or when the property is sold.

During this stage of the *lifecycle* commercial property surveyors can familiarise themselves with the requirements of the Energy Performance Certificates and Display Energy Certificates such that they are able to convey knowledgeably the energy performance of the building to existing or potential clients. Whilst many buildings will undergo refurbishment or redevelopment which would be likely to change the energy rating, it is still beneficial to understand the implications and the possible cost effective actions that can be undertaken to improve energy performance.

Environmental

The environmental surveyor specialises in environmental management, land use and contaminated land, environment auditing and assessment, particularly in development, regeneration, town planning, and residential and/or commercial work.

The environmental surveyor, whilst not necessarily being an expert in all areas of sustainability, would be expected to be able to identify key impacts and ensure that appropriate due diligence is being undertaken through the design and procurement process to ensure sustainable design and also sustainable construction. The latter would include social and economic impacts of construction procurement in addition to the more commonly recognised environmental implications.

At this stage the potential interventions include ensuring that:

- an appropriate level of environmental investigation has been carried out to support the planning application (this may include the requirement for a formal Environmental Impact Assessment and submission of an environmental statement with the planning application or ensuring that on smaller projects a non-statutory environmental appraisal is undertaken); and
- a commitment has been made to an environmental assessment methodology – also considering broader sustainability criteria in relation to social and economic aspirations.

Good environmental management during refurbishment and alteration is an important aspect of any project. Projects can last for many years, creating nuisance impacts via noise and vibration, dust and air quality issues, in addition to impacts on local environmental and heritage resources, and ecology and biodiversity. Ensuring that robust management systems are in place is a key responsibility that could be in the remit of the environmental surveyor.

The implementation of Environmental Management Systems (ISO 14001) during refurbishment and alteration activity is increasingly becoming a 'must have' in order to demonstrate that issues are being identified and managed in a systematic way. The environmental surveyor may have a role in developing and implementing such systems.

At this stage, where the operation of a building is being reviewed, potential interventions may include pollution prevention and control. Day-to-day or more regular periodic activities during occupation and use may include the development of the Environmental Management System or a role in implementing such a system. Many systems are now certified to ISO 14001 and would require that operational impacts are identified, measured and monitored and that action plans are in place to reduce impacts through continuous improvement measures. Environmental surveyors can play a key role in ensuring that appropriate actions are being undertaken and that an improvement trajectory is being maintained. Through inspection and audit processes they will be able to identify non-conformances and help to initiate corrective actions.

Facilities management

The way in which a building can be effectively managed can be determined at the design stage. Facility managers (where the end user is known) would be expected to contribute to the overall design through choice and location of rooms, storage, etc., routes of access and egress (particularly for deliveries and waste removal), impact on cleaning regimes of material selection and impact on planned maintenance regimes of technology selection.

Upon completion and handover the Facilities Management Plan developed from the original design stage input commences. During the use stage, consideration can be given to a number of sustainability issues including potential pollution risks from cleaning materials, the environmental impact of materials specified and used in the planned preventative and reactive maintenance regimes, the undertaking of occupier satisfaction surveys designed to improve health and well-being, the provision of locally and ethically sourced goods and services, ensuring compliance with human rights and labour standards, the selection of components and technologies for planned maintenance that reduce energy consumption and carbon emissions and water consumption, and maintaining and enhancing biodiversity.

It is important to consider introducing industry best practice in areas of waste management, reducing wastage and maximising reclamation, reuse and recycling during the use stage, as well as providing training and awareness for occupiers in all areas of sustainability.

Facilities management surveyors can also participate in the development and promotion of green travel plans thereby aiding the reduction in an organisation's carbon footprint and reducing congestion.

It can be the responsibility of the facilities manager to produce a report on performance that is incorporated into corporate responsibility and annual reports that form part of a client's approach to shareholder and customer relations.

Minerals and waste

During this stage minerals and waste surveyors can, for large developments, provide advice on waste management strategies including opportunities for waste-to-energy technologies.

Planning and development

When carrying out development appraisals, consideration would be given to all sustainability issues, including the impact of site location, landscape and visual impact, biodiversity, noise, dust, traffic congestion, accessibility to public transport, provision of public space and amenity, travel and transport, local economic impact, low or zero carbon, or renewable energy, technologies (e.g. wind turbines, solar panels).

Throughout the planning process consideration would be given to benefits accruing from addressing such issues as biodiversity, cultural heritage, provision of public space and amenity, development of better public transport, training and development of skills, climate change impact through energy reduction and adaptation measures, the introduction of cost-effective low and zero carbon technologies in developments, showcasing exemplar technologies and processes, prudent use of natural resources, water use, flood mitigation and adaptation measures.

The identification of the issues and how the development plans to address them are often included within an Environmental Impact Assessment accompanying the planning submission and certain activities may be subject to Section 106 Agreements.

Project management

Surveyors responsible for the preparation of the project timetable will need to consider the client's overall business objectives likely to affect this. This may include planning implications, corporate responsibility policies and targets, tenant/occupier requirements, etc.

When carrying out the duties on a project, the project management surveyor is advised to consider holding a workshop of key clients and stakeholders to develop a common understanding of what sustainability means for this project or programme, and to translate the client's key corporate responsibility targets into project targets. Examples could include energy in use, embodied energy, user comfort, air tightness, percentage of local materials, precentage of recycled materials, percentage of local labour, habitat and species protected or enhanced, percentage reduction of site waste, and life cycle costs of key building elements.

Project management surveyors can provide advice to the client that can affect how the budget is spent in relation to energy efficiency and carbon reduction principles. It is recommended that project execution plans developed at the early stages of a project specifically address energy strategies, targets and responsibilities. Knowledge of the main environmental assessment schemes such as BREEAM, LEED or the *Code for Sustainable Homes* is an advantage.

When the project management surveyor is required at this stage to liaise with the client and professional team to determine the client's initial requirements and to develop the client's brief, consideration can be given to the client's overall business objectives, particularly any corporate responsibility targets likely to affect the project.

In advising the client on demolition and enabling works the project management surveyor is advised to consider carrying out a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

The procurement of demolition and enabling works could include evaluation criteria that consider a company's sustainability credentials. Specialists would be required to contribute to meeting the client's objectives and the project targets in the key sustainability areas.

Where project management surveyors have been employed to liaise with the professional team and coordinate the preparation of alternative viability studies, feasibility studies, sensitivity studies and investment appraisals, it is important to recognise that decisions made at this stage will influence the impact a development has throughout the entire *lifecycle* and therefore it is crucial to ensure that all sustainability issues are reviewed as a part of the key activities.

Where the client's objectives include achieving ratings/levels under BREEAM, LEED or the *Code for Sustainable Homes*, surveyors would be expected to familiarise themselves with the specialists that need to be appointed both to carry out the assessment and to provide the necessary reports required by the schemes.

Where the activities relate to CDM Regulations, surveyors need to be aware of Site Waste Management Plans.

A site visit can identify issues likely to affect the project, including existing buildings on site (including cultural heritage), existing ecological features on site that may need protecting to achieve BREEAM credits, local road layouts that could create traffic congestion and noise, existing watercourses and the implications for storm water control and attenuation, and areas of the site liable to flooding.

When procuring consultants and contractors, it is important to ensure that the process matches the brief aspiration, to undertake an outline appraisal of life cycle costs and benefits, to exploit opportunities to use existing sites or to make use of recoverable materials.

As part of the liaison process to establish quality, cost and programme management, structure and procedure, surveyors are advised to consider reporting on key sustainability indicators identified as part of the project brief.

Surveyors would be expected to be aware of the sustainability issues as they affect other disciplines throughout this stage and to be able to challenge and contribute to discussions on the subject.

When preparing a risk management strategy, consideration would be given to identifying sustainability risk including, for example, targets for energy, water and waste reduction, achieving BREEAM credits, renewable energy generation, local employment, sustainable materials, and use of local materials.

When advising on tendering and contractual procurement options, consideration would be given in pre-qualification documentation to evaluation of the bidder's response to sustainability issues, particularly those affecting the project. Surveyors are advised to ensure that sustainability is addressed in the pre-construction and tender report.

Project requirements, as well as legislation, require contractors to ensure sustainability issues are managed and mitigated on site.

These include Site Waste Management Plans (SWMP), where all waste streams and volumes must be monitored. Clients have a duty to consider waste at design stages, see earlier, and to appoint a principal contractor to run the SWMP. As landfill tax increases it makes good commercial sense to mitigate landfill waste at source and recycle more – as a developer can end up paying for an element of waste by virtue of the choice of design and materials specified.

The contractor may also be required to comply with an Ecology and Diversity Management Plan and the project manager will need to understand the requirements of the plan and be required to check that compliance.

One action resulting from a stakeholder management and communication strategy may involve the contractor registering the project with the Considerate Contractor's Scheme.

It is important to ensure that targets relating to sustainability and reflecting clients' requirements are set, and are monitored and reported on.

It is also important to ensure that particular attention is paid to the commissioning and handover stages at the end of a project to ensure complete and successful operation for the end user.

At this stage more time may be needed for certain activities, for example, sourcing of local materials and labour, and implementing BREEAM requirements.

Quantity surveying and construction

At the design stage the surveyor needs to be aware of the drivers for sustainability and the impact these have on capital and life cycle costs, as well as the technical requirements of sustainable buildings, so that these are developed into realistic costs and not arbitrary percentage additions.

When the surveyor is required at this stage to liaise with the client and professional team to determine the client's initial requirements and to develop the client's brief, consideration can be given to the client's overall business objectives, particularly any corporate responsibility targets likely to affect the project.

In advising the client on demolition and enabling works, the surveyor is advised to consider carrying out a pre-demolition audit to maximise material reclamation and reuse and minimise waste to landfill.

The procurement of demolition and enabling works could include evaluation criteria that consider a company's sustainability credentials. Specialists would be required to contribute to meeting the client's objectives and the project targets in the key sustainability areas.

Where the activities relate to CDM Regulations surveyors need to be aware of Site Waste Management Plans.

Where the client's objectives include achieving ratings/levels under BREEAM, LEED or the *Code for Sustainable Homes*, surveyors would be expected to familiarise themselves with the specialists that need to be appointed both to carry out the assessment and to provide the necessary reports required by the schemes.

In advising on the cost of the project, sustainability implications of alternative design and construction options need to be understood. It is recommended that cost estimates include cost/m^2 information for indicative low and zero carbon and renewable energy schemes and material selection as required by the *RICS new rules of measurement.*

Costing of issues not generally associated with building design is extremely important, for example, those actions identified in an Environmental Impact Assessment or the implications of a green travel plan, and the quantity surveyor would be expected to understand or be able to undertake Life Cycle Assessment for the whole development not just the building.

A site visit can identify issues likely to affect cost, time or method of application, including existing buildings on site (including cultural heritage), existing ecological features on site that may need protecting to achieve BREEAM credits, local road layouts that could create traffic congestion and noise, existing watercourses and the implications for storm water control and attenuation, and areas of the site liable to flooding.

Advising on the likely effect of market conditions can involve looking at the possible level of employment and skills in the area, and the levels of crime that might affect the site.

The project costs at this stage can influence a financial appraisal and surveyors are advised to ensure they understand what is to be priced in order to provide a level of accuracy and avoid substantial cost increase at a later date.

In addition to considering the effects of site usage, shape of the building, alternative forms of design, procurement and construction, etc. the surveyor would be expected to be able to proactively advise on the sustainability implications of various low and zero carbon technologies, renewable energy installations and material selections. The surveyor would also be expected to be able to advise on the cost implications of other sustainability issues, including possible construction waste, levels of local employment and skills, traffic and transport.

In advising on tendering and contractual procurement options, it is recommended that consideration is given in pre-qualification documentation to evaluation of the bidder's response to sustainability issues, particularly those affecting the project.

It is important to ensure that the client's and project's sustainability requirements that were incorporated into the project brief have been reflected in the tender documents and to ensure that the documentation also includes a responsible approach to sustainability in the contractor's operations, preliminaries and temporary work.

Note: BREEAM credits are available if the contractor signs up to and achieves a certain level of performance under the Considerate Constructor's Scheme. If this, or other targets, have been set it is important to ensure these are reflected in the tender documentation.

Where bills of quantities are required, it is important that every effort is made to adequately measure all sustainability-related products and technologies, avoiding where possible provisional and prime cost sums.

It is important to ensure that the tender report identifies the sustainability issues/risks affecting the project and the bidder's response to them. Surveyors

are advised to carry out an analysis of contractor's sustainability costs, to compare it with benchmarks and to report on this.

It is important to ensure that variations with sustainability implications are valued and agreed.

Residential

Those surveyors involved in residential property practice can be expected to undertake a variety of roles and services, each of which may, at some time, provide the opportunity for intervention.

When providing advice on the possible purchase, sale and leasing of a building being considered at this stage, surveyors would be expected to have knowledge of issues such as the impact of the energy use and carbon emissions of the building, water consumption (and any technologies introduced to reduce this), pollution and nuisance, light, dust, etc., potential traffic disruption from operations, etc. and the provision of alternate public transport (not just car parking spaces).

It also necessary to consider the influence the design will have upon the potential rental or market value of a building. A view will need to be taken on how much investment is to be committed to a refurbishment project and whether this will improve the level of rental per square metre of area or the open market value and whether this investment can be recovered sufficiently when a tenant is secured or when the property is sold.

Valuation

It is possible that the refurbishment and alteration of a building will affect what someone will pay for it and consequently affect its value. This needs to be considered, particularly when making investment decisions. Valuers can provide that information at this stage of a project to avoid unnecessary costs being incurred.

During this stage of the *lifecycle*, valuation surveyors can familiarise themselves with the requirements of the Energy Performance Certificates and Display Energy Certificates such that they are able to knowledgably convey the energy performance of the building to existing or potential clients. Whilst many buildings will undergo refurbishment or redevelopment which would be likely to change the energy rating, it is still beneficial to understand the implications and the possible cost effective actions that can be undertaken to improve energy performance or any other actions that may impact on valuation.

RICS property lifecycle stage 5 – Demolition and remediation

Description of the lifecycle stage

This stage of the *lifecycle* is concerned with the activities associated with the end of a building's useful life. This can include its disposal for subsequent refurbishment, change of use, etc., or its demolition and site clearance and possible removal of pollution that occurred following the building's operation, and remediation actions.

It is important to consider the disposal of the building at the design stage to ensure that it can be refurbished, decommissioned or dismantled easily. Also, the type of materials used within the building will affect the opportunity for reclamation, recycling and reuse.

Key Professional Groups affected: Comm, Env, FM, Geo, MBA, MC, M&W, PM, Res, RP, Val.

Which key issues are likely to be encountered at this stage of the project?

- Amenities and recreation;
- biodiversity;
- climate change;
- community;
- crime and security;
- cultural heritage;
- drainage and flooding;
- energy;
- geology and soils;
- health, safety and well-being;
- human rights and ethics;
- landscape and visual aspects;
- land use;
- material use;
- pollution and nuisance;
- shareholder and customer relations;
- social inclusion and accessibility;
- stakeholder engagement;
- training and development;
- travel and transport;
- waste; and
- water use.

Roles, actions and interventions

Commercial

During the purchase, sale and leasing of real estate, where the surveyor is acting as an agent, broker or auctioneer in the purchase, sale and leasing of commercial real estate, it is important to consider researching and identifying

those key sustainability aspects of the real estate which could be considered by the purchaser. These include the energy use and carbon emissions of the building (important for those organisations participating in emissions trading schemes), the Energy Performance Certificate, water consumption (and any technologies introduced to reduce this), issues of pollution and nuisance, light, dust, etc., potential traffic disruption from operations, etc. and the provision of alternate public transport (not just car parking spaces).

Commercial property surveyors would be expected to have knowledge of valuation and whilst this is covered by the *RICS Red Book*, it is important to consider, for example, the corporate responsibility policies, goals and objectives of potential tenants and purchasers.

Environmental

The environmental surveyor specialises in environmental management, land use and contaminated land, environment auditing and assessment, particularly in development, regeneration, town planning, and residential and/or commercial work.

At this stage, where a building is being demolished or disposed of, potential interventions include the preparation of the residual pollution risks from existing operations and structure. This stage of the *lifecycle* is also a vital one in terms of renewal and the opportunity to minimise impacts associated with future developments. The environmental surveyor has an important role in identifying opportunities for reuse and recycling of resources that can be utilised from the demolition and remediation stage. There may also be a requirement to ensure that surveys have been undertaken for fauna and flora on the site or building, particularly for those that might be rare or protected, such as bat surveys.

Other aspects may relate to environmental controls for noise, dust and air quality, etc. during the demolition and remediation process.

Geomatics

Geomatic surveyors may be required to produce surveys to identify land contamination, subsidence, boundary issues, and location of ecological features that need to be protected.

Machinery and business assets

During this stage of the *lifecycle*, management surveyors associated with machinery and business assets would be expected to understand the issues that are likely to be encountered (when, for example, considering dismantling assets for recycling) and it is important to consider these when providing advice to clients.

Management consultancy

During this stage of the *lifecycle*, management consultancy surveyors would be expected to understand the issues that are likely to be encountered and it is important to consider these when providing advice to clients.

Minerals and waste

Activities undertaken during the disposal stage of the *RICS property lifecycle* can involve negotiation and consultation with landowners, the general public and other professionals, including planners, environmental specialists, lawyers and accountants.

It is important that particular consideration is given to environmental control systems and to aftercare and restoration measures.

When carrying out valuations/financial appraisals, surveyors are advised to consider all sustainability issues, including biodiversity, provision of public space and amenities, travel and transport.

Where land use opportunities occur surveyors are advised to consider the potential introduction of low/zero carbon/renewable energy technologies (e.g. wind turbines, solar panels). After reclamation has been undertaken on waste disposal sites, consideration could be given to the potential of landfill gas extraction and power generation.

Where waste management opportunities exist surveyors are advised to consider investigating waste-to-energy technologies.

It is recommended that surveyors promote reclamation and reuse of materials and encourage the maximisation of recycling opportunities.

Project management

A project manager may be appointed to manage the demolition of a building in which case those interventions identified during the construction stage would apply here.

Residential

When undertaking the purchase and sale of residential property, whether acting as an agent, broker or auctioneer, knowledge of the sustainability implications is important if a well-informed decision is to be made. This can include much of what is already disclosed but may not have been considered as relating to sustainability, such as location, access to public transport, the level of energy efficiency of the property, potential hazardous substances in the vicinity, location of local space/amenity, and noise, waste and other potential disturbances. The information sought and declared during lettings and management can involve discussions around likely running costs, energy efficiency of the building, and proximity to local transport. Landlord and tenant activities, including rent reviews and lease renewals, can consider landlord/tenant improvements to the energy efficiency of the building, and access to public transport and may be developed into a 'green lease'. Landlords can benefit from potential higher market or rental values, reduced void periods due to greater demand, working closely with tenants and compliance with corporate responsibility commitments. Tenants benefit from reduced operating costs, working closely with landlords and an appeal to their personal values. Valuations undertaken in the case of residential property are mostly for loan security, although the introduction of ethical funds or mortgages may require greater understanding of the potential issues and ways to address or mitigate them. See also valuation below. Investment advice on investment appraisal, performance measurement and analysis, and portfolio management

would consider the costs and benefits of the current and future state of the property and the opportunities available to improve its 'sustainability credentials'.

Rural practice

Rural surveyors may be involved in land use and remediation, in addition to any disposal activities.

Knowledge of the implication of land remediation costs and potential land values on development appraisals is important.

It is at this stage that enhancements of biodiversity and the development of public amenity and recreational space can be carried out and the rural surveyor would be expected to understand the implications in terms of cost, programme, planning and legislation.

Valuation

The *RICS Valuations Standards* (the *Red Book*) guide the valuation surveyor. Whilst the standards do not explicitly require the valuer to apply a value to the level of sustainability addressed in or by the assets being valued, they would nevertheless ensure that when it is 'properly marketed' there is full disclosure of sustainability information to ensure that the parties can act knowledgeably, prudently and without compulsion (the *RICS Red Book*, p42, see Market value). This information would include (but not be limited to):

- environmental issues, such as levels of energy performance, levels of water consumption, levels of pollution (land, water, air, noise, light), ecological value, cultural heritage and flooding;
- social issues, such as local traffic and transport, diversity of the area, provision of public space and amenity, and accessibility; and
- economic issues, such as potential local supply chains, levels of skills and employment in the area and potential local economic impact.

An important aspect of developing sustainably refurbished buildings is the promotion of collaboration between landlord and tenants. This relationship can be enhanced through the use of 'green leases'.

Further information

Biodiversity

The Institute of Ecology and Environmental Management (IEEM): www.ieem.org.uk

The Economics of Ecosystems and Biodiversity, European Communities, 2008

Guidelines for Ecological Impact Assessment, IEEM, available online at www.ieem.net/ecia.asp

Working with Wildlife, CIRIA, see www.ciria.co.uk/wildlife.htm

Biodiversity indicators for construction projects, CIRIA, available online at www.ciria.co.uk/pdf/w005.pdf

Climate change

Defra *Adapting to climate change* website: www.defra.gov.uk/environment/climatechange/adapt/index.htm

Association of British Insurers (ABI): fact sheet on *Flood Resilient Homes*, available online at www.abi.org.uk/Display/File/Child/228/Flood_Resilient_Homes.pdf

Adapting to Climate Change, The Local and Regional Partnership Board, 2008, available online at www.defra.gov.uk/ENVIRONMENT/localgovindicators/documents/ni188-guidance-2008.pdf

Sustainable Design, Climate Change and the Built Environment, CABE, available online at www.cabe.org.uk/files/Sustainable-design-climate-change-and-the-built-environment.pdf

Crime and security

Secured by Design, www.securedbydesign.com/professionals/guides.aspx

Cultural heritage

Heritage at Risk, English Heritage, 2008, see www.english-heritage.org.uk/server/show/nav.19188

Advice for Domestic Energy Assessors, English Heritage, www.english-heritage.org.uk/upload/pdf/EH_Web_Advice_on_DEAs_Dec_07_SE.pdf2.pdf?1238296995

Ancient Tree Guide, English Heritage, three guides available online at www.english-heritage.org.uk/server/show/nav.9119

Environmental Quality in Spatial Planning, English Heritage, available online at www.english-heritage.org.uk/upload/pdf/Envir_Quality.pdf

Drainage and flooding

Be aware, be prepared, take action; how to integrate climate change adaptation strategies into local government, Environment Agency, UKCIP, LGA, 2008, available online at www.lga.gov.uk/lga/aio/566302

Defra *Adapting to climate change* website: www.defra.gov.uk/environment/climatechange/adapt/index.htm

SUDS at www.ciria.org.uk/suds (includes the SUDS manual, guidance for developers, etc.)

Energy

Building Regulations Parts L and F, available online at www.planningportal.gov.uk/england/professionals/en/1115314110382.html

Low Carbon Technology Innovations, The Carbon Trust, available online at www.carbontrust.com/Publications/CTC736.pdf

Small scale wind energy: Policy insights and practical guidance, The Carbon Trust, available online at www.carbontrust.co.uk/technology/technologyaccelerator/small-wind

Better business management guide, The Carbon Trust, see www.carbontrust.co.uk/publications/publicationdetail?productid=CTV034

Energy Efficient New Housing: a guide to the design and construction of low rise single occupancy housing for energy efficiency, CIRIA

Material use

Recycled Product Guide, WRAP, see http://rcproducts.wrap.org.uk

Setting a requirement for recycled content in building projects, WRAP, available online at www.wrap.org.uk/downloads/RC_procurement_guidance_for_Scotland_FINAL_171106.83042e18.3019.pdf

Pollution and nuisance

Control of Water Pollution from Linear Construction Projects, CIRIA

Social inclusion and accessibility

Inclusion by design: Equality, diversity and the built environment, CABE, available online at www.cabe.org.uk/files/inclusion-by-design.pdf

Waste

Demonstrating waste minimisation benefits in construction, CIRIA

Waste minimisation and recycling in construction, CIRIA

Achieving good practice Waste Minimisation and Management, WRAP, available online at www.wrap.org.uk/downloads/WMM_guide_Mid_level.c272ebaf.4065.pdf

Achieving effective Waste Minimisation, WRAP, available online at www.wrap.org.uk/downloads/Waste_min_mid_level_FINAL1.c96aaf76.4831.pdf

Water use

Evidence Base for Large-scale Water Efficiency in Homes, Waterwise, 2008, available online at www.waterwise.org.uk/reducing_water_wastage_in_the_uk/research/publications.html

Model Agreements for Sustainable Water Management Systems: Model agreements for rainwater and greywater use systems, CIRIA, see http://ciria.org/suds/model_agreements.htm

Model Agreements for Sustainable Water Management Systems: Model agreements for SUDS, CIRIA, see http://ciria.org/suds/model_agreements.htm

General

Green Building Bible, Volumes 1 and 2, Green Building Press

HSE statistics: see www.hse.gov.uk/statistics/index.htm

The HOK Guidebook to Sustainable Design, Wiley

Sustainability in the built environment: An introduction to its definition and measurement, IHS/BRE Publishing, 2009

Good practice guidance for refurbishing occupied buildings, CIRIA

Operations and maintenance manuals for buildings – a guide to procurement and preparation, CIRIA

Building Research Establishment Environmental Assessment Method (BREEAM), available online at www.breeam.org

Leadership in Energy and Environmental Design (LEED), available online at www.usgbc.org/

Code for Sustainable Homes, available online at www.planningportal.gov.uk/england/professionals/en/1115314116927.html

Securing the future: delivering UK sustainable development strategy, HM Government, 2005, available online at: www.defra.gov.uk/sustainable/government/publications/uk-strategy/documents/SecFut_complete.pdf

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Sustainability and the RICS property lifecycle

1st edition, guidance note

The chartered surveying profession has long had a role and reputation as being the custodian of the built and natural environment.

Aimed at surveyors in practice, this guidance note shows how the overarching concept of sustainability relates to the entire range of practice disciplines that make up the surveying profession. Understanding the key contributions from other disciplines will highlight when it is appropriate to seek and obtain specialist guidance and advice from other property professionals.

This guidance note:

- examines and navigates the sustainability interventions and opportunities property professionals can put forward primarily during the design and construction of a building project; and
- provides a starting point for further guidance aimed at the other subsequent property lifecycle stages, principally:
  - greenfield/estate management;
  - planning and procurement;
  - new construction;
  - occupation and use (including refurbishment and alterations); and
  - demolition and remediation.

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