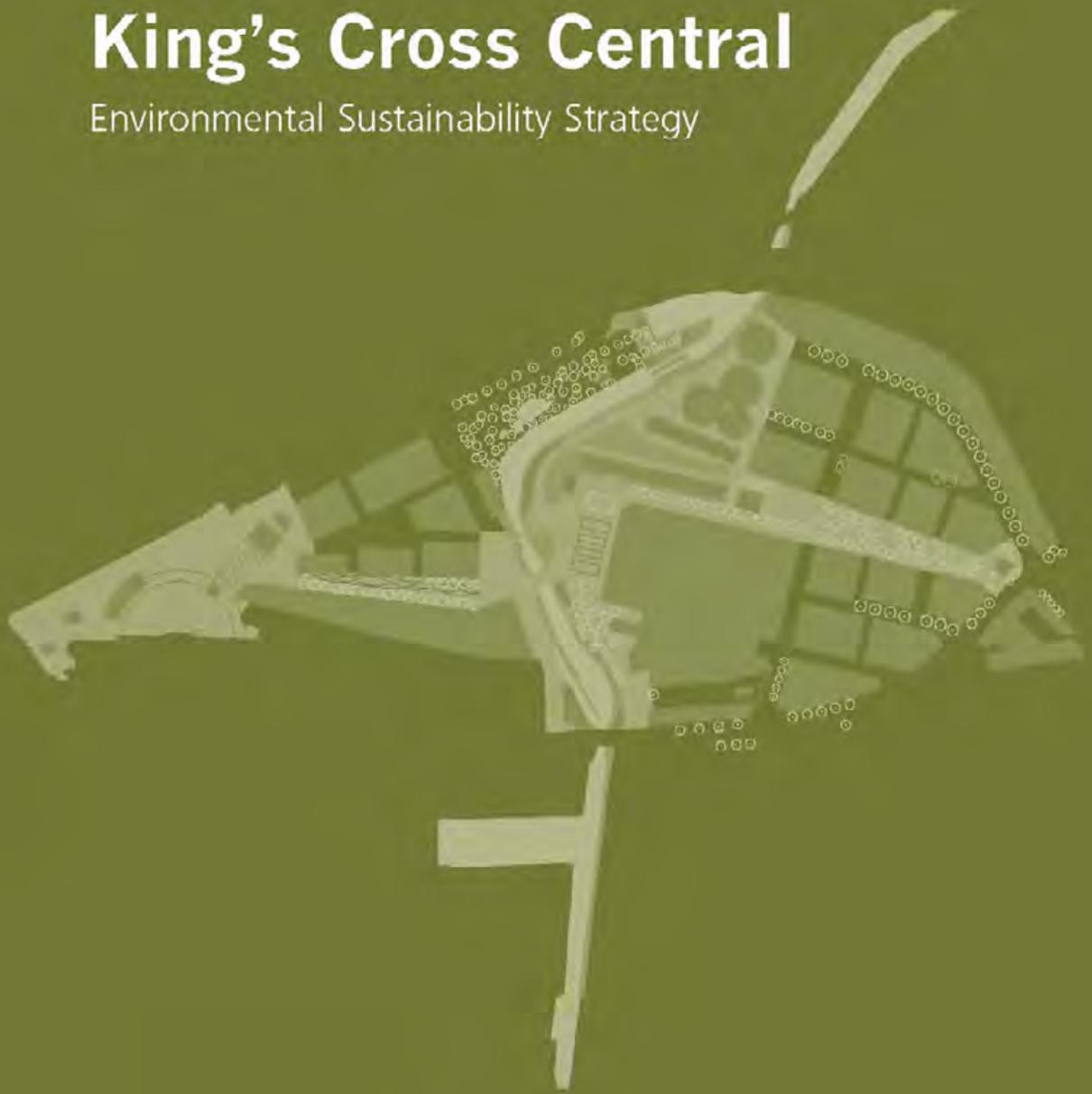


King's Cross Central

Environmental Sustainability Strategy



**Argent St George,
London and Continental Railways
and Exel**

April 2004

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Executive Summary

Introduction and Context

This Environmental Sustainability Strategy explains how Argent St George, London and Continental Railways and Exel (the Applicants for the King's Cross Central development), would explore and address the environmental and natural resource issues which form one aspect of sustainable development, the others being social and economic considerations.

The social and economic aspects of sustainable development are addressed in the Regeneration Strategy which accompanies the outline planning applications, and also in the socio-economic and health sections of the Environmental Statement.

The principles of sustainability underlie all aspects of the King's Cross Central proposals. The proposals are subject to Environmental Impact Assessment and many of the environmental considerations relevant to sustainable development, for example cultural heritage, biodiversity, noise and air quality, are covered in detail in the Environmental Statement. In addition, transportation is fully covered in a Transport Assessment and Green Travel Plan.

The location and nature of King's Cross Central means that in a number of respects the proposed development is intrinsically environmentally sustainable. The entire site comprises "brownfield" land. The presence of heritage buildings and structures means that, where practicable, these can be refurbished and re-used as part of the development. King's Cross has the best public transport connections in London. These will improve further with the completion of the Channel Tunnel Rail Link, the extended St Pancras station and associated new infrastructure.

The future major growth areas in the Midlands and South-east England, at Milton Keynes and the East Midlands, the Stansted-Cambridge Corridor, Thames Gateway and Ashford, all currently have direct rail links into King's Cross/St Pancras or Euston, or will have such links once the CTRL and associated rail infrastructure is completed.

The locational advantages of the site are recognised in the London Boroughs of Camden and Islington Planning and Development Brief for the King's Cross Opportunity Area (December 2003) which states at para 2.1.6 that:

" ... King's Cross has the potential to provide an outstanding development, exemplifying the principles of sustainability in a socially inclusive way. In particular it has the public transport accessibility and infrastructure to support business and commercial development, culture, tourism, retail and leisure, higher education and other Central Area activities. These should be combined with improved accessibility, new housing provision, the enhancement of existing and the provision of new open space, new community and other facilities, enhanced transport functions, and the integration of its valued historic features with high quality design."

The Applicants seek to ensure that the proposals contribute to sustainable development to a greater degree than would arise simply from the nature of the site and its location. It is the purpose of this strategy to show how the Applicants intend to approach this and to address principles of environmental sustainability in development of King's Cross Central.

The urban design has been informed by environmental sustainability considerations. The re-use of existing buildings represents sound use of existing assets and resources. Design of site levels has been guided by two sometimes conflicting aims:

- To promote accessibility (by all modes, but particularly pedestrian, cycle and public transport) by tying in to surrounding levels and setting maximum gradients.
- To minimise off-site removal of material by raising levels as much as practicable north of the canal.

The general north-south/east-west arrangement of building grids will help to create opportunities for lower energy buildings without too much reliance on solar shading.

The location has inherent problems of noise and air quality as a result of the surrounding transport infrastructure so natural ventilation is difficult. However, opportunities would be improved by construction of continuous built development along the CTRL embankment and west of King's Cross Station which would help to protect the environment within the site.

Whilst the commercial climate within which the principles of environmental sustainability must be applied and recognised, it is also important to appreciate that, particularly in the context of the timescale of the King's Cross Central project, that commercial climate is itself changing as businesses and their investors become increasingly aware of environmental issues, and as Government Policy and fiscal measures come increasingly to the fore. Some measures which at present seem unlikely to be commercially acceptable are likely to meet less resistance in the future and become accepted as normal practice.

Each of the buildings at King's Cross Central would be assessed using the relevant Building Research Establishment Environmental Assessment Method (BREEAM) method, or the equivalent EcoHomes for dwellings.

The Applicants' target for all appropriate building types at King's Cross Central would be to achieve BREEAM or EcoHomes 'Very Good' or better, with an aspiration for 'Excellent', accepting however that there may be some circumstances in which these standards cannot be achieved. The re-use of heritage buildings; some high density residential formats; and the provision of individual deep plan offices responding to very particular occupier demands may mean that a small minority of buildings do not meet the stated target. Conversely, where buildings are constructed for a known occupier, it should be easier to achieve the BREEAM/EcoHomes standard of 'Very Good' and indeed the Applicants' stated aspiration for 'Excellent'.

All buildings need to meet the requirements of the Building Regulations. In some instances the Building Regulations set relevant standards which must be met or bettered.

The Applicants would consider the potential for selected buildings, in early phases, to demonstrate one or more leading edge sustainability techniques, specifically aimed to improve the techniques' commercial application and viability. These may include energy, water or waste demonstration projects.

Energy

Climate change is recognised to be mainly due to greenhouse gas emissions resulting from combustion of fossil fuels for energy use. Decisions at the local level have a large influence on the need for energy, and ultimately on the scale of eventual climate change effect.

King's Cross Central may be developed over some fifteen to twenty years and during that time the statutory requirements, the range of technical solutions, and their cost effectiveness are likely to change. A rigid target set now would be unsuitable for later buildings. Thus a mechanism is needed that allows realistic targets to be used now; and responds to future changes and opportunities, whereby the Building Regulations set the minimum requirements for reduced carbon emissions, with 'Good Practice' and 'Better than Good Practice' achieving consistently improved reductions.

Whilst all buildings would need to satisfy the Building Regulations, King's Cross Central has set an initial target of reducing carbon emissions by up to 25% below those specified by the Regulations through a combination of energy efficiency, use of renewables and increased supply efficiency. This benchmark would be reviewed for practicality at 10-year intervals from the date of outline planning approval.

Whilst each of the buildings at King's Cross Central would be assessed using the relevant BREEAM/Ecohomes method, the carbon emission targets have been set independently because, being based on a range of environmental issues, the BREEAM and EcoHomes assessment methods do not explicitly define the high standard of energy or carbon performance aspired to.

The Energy Hierarchy is the basis for the methodology to be applied. This involves applying the following components in the order:

- apply energy efficiency; then
- apply renewable energy; and then
- optimise efficiency of supply.

Energy Efficiency

Building efficiency starts with the building envelope, with its massing and positioning. This in turn affects the choice of building systems needed and their capacities. It is when loads are significantly reduced that passive cooling or heating and thermal mass become potentially significant factors. These interactions point to:

- appropriately sized and designed windows;
- whole-life assessment benefits of investing in enhanced envelope thermal performance, to reduce systems capacity;
- careful design of building systems to reduce electrical demand;
- applying HM Govt Energy Efficiency Best Practice Programme Energy Consumption Guides;
- well controlled and directed lighting; and
- consistent reduced peak energy demand.

Renewable Energy

As development of King's Cross Central progresses, detailed consideration would be given to the full range of active renewable energy systems to review their suitability and cost effectiveness. These include:

- solar electric photovoltaics (PV);
- solar hot water collectors;
- wind-generated electricity;
- biomass; and
- the use of electricity Green tariffs.

It is anticipated that there is the potential for generating some 15% of the King's Cross Central energy needs from renewables, using currently available technologies. A proportion could be site generated, but it is expected that because of the high-density form and the extent of heritage buildings, the majority would be renewables generated off-site.

Supply Efficiency

There are a number of potential methods for improving energy supply efficiency. Those which are most relevant are:

- Combined Heat & Power (CHP);
- Combined Cooling, Heating & Power (CCHP); and
- Energy Supply Companies (ESCOs).

The applicants are committed to providing an energy information and monitoring service as part of the site-wide management. During the development stage this would provide the key point of responsibility for initiating site-wide feasibility studies, establishing and refining benchmarks and targets, providing carbon targeting briefs for each of the buildings, and monitoring and reviewing the individual building design energy proposals. The role would include liaison with Camden and Islington Borough Councils and energy providers. Once the development was established, the role could also involve the operational services of an ESCO.

Waste

Waste would be generated by the King's Cross Central development at two stages. Firstly, the construction of the development itself has the potential to generate significant volumes of waste. Secondly, the users of and the visitors to the completed development would also generate waste. As a high density mixed-use development, King's Cross Central would include a range of uses including business and employment, residential, hotels, retail, leisure and community facilities.

The waste types that would be produced at King's Cross Central would include:

- construction and demolition waste;
- commercial and industrial waste;
- municipal solid waste;
- green waste; and
- waste from leisure uses.

Waste would be managed according to the principles of Best Practicable Environmental Option (BPEO), regional self sufficiency, the proximity principle and the waste hierarchy.

The aim would be to:

- first, minimise the amount of waste produced; then
- re-use as much as possible of that which is produced; then
- recover value from that waste which cannot be re-used, for example, through recycling, composting and for energy from waste schemes; and then
- dispose of residual waste through landfilling or incineration without energy recovery.

Construction and Demolition Waste

Construction and demolition waste can be minimised through avoidance strategies. The most obvious is to re-use, where practicable, existing buildings and structures and to incorporate them into the scheme. At King's Cross Central, a number of historic buildings would be re-used within the development.

Where demolition of existing buildings and structures is proposed, there is the potential to salvage materials for re-use, either with or without further processing or treatment. This would have the benefit of reducing the requirement for primary materials.

The crushing and screening of materials would almost certainly be required prior to their re-use within the development. This could be achieved either through the use of mobile plant within demolition areas or at a centralised processing and storage area.

Surplus material removed from the King's Cross Central site may be used on other development sites in the vicinity or elsewhere. Alternatively, some of the material may be suitable as a feedstock for use in the nearby concrete batching plants. Any material that could not be so used would be removed to landfill.

Packaging waste associated with the delivery of construction materials can be a significant issue. In a development of the scale of King's Cross Central the objective would be to use purchasing power either to minimise the nature of such packaging, look at ways of re-using packaging, or to specify that it must be capable of being readily recycled.

Significant amounts of waste materials could be generated from the craft industries in the form of off cuts of wood, bricks, steel, glass etc. Where practicable, this would be minimised through purchasing to precise specifications which may, where appropriate within the design and method of procurement, include a degree of pre-fabrication.

Where waste generation is inevitable, site managers would ensure that it is collected and deposited in segregated containers to enable recycling either elsewhere on site or, more probably, through processing off site and subsequent re-use in other products.

Waste from Residents, Businesses and Visitors

The strategy for waste management would be two-stage. The first would be educational, promoting the issues of waste minimisation, and re-use and recycling. The second would be development-led, providing the practical opportunities to implement sustainable waste management practices.

The London Boroughs of Camden and Islington already have well developed information about recycling, re-use and 'sustainable' purchasing strategies available in a variety of media. Existing information includes:

- advice on waste avoidance through purchasing;
- re-use of unwanted items either directly or indirectly through charity shops;
- unwanted goods exchange;
- junk mail prevention measures;
- recycling services available;
- home composting;
- waste watch business network; and
- educational visits to schools, residential groups and businesses.

Information packs would be made available, and regular feedback sought on the success of schemes and suggestions for improvements. Given the duration of the project, the advice and information process would inevitably evolve as development progresses. This would provide the opportunity to include new initiatives, and would enable best practice to be incorporated as it is identified and evaluated.

Raising the awareness of waste as an issue must be supported through design solutions, both in the public realm and within homes, businesses and leisure facilities, to enable sustainable waste management to be achieved.

Design would help householders segregate and store waste into the various streams to be collected, as the waste collection authorities' residential collection service develops. Space would be provided for general waste containers and for recycling of cans, bottles, paper, plastics, textiles, etc. Storage areas would be secure and sited to be easily accessed by waste collection vehicles.

Since homes are likely to have limited or no outside storage space, secure communal recycling storage areas would be made available. Within homes, space could be provided to store small amounts of segregated, non biodegradable waste prior to transfer to the appropriate communal containers. Alternatively, chute systems could be installed directly feeding waste containers.

Within the commercial and leisure buildings it would be equally important to design in adequate waste segregation and storage areas.

Within the public realm, waste containers would be provided at key locations in appropriate numbers.

The Site Management Company is likely to have an important role in street cleaning and litter collection in public areas, and for maintenance of landscape areas. Wherever practicable, the wastes collected would be appropriately segregated for recycling or composting.

An area of land between the CTRL and the North London Line (the 'Linear Land') together with adjacent Camden-owned depot facilities along York Way, may present opportunities to incorporate new waste management facilities which may include, for example, clean bulking facilities. This will be examined further and is the subject of ongoing feasibility studies.

Water Supply and Surface Water Disposal

The Applicant would look to include specific measures and water economy features to enable potable water consumption to be reduced within the King's Cross Central design proposals. Targets for overall water consumption reduction would be 20% below the typical usage for residential of 150 litres/day per person, and commercial/retail premises of 25 litres/day per person.

Economy in use of water would inform the brief for the design and fit-out of buildings with the aim of reducing overall water environmental impact. Building briefs would specifically require the consideration of water saving, recycling and supply options. When constructing the base build of speculative office and residential buildings, the Applicants would employ good practice in water consumption. The future management of water use would then be the responsibility of tenants or residential occupants, but they would generally not be expected totally to remove the base systems.

The feasibility of a range of water conservation and management options would be considered as part of the design process. These are outlined below.

Reduced Demand

Various water efficiency measures can be implemented in order to reduce demand for mains water consumption. Water efficiency leads to reduced impacts associated with its supply and disposal, including energy, chemicals, carbon emissions and use of resources.

Reducing demand for water has the effect of reducing the volume of used water to be subsequently handled, treated and disposed of. In particular, where foul water is discharged to sewers, it reduces the required capacity of the sewer system and reduces the peak capacity needed at treatment works. Hence reducing the need for water has a double benefit of reducing the resource use associated with both supply and effluent discharge.

Non-potable Supplies

A water conservation strategy relies on the effective supply of water of suitable quality. Traditionally in the UK this has all been at the one potable quality level. There are potential alternatives to this, which involve delivery of water at different quality levels for different uses. Often these have a secondary benefit of reducing discharge volumes of wastewater to conventional foul and surface water sewers. These potential alternatives include:

- groundwater abstraction;
- greywater recycling;
- blackwater recycling; and
- rainwater harvesting.

It may not be technically or economically feasible to employ some of these systems centrally. However, it may be possible to use them on a small scale to provide a sustainable water source to a group of buildings or to a single building. Blackwater re-use is however unlikely to prove feasible at a large scale on a multi-tenancy site with limited land availability for the treatment infrastructure.

Supply System

Initial discussions have taken place with licensed utilities for the potential use of the canal as a water resource. Its viability would depend on detailed technical investigations and agreement of appropriate licensing and commercial terms.

Sustainable Drainage Systems (SUDS)

The treatment of storm run-off would follow current guidelines on sustainable design in high density, central locations. The intention is to control the timing and volume of flows to acceptable standards. It is proposed to reduce the total combined flow to the existing combined sewers by 10% below the agreed existing discharge from the site.

It is also the intention to improve the quality of water run-off from the developed site. The potential range of methods, to be investigated further, is in part determined by the topography, soil properties and development layout. Requirements for any special ground surface finishes would be subject to agreements with local authorities. The range of potential techniques includes landscape features used to improve the quality of the run-off through:

- infiltration;
- retention;
- filtration; and
- attenuation.

Construction Materials

Sourcing and use of construction materials are important considerations in the environmental sustainability of development. Choices of construction materials and practices adopted on site make important contributions to safeguarding the environment. The Applicants' materials and purchasing strategy would be based upon three principles:

- best practice on site, specifically addressing reducing material usage, use of recycled materials, and waste minimisation;
- suitable design with the intention of promoting sustainable techniques and principles; and
- materials selection following a hierarchy based on sustainability criteria.

The strategy would act as a guide to contractors, designers and others on the principles of reducing material impacts on the environment and would lead to specification clauses and targets for all designers, contractors and suppliers.

In undertaking the King's Cross Central development the following measures would be considered:

- reduce volume of materials used;
- use recycled material;
- minimise waste;
- use impact reduction methodologies;
- design for adaptability and flexibility;
- design for future deconstruction and re-use; and
- establish criteria for material selection.

Landscape provision across the site would follow the materials use and purchasing strategy. It should be possible to use appropriate materials that have been recovered or recycled in the landscaping on site. Both soft and hard landscaping would adopt a sustainable approach.

The future delivery of the King's Cross Central strategy must consider future building standards and industry best practice. This means that targets have to be flexible, be based on simple practical and enduring themes, be measurable, and reflect the strategy's ultimate goals. It is important that the measures proposed are capable of being delivered. For this reason, the Applicants have identified targets based to a considerable extent on the BREEAM standards applied at the design and specification stage and consistent with achieving overall 'Very Good', aspiring to 'Excellent' rating.

The Applicants would use the BREEAM assessment as the mechanism to set targets for construction materials. The Applicants would seek to obtain as many points as possible for each building through achieving these targets, consistent with achieving other targets set in this Environmental Sustainability Strategy.

Implementation of the Strategy

The key commitments made by the applicants in the context of this Environmental Sustainability Strategy for King's Cross Central are as follows:

- The Applicants are committed to the development and implementation of a Code of Construction Practice which would set the framework for the individual Construction Environmental Management Plans for each construction Contract.
- The Applicants are committed to the implementation of a comprehensive Environmental Management System which would cover the post-construction estate management activities at King's Cross Central in the long term. The EMS would be modelled on ISO14001.
- The remit of the EMS would include all those areas addressed in this Environmental Sustainability Strategy. It may also cover other issues addressed within the Environmental Statement and the Green Travel Plan. In particular the EMS would include:
 - Energy Reduction Strategy;
 - Sustainable Waste Strategy;
 - Sustainable Water Strategy; and
 - Materials Use and Purchasing Strategy.
- The responsibility for maintaining the EMS would fall on the Applicants and the estate management company which would be set up to manage the King's Cross Central estate.

Recognising that the commercial climate within which the principles of environmental sustainability must be applied is changing as businesses and their investors become increasingly aware of environmental issues, and as Government Policy and fiscal measures come increasingly to the fore, the Applicants would actively promote awareness of the issues addressed in this Environmental Sustainability Strategy to those seeking to commission/purchase and/or occupy new buildings.

1. Introduction and Context

1.1 This Environmental Sustainability Strategy explains the ways in which Argent St George, LCR and Exel (the Applicants for the King's Cross Central development), would explore and address the environmental and natural resource issues which form one aspect of sustainable development, the others being social and economic considerations. The London Sustainable Development Commission has prepared a Sustainability Framework for London which has as its overall objective:

“ We will achieve environmental, social and economic development simultaneously, the improvement of one will not be to the detriment of another. Where trade offs between competing objectives are unavoidable, these will be transparent and minimised.”

1.2 The social and economic aspects of sustainable development are addressed in the Regeneration Strategy which accompanies the outline planning applications, and also in the socio-economic and health sections of the Environmental Statement.

1.3 The environmental and resource objectives of the Sustainability Framework for London are:

- **Environment**

We will protect and improve the city's natural ecosystems, its biodiversity, its open spaces and its built environment. We will help to protect the wider regional, national and international environments with which London has links.

- **Resources**

We will limit and deal with our pollution, and use energy and material resources prudently, efficiently and effectively, including re-using and recycling our residual waste.

1.4 It should be appreciated, as referred to by the Inspector in his report on the Camden Unitary Development Plan Chapter 13 Local Public Inquiry (para 1.35), that

“ ... sustainability should be viewed as a recurring theme that informs all policies in Chapter 13 rather than a topic subject to a discrete policy ...”

In the same way, the principles of sustainability underlie all aspects of the King's Cross Central proposals. The proposals are subject to Environmental Impact Assessment and many of the environmental considerations relevant to sustainable development, for example cultural heritage, biodiversity, noise and air quality, are covered in detail in the Environmental Statement which accompanies the outline planning applications. In addition, transportation is fully covered in a Transport Assessment and Green Travel Plan, which also accompany the proposals.

Sustainable Location and Development Choices

- 1.5 King's Cross is identified as an Opportunity Area in the London Plan (GLA 2004). Para 2.8 of the Plan explains that:
- “ Opportunity Areas have been identified on the basis that they are capable of accommodating substantial new jobs or homes and their potential should be maximised. Typically, each can accommodate at least 5,000 jobs or 2,500 homes or a mix of the two, together with appropriate provision of other uses such as local shops, leisure facilities and schools. These areas generally include major brownfield sites with capacity for new development and places with potential for significant increases in density. Their development should be geared to the use of public transport and they are either located at areas of good access or would require public transport improvements to support development ...”
- 1.6 The very location and nature of King's Cross Central means that in a number of respects the proposed development is intrinsically environmentally sustainable. The entire site comprises “brownfield” land. The presence of heritage buildings and structures means that, where practicable, these can be refurbished and re-used as part of the development. King's Cross has the best public transport connections in London. These will improve further with the completion of the Channel Tunnel Rail Link, the extended St Pancras station and associated new infrastructure.
- 1.7 These intrinsic environmental advantages of the site are recognised in Chapter 13 of the London Borough of Camden's Unitary Development Plan (UDP) (which is specifically concerned with the King's Cross Opportunity Area), which states at para 13.3 that the Opportunity Area is one of the few remaining major development opportunities in London and the major one in Camden. It merits separate treatment in the UDP by virtue of:
- “ a. the scale and nature of the outstanding development opportunities presented by the area's excellent and improving public transport network.”
- and
- “ f. the great potential for low energy buildings with sustainable transport links, located in the heart of central London.”
- 1.8 This accords with the Government's guidance as set out in Planning Policy Guidance (PPG) 13: Transport which aims to extend choice and secure mobility in a way that supports sustainable development (para 2). This means enabling people to make sustainable transport choices and promoting sustainable distribution (para 3). Para 4 of PPG13 sets out the Government's objective to integrate planning and transport at the national, regional, strategic and local level to:
- “ 1. promote more sustainable transport choices for both people and for moving freight;
2. promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling, and
3. reduce the need to travel, especially by car.”
- 1.9 In order to deliver these objectives, local authorities are advised to (para 6 of PPG13):
- “ 1. Actively manage the pattern of urban growth to make the fullest use of public transport, and focus the major generators of travel demand in city, town and district centres and near to major public transport interchanges.”
- 1.10 Para 21 of PPG13 sets out guidance regarding key sites:
- “ Local authorities should seek to maximise use of the most accessible sites, such as those in town centres and others which are, or will be, close to major transport interchanges. These opportunities may be scarce. They should be pro-active in promoting intensive development in these areas and on such sites. They should develop a clear vision for development of these areas, prepare site briefs and, where appropriate, consider using compulsory purchase powers to bring development forward. Local authorities should review their development plan allocations and should:
- Allocate or reallocate sites which are (or will be) highly accessible by public transport for travel-intensive uses (including offices, retail, commercial leisure, hospitals and conference facilities), ensuring efficient use of land, but seek, where possible, a mix of uses, including a residential element; and
 - Allocate or reallocate sites unlikely to be well served by public transport for uses which are not travel intensive.”

1.11 The future major growth areas in the Midlands and South-east England, at Milton Keynes and the East Midlands, the Stansted-Cambridge Corridor, Thames Gateway and Ashford, all currently have direct rail links into King's Cross/St Pancras or Euston, or will have such links once the CTRL and associated rail infrastructure is completed.

1.12 The locational advantages of the site are further recognised in the London Boroughs of Camden and Islington Planning and Development Brief for the King's Cross Opportunity Area (December 2003) which states at para 2.1.6 that:

" ... King's Cross has the potential to provide an outstanding development, exemplifying the principles of sustainability in a socially inclusive way. In particular it has the public transport accessibility and infrastructure to support business and commercial development, culture, tourism, retail and leisure, higher education and other Central Area activities. These should be combined with improved accessibility, new housing provision, the enhancement of existing and the provision of new open space, new community and other facilities, enhanced transport functions, and the integration of its valued historic features with high quality design."

Further Application of Sustainability Principles

1.13 The Applicants seek to ensure that the proposals contribute to sustainable development to a greater degree than would arise simply from the nature of the site and its location. It is the purpose of this strategy to show how the Applicants intend to approach this and address principles of environmental sustainability in development of King's Cross Central.

1.14 Strategic Policy SKC1 of the London Borough of Camden UDP seeks the sustainable development of the King's Cross Opportunity Area. Policy KC8 refers to design matters, including the promotion of sustainable design principles and maximisation of opportunities for improved energy efficiency to limit greenhouse gas emissions. In this context para 13.61 states that:

" There is an opportunity to create an outstanding development in the King's Cross Opportunity Area based on the principles of sustainability. Particular facilities such as waste management and recycling provision may have the capacity to serve a wider area. Developments should incorporate the following sustainable design principles, to:

- minimise materials, energy and water use in building construction and operation;
- use materials that are not scarce and are obtained without damaging important habitats, ecosystems or landscapes;
- recycle materials;
- minimise air and water pollution;
- minimise waste creation and provide effective waste management;
- minimise ambient noise;
- design and construct buildings to be flexible, adaptable and maintainable with minimal use of resources and environmental impact;
- protect, create and enhance habitats and overall biodiversity;
- minimise the risk of flooding;
- conserve water; and
- minimise surface water and run-off through the use of Sustainable Urban Drainage Systems."



Urban Design

- 1.15 In addition to the high density mixed-use nature of the proposals at this major public transport node (promoting sustainable transport choices) and the brownfield nature of the site (making efficient use of previously developed land), the urban design has been informed by environmental sustainability considerations. The re-use of existing buildings represents sound use of existing assets and resources, reducing waste generation and minimising use of virgin materials.
- 1.16 Design of site levels has been guided by two sometimes conflicting criteria:
- to promote accessibility (by all modes, but particularly pedestrian, cycle and public transport) by tying in to surrounding levels and setting maximum gradients; and
 - to minimise off-site removal of material by raising levels as much as practicable north of the canal.
- 1.17 The general north-south/east-west arrangement of building grids will help to create opportunities for lower energy buildings without too much reliance on solar shading.
- 1.18 The location has inherent problems of noise and air quality as a result of the surrounding transport infrastructure so natural ventilation is difficult. However, opportunities would be improved by construction of continuous built development along the CTRL embankment (Development Zone T) and west of King's Cross Station (Development Zone A), which would help to protect the environment within the site.

Status and Application of the Strategy

- 1.19 This Environmental Sustainability Strategy is submitted as a further supporting document, to sit alongside the Environmental Statement, Transport Assessment and other documents. It explains how various topics - energy, waste, water supply and surface water disposal, and construction materials – would be addressed through the lifetime of the development.
- 1.20 The Environmental Sustainability Strategy does not form part of any planning application. Nevertheless, it has been prepared in the context of various planning documents, in particular the London Boroughs of Camden and Islington Planning and Development Brief for the King's Cross Opportunity Area, referred to above, which states at para 3.4.5:
- “ The Councils recognise that there are sometimes complex balances and compromises to be made and achieved between different aspects of sustainable development and indeed wider economic or social objectives. They also recognise that, because of the long-term nature of the development of the Opportunity Area, a flexible approach that reflects changing social, economic, environmental and technological circumstances will be central to the sustainable regeneration of the area ...”
- 1.21 It is the case that there are tensions between some of the many aspects of sustainable development. For example, the imperative for high density development to optimise the locational and public transport benefits of the site means that opportunities for passive solar gain to reduce the need for heating of buildings are more limited than they might otherwise be, and the opportunities for biodiversity provision are similarly constrained. Low intensity land uses which might otherwise be considered desirable for reasons of environmental or social sustainability, such as extensive waste management, waste water treatment, or large scale outdoor sports facilities, cannot be accommodated.

- 1.22 The overall aim of this strategy is to promote and achieve high standards of environmental design at King's Cross Central by informing the detailed environmental design and realisation of the development. This would be a dynamic process whereby new developments in technology and techniques, and changes in and experience of, the environment at the site can be taken into account in the ongoing design, construction and management of the site and its buildings and facilities over time.

Structure

- 1.23 **Section 2** of this strategy addresses energy considerations. Design and operational measures which aim to promote long-term energy efficiency in buildings are discussed. The potential for renewable energy production on the site is considered, and methods of maximising the carbon efficiency of non-renewable energy consumption within the site are discussed. Environmental standards and energy targets are also provided.
- 1.24 **Section 3** considers waste issues. It sets out an outline waste strategy, including waste minimisation and recycling, recommendations for waste management storage and access, promotion of waste management schemes, transport of waste, and integration of the strategy with the waste management objectives of the London Boroughs of Camden and Islington.
- 1.25 **Section 4** considers water supply and surface water disposal, and provides guidance on more sustainable options beyond the conventional requirements for water supply and sewerage.
- 1.26 **Section 5** considers environmental issues associated with the materials to be used for the construction of buildings and external areas at King's Cross Central. It identifies the key strategic considerations and sets out proposed specification criteria and targets.

- 1.27 **Section 6** of this document explains how the Environmental Sustainability Strategy would be implemented. Environmental requirements are defined in a Code of Construction Practice which would set the parameters for Construction Environmental Management Plans (CEMPs). These CEMPs would form part of construction contracts. In the longer term, as the elements of the development are built out, the ongoing estate management of the completed sections of the development would implement and operate an Environmental Management System.
- 1.28 Where appropriate in the text, reference is made to examples of previous developments undertaken by the Applicants and others to illustrate the application of some environmental sustainability principles.

Commercial Considerations

- 1.29 The Applicants, as development/landowner partners, intend not only to take account of environmental sustainability in the design and construction of King's Cross Central, but also to establish a management company to retain control of the management of the completed development. In the long term, environmental sustainability through management would depend at least in part on choices made by occupiers of the buildings. However, implementation of this strategy in the design and construction of the development would mean that sustainability principles are inherent features of the buildings and associated infrastructure, facilitating the future choice of sustainable management options. In so far as the management company had direct responsibility, this Environmental Sustainability Strategy would be taken forward through the Environmental Management System.

- 1.30 It is important to recognise that there are commercial and practical constraints which determine the degree to which the applicants can incorporate innovative environmental sustainability measures into new buildings. These constraints vary with the nature of the development. For example, in the case of speculative commercial development, where the end users and their requirements are not known, the building has to be 'aimed' at the broadest possible market in order to ensure that it attracts a tenant. Also, in this situation it is difficult to invest in systems that require high additional capital investment because, whereas these may theoretically be 'paid back' through cost savings, the initial capital cost is borne by the developer whilst the tenant/occupier receives the ongoing benefit.
- 1.31 The situation is different in the case of pre-let, pre-sale or similar commercial arrangements where there is an opportunity for the developer to work with the occupier on bespoke systems etc.
- 1.32 In the case of residential development, one building may have many different occupiers, and there may be a mixture of market and affordable housing. Capital costs are a constraint on affordable housing, which is generally delivered with public sector grant and its occupiers are typically highly sensitive to service charge and other costs. However, more economical management, and the demanding standards set by the Housing Corporation, mean that affordable housing can often achieve a high degree of environmental sustainability.

1.33 Whilst the commercial climate within which the principles of environmental sustainability must be applied must be recognised, it is also important to appreciate that, particularly in the context of the timescale of the King's Cross Central project, that commercial climate is itself changing as businesses and their investors become increasingly aware of environmental issues, and as Government Policy and fiscal measures come increasingly to the fore. Some measures which at present seem unlikely to be commercially acceptable are likely to meet less resistance in the future and become accepted as normal practice.

Interactions

1.34 Within the individual sections of this report, the various environmental design measures which may be implemented are each considered in isolation. For example, when energy efficiency is discussed, the options considered highlight possible reductions in total energy requirements. When renewable energy provision is considered, it is quantified against a 'standard' energy demand which does not take into account potential reductions in demand through implementation of energy efficiency measures. Thus if both energy efficiency measures and renewable energy were implemented, the resultant benefits may be cumulative. Similarly, if both waste minimisation and waste recycling measures were implemented, the effects of both in combination may be cumulative although they are considered here in isolation.

1.35 There may also be interactions between environmental components considered in different sections. For example, measures to improve energy efficiency may influence the selection of building materials or techniques. Again, these interactions are not considered in this strategy, but would be important considerations in the ongoing design of the development.

Setting Targets

1.36 Each of the buildings at King's Cross Central would be assessed using the relevant Building Research Establishment Environmental Assessment Method (BREEAM) method, including the bespoke BREEAM system where applicable, or the equivalent EcoHomes for dwellings.

1.37 BREEAM provides a method for assessing the environmental performance of both new and existing buildings, and is generally regarded by the UK construction and property sectors as the measure of best practice in environmental design and management. BREEAM provides a means of assessing overall environmental performance based on the individual consideration of management, energy use, health and well-being, pollution, transport, land-use, ecology, materials and water.

1.38 There is a growing awareness that for new buildings where the design team considers it as part of the initial brief, the attainment of a high BREEAM standard can often be achieved. Consequently, the Applicants' target for all appropriate building types at King's Cross Central would be to achieve BREEAM or EcoHomes 'Very Good' or better, with an aspiration for 'Excellent', accepting however that there may be some circumstances in which these standards cannot be achieved. The re-use of heritage buildings; some high-density residential formats; and the provision of individual deep plan offices responding to very particular occupier demands may mean that a small minority of buildings do not meet the stated target. Conversely, where buildings are constructed for a known occupier, it should be easier to achieve the BREEAM/EcoHomes standard of 'Very Good' and indeed the Applicants' stated aspiration for 'Excellent'.

- 1.39 All buildings need to meet the requirements of the Building Regulations, which is the principal statutory mechanism by which the Government can push the industry towards more sustainable construction. In some instances, the Building Regulations set relevant standards which must be met or bettered.
- 1.40 The way in which the BREEAM ratings or Building Regulation standards would be applied in the context of this strategy are explained in the individual topic sections which follow.

Demonstration Projects

- 1.41 The Applicants are aware of the considerable future potential of sustainability-related energy and other techniques, but are also concerned about the current constraints that limit their more general application in the commercial market. Many of these constraints relate to the perceived risk and the limited application experience. To address this, the Applicants would consider the potential for selected buildings, in early phases, to demonstrate one or more leading edge sustainability techniques, specifically aimed to improve the techniques' commercial application and viability. These may include energy, water or waste demonstration projects.

The Application of Sustainability Principles

- 1.42 At appropriate points through this strategy report, examples are provided of where the Applicants and others have applied sustainable principles in relation to energy, waste, water supply and surface water disposal, and construction materials at previous developments.
- 1.43 The following examples relate to other environmental sustainability principles not specifically addressed in this strategy:

Transport, cultural heritage and re-use of brown-field sites are important topics for environmental sustainability that are not addressed by this document. These topics are addressed intrinsically by the proposals and are addressed in the Environmental Impact Assessment, the Transport Assessment and the Green Travel Plan. Examples of where the Applicants have used sustainable principles to address these topics are:



Transport

Both Argent and St George seek to minimise carbon emissions from transport to and from their new developments by looking at all aspects of the transport infrastructure. All current major development projects have secure cycle storage facilities and are within 15 minutes walk of a tube or rail link. Both companies promote high density mixed-use developments, as proposed at King's Cross, that allow residents and workers to reduce dependence on vehicular modes of transport by combining trips to work with trips to shops and leisure activities.



At Imperial Wharf, which was not well served by public transport, St George is creating an integrated transport hub: improving local bus services, cycle routes and contributing to £1.75m to a new rail station. At Thames Valley Park in Reading, which also lacked public transport links, Argent helped fund bus links to Reading Station and committed to the provision of a £2m new rail station.



At Charter Quay, Teddington Wharf and Putney Wharf, St George provided new slipways and river piers to open up a new transport option along with the provision of new moorings. At Brindleyplace in Birmingham, Argent enhanced the surrounding canal environment and even brought some pre-fabricated building elements to the site by narrow-boat.



Cultural Heritage

Argent has had considerable success in developing in and around sensitive heritage environments. At Governor's House in the City of London Argent undertook extensive archaeological research that established that the proposed building was indeed on the site of the former Roman governor's house. Sensitive piling techniques and superstructure design minimised ground disturbance.

At Alder Castle, archaeological work facilitated research into the London Wall dating back to the Roman period. The design enhanced the setting of the London Wall and incorporated a number of features to enhance understanding of the site.

At the Ikon Gallery at Brindleyplace, Argent worked with the gallery to convert successfully the old Grade II listed schoolhouse into an award winning venue for modern art.



In its seven Thames-side schemes, St George has upgraded over 2km of river frontage, improving access to the River. River wall repairs using pre-aged natural materials led to the Environment Agency supporting a successful grant bid to MAFF to use similar techniques in the Docklands. At St George's Wharf, they worked closely with the Environment Agency to protect the river foreshore from encroachment to ensure that this important area of the Thames is not built on, despite the local authority granting permission to do so.



Re-Use of Brownfield Sites

Argent and St George are both at the forefront of brownfield site redevelopment and all of their current development projects are being delivered on brownfield sites. St George has worked in conjunction with the Civic Trust to publish an industry guide for reclamation, offering encouragement and best practice examples.

Some examples of brownfield development undertaken by Argent and St George include:

- **Brindleyplace** – a former brass works and other industrial site
- **Thames Valley Park** – a former coal fired power station and concrete works
- **Imperial Wharf** – former gas works
- **Lockes Wharf** – former lead smelting works

Exel has worked with many of its partners to bring forward development of a number of their brownfield sites.

In the early 1990s Exel partnered with Safeway and Community Housing Association to regenerate Camden Goods Yard.

Another former Exel site, Paddington Central, is currently delivering high density, mixed-use development on brownfield land adjacent to a transport node. This follows Exel and its partner securing a negotiated planning consent.

2. Energy

Introduction

- 2.1 Climate change is recognised by international consensus to be mainly due to greenhouse gas emissions resulting from combustion of fossil fuels for energy use. Climate change effects are beginning to be felt locally, both directly through changes in weather patterns, and also through implementation of mitigation measures, such as increasing generation of power through renewable energy sources, particularly wind power. Decisions at the local level have a large influence on the need for energy, and ultimately on the scale of eventual climate change effect.
- 2.2 Reducing greenhouse gas emissions from energy production is the fundamental aim of an energy strategy. The Government's Energy White Paper of February 2003 includes as one of its four goals:
- “ to put ourselves on a path to cut the UK's carbon dioxide emissions - the main contributor to global warming - by some 60% by about 2050 with real progress by 2020.”
- 2.3 King's Cross Central would aspire to become a model of how to balance the needs of carbon-based energy reductions against commercial pressures, evolving technologies, and continually changing expectations. Building energy use benchmarks are continuing to evolve and the King's Cross Central energy strategy provides the flexibility to respond to these changes. This section presents initial energy targets and the methodology for their realisation.

Context

- 2.4 In addition to a growing general awareness of the implications of global warming, there are increasing relevant UK Government and EU commitments, legislation and recommendations on energy.
- 2.5 The Energy White Paper 'Our Energy Future – creating a low carbon economy' (H M Govt, 2003) outlines the UK Government's new energy policy for reduced dependence on gas, coal and oil, and a substantial increase in renewable energy production. It confirms the UK objective of a 60% carbon emissions reduction by 2050, and a target of 20% reduction by 2020. It identifies the benefits of developing renewables instead of increased dependence on imported natural gas as our indigenous supplies reduce.
- 2.6 There are clear advantages in developing the technologies involved in moving to a low carbon economy. Instead of exporting hard-earned revenue by buying imported fuel, it recycles revenue through more locally derived renewables, with increased local employment, skills base and technologies developed for delivering this more diverse range of energy sources.
- 2.7 Energy efficiency and reducing the amount of energy needed are at the forefront of this drive. Not only does this reinforce improved resource efficiency, the 'getting more from less' principle, but it shifts a larger proportion of available expenditure towards local services and higher value products.

- 2.8 Buildings contribute some 50% of the UK's carbon emissions, and considerably more than this if the travel to and from these buildings is included. The buildings we construct now are likely still to be in use in 2050 when 60% carbon emission reductions are expected, and some in use in 2100 when the Royal Commission on Environmental Pollution predicts that 80% reductions will be needed (RCEP, 2000). Newly-constructed buildings, in particular, are expected to respond to this new agenda, not least because of the technical ability to achieve very high energy performance compared with the existing building stock, even if the financial means and social acceptance may not yet be in place. It is also the case that most new developments are adding to the overall building stock, and hence adding to carbon emissions, rather than simply replacing and upgrading existing stock.
- 2.9 The Government has indicated that it will use the full range of controls at its disposal to harness market forces to bring about the needed energy use changes. The Building Regulations (H M Govt, 2002) are to be reviewed on a continuous five yearly basis and methods explored for applying aspects of these regulations to existing buildings. Planning guidance is being revised with the intention that energy use becomes a material planning consideration (see for example the Consultation Draft Planning Policy Statement (PPS) 22: Renewable Energy). The GLA and the new Regional Development Agencies formally include energy in spatial planning guidance. These policies are influencing local Supplementary Planning Guidance, with at least one London Borough now including the requirement for 10% renewable energy in its Unitary Development Plan.
- 2.10 Currently, even for many 'Good Practice' buildings, actual in-use carbon emissions are continuing to rise as buildings are used more intensively and with increased use of carbon-intensive electrical systems. The current incremental improvement approach to national Building Regulations is likely simply to cap this continued rise, and not be sufficient to achieve the reductions required to meet EU and Government targets, unless the basis for Building Regulations is substantially altered. The use of the planning and development control system is seen as a mechanism that allows locally established priorities to define how reduction targets are to be achieved.
- 2.11 The GLA, through the Mayor's draft Energy Strategy (GLA 2003), has taken a lead in suggesting means for achieving carbon targets. It seeks 20% carbon emission reductions by 2010, with major developments expected to be 'exemplars' of energy efficiency with 10% of energy provided by renewables. The Strategy goes on to explore a full range of implementational mechanisms: energy saving; fuel switching; education; generation; and technological aspects, although some are far from today's market. It also talks about the need for demonstration projects and aspirations for a zero carbon development in each borough. The Strategy serves two different purposes; firstly guidance on what is to be expected now, but secondly illustrating how future targets could be met using a range of evolving technologies and techniques. The issue highlighted by the strategy is distinguishing what is practical now, from what is future aspiration.

Market Influence

- 2.12 The provision of new and refurbished buildings is governed by market requirements. Anticipating the needs and perceptions of potential tenants and occupiers shapes the building form, its facilities and systems. Currently, carbon emissions do not register as a priority for many, certainly not something warranting a cost premium. The risk of discouraging potential occupiers in this way, so they may go elsewhere, has to be managed and avoided for the overall success of King's Cross Central.
- 2.13 Where a developer can design the building for a known user, be it a pre-let, pre-sale, or similar situation, there is an opportunity to consider innovative energy systems. It allows an increased capital investment to be agreed in return for lower running costs.
- 2.14 However, much of King's Cross Central, as everywhere else in the UK, is likely to be speculative development where the end user, occupier or purchaser is unknown until individual buildings are completed. Intense competition for potential occupants means that higher capital costs of any innovation can rarely, if ever, be converted into higher sale or rental rates to recover the developer's investment, even if the occupier benefits from lower running costs.
- 2.15 However, there are indications of a shift in parts of the market, with increasing interest in environmental issues. How far and how fast this interest will develop remains to be seen. By the later stages of the King's Cross Central development, the market needs may have changed and may (or may not) be demanding significantly improved environmental standards.

Number Five Brindleyplace (Pre-let to BT)

In 1995 Argent agreed a pre-letting of 15,400m² to British Telecom at Brindleyplace in Birmingham. From the outset, BT was convinced that the new office should be a low energy building while meeting their other aspirations for a good quality interior space with focal points where staff would meet naturally.

To gain background information, Argent surveyed existing BT buildings to understand the range of operations envisaged within the new building and to estimate the energy and environmental demands generated by these activities. This allowed Argent and BT to arrive at the 'right' specification for BT's needs which allowed the designers to fine-tune the building.

Windows were kept as small as practical, commensurate with good daylighting. This made it possible to keep the air conditioning system very simple and efficient while maintaining the internal environmental standards to meet the occupiers' needs. Air at 18°C is supplied through grilles in a 400mm floor void and passed back through the air handling plant through the ceiling void.



Number Four Brindleyplace

Speculative Development Safeguarding the Future

When Argent approached the speculative development of Number Four Brindleyplace in 1997, there was a clear desire to create the build on the low energy concepts of Number Five, whilst ensuring that the building could meet the widest possible requirements of “institutional” occupiers. The result was an award-winning building capable of flexible, multi-tenant occupation, with a choice of energy and environmental control systems including part natural ventilation.

The external envelope and fresh air supply systems were designed to be capable of accommodating occupancy levels as dense as 7m²/person. Whilst these occupancy levels are seldom utilised in practice, this enhanced capacity allows the building to appeal to the widest possible range of users, which is essential when bringing a speculative building to the market.

Design to an enhanced level of performance puts high demands on the building envelope and systems. Whilst much of the façade is glazed, good energy performance is achieved by using external solar shading and high performance glass.

The building was designed to allow the tenant to choose the type of cooling and ventilation systems that would achieve a comfortable working environment. The atrium and façade were designed to allow a single occupant to achieve partial natural ventilation. The floor slabs were built so that they could be exposed, allowing climate moderation using chilled beams. Each floor has a 450mm raised floor which could act as a plenum if a tenant chose to operate an upward displacement system.

In the event, none of the tenants chose to use anything other than the standard “institutional” fully air-conditioned option. Unless energy costs increase to the level at which consumption constitutes a meaningful proportion of business running costs, or if there are other “corporate responsibility” drivers, it is unlikely that there will be a shift in occupier demand to take up lower energy features. If this shift does take place, Number Four will be able to respond to the new environment.



Evolving Targets

- 2.16 King's Cross Central may be developed over some 15-20 years and during that time the statutory requirements, the range of technical solutions, and their cost effectiveness are likely to change. A rigid target set now would be unsuitable for later buildings. Thus an escalator mechanism is needed that allows realistic targets to be used now and responds to future changes and opportunities. This principle is illustrated schematically in Figure 2.1, where the Building Regulations set the minimum requirements for reduced carbon emissions, with 'Good Practice' and 'Better than Good Practice' achieving consistently improved reductions.

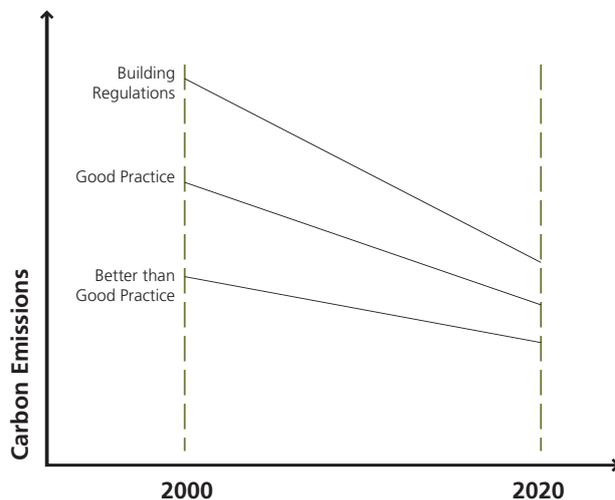


Figure 2.1
Benchmark Escalator: Improving with Time

Setting Targets

- 2.17 To be of use, energy targeting needs to be:

Simple

- As the fundamental aim is to reduce carbon emissions, this would be the measure to be applied throughout building types (measured as kgC/m² per year). It has the benefit of now being adopted by the Building Regulations for various building types. It avoids the interpretation issues involved in many of the other measures like primary energy, delivered energy, and various Best Practice standards.

Auditable

- By relating the target to Building Regulations, a clearly identified evolving standard can be established. This provides a good practicality check because each regulation change relates to what the industry at that time can deliver. In addition, the Building Regulations provide the mechanism for auditing against the target because each building design has to be accompanied by a carbon-related assessment for Building Regulations approval. The Regulations now also require energy sub-metering throughout buildings, providing the means for monitoring actual carbon emissions if and when EU Building Energy Use regulations come into operation.

Flexible

- Using an overall building carbon target allows the developer the flexibility to use the most cost-effective combination of energy efficiency, use of energy from renewable sources and energy supply to achieve the target.

Practical

- The actual energy consumption of a building depends on a combination of the building user systems and management, alongside the building envelope, and basic infrastructure. A significant proportion of this is beyond the influence of the developer, including obtaining meter readings of actual energy use. Thus an intermediate stage that allows the initial building design to be audited provides assurance that the target is being implemented.

Benchmarks

- 2.18 Whilst all buildings at King's Cross Central would need to satisfy the Building Regulations, the Applicants are committed to setting challenging carbon emissions performance targets that go beyond that which is required by law.
- 2.19 King's Cross Central has set an initial target of reducing carbon emissions by up to 25% below those specified by the Building Regulations through a combination of energy efficiency, use of renewables and increased supply efficiency. For individual building types, this represents the following targets:
- 2.20 The carbon emissions benchmark escalator of 25% better than the Building Regulations would be reviewed for practicality at 10 year intervals from the date of outline planning approval.

Table 2.1 Carbon Emissions Targets

Offices carbon target (kg C/m ² /yr) Base building only - includes heating, cooling, fans, pumps, lighting & domestic hot water (Notes 1 & 2) Tenant energy use - includes office equipment, computers & communications rooms, catering & other miscellaneous uses	Naturally ventilated 7.1	Mechanically ventilated 8.8	Air-conditioned 13.9
	The tenant's equipment is excluded from the target. Tenant's essential processes within the buildings may add additional carbon emissions.		
Residential Carbon Index (Note 3)	9.1		
Retail Includes tenant use carbon target (kg C/m ² /yr)	Non-food 21.8	Department 28.3	Supermarket 72
Hotels & Conferencing carbon target (kg C/m ² /yr)	Holiday Hotel 15.8	Luxury Hotel 18	
Leisure carbon target (kg C/m ² /yr)	Sports & Pool 28.3	Cinema 2.7	
Community Facilities carbon target (kg C/m ² /yr)	Police, Fire & Ambulance 13.3	Bank 10.1	Schools 4.8 (Note 4)

Note 1 The choice of ventilation system would take into account noise & other external pollution levels, occupier requirements, market perception and other factors. To provide a positive incentive to encourage take-up of more efficient building types, the air-conditioned office benchmark is 25% better than the Building Regulations, while mechanical ventilation is only 12% better and natural ventilation equal to the Building Regulations.

Note 2 In accordance with Building Regulations Part L2 2002, this excludes carbon emissions due to occupant "process requirements", for example, extra high occupancy beyond typical office use (12m² per person defined as typical by the British Council for Offices Guide 2000) or intensive IT requirements.

Note 3 SAP: 2001. The Government's Standard Assessment Procedure for Energy Rating of Dwellings

Note 4 Building Bulletin 87: 2003. Dept for Education and Skills

Building Environmental Assessments

2.21 As explained in Section 1, each of the buildings at King's Cross Central would be assessed using the relevant BREEAM/Ecohomes method. The carbon emission targets are expected to complement these assessments but have been set independently because, being based on a range of environmental issues, the BREEAM and EcoHomes assessment methods do not explicitly define the high standard of energy or carbon performance aspired to.

Application Methodology

2.22 The London Mayor's draft Energy Strategy (GLA, 2003) includes the Energy Hierarchy as a strategic tool for prioritising carbon emission reduction methods. This is the basis for the methodology to be applied:

- apply energy efficiency; then
- apply renewable energy; and then
- optimise efficiency of supply.

2.23 This emphasises the importance of reducing the need for energy before considering the use of renewables; and lastly energy supply aspects like Combined Heat and Power (CHP). This is reinforced in whole-life cost terms where reducing the need for energy is better than use of renewables and alternative energy supply methods. Thus the emphasis for King's Cross Central is on reducing demand, albeit that this may make the economic case for some renewable or energy supply initiatives more marginal.

2.24 There are various carbon-saving technologies that, if they are to be implemented, have to be done as part of district-wide infrastructure. Establishing which technologies are appropriate, and for which areas and phases of the development, would require detailed feasibility studies at a later stage. The available and emerging technologies are:

- passive cooling using night ventilation or ground water;
- active cooling & heating using ground-source heat-pumps;
- community heating infrastructure serving all or parts of the site;
- combined heat & power (CHP); large scale, micro-CHP & fuel cell; and
- combined cooling, heat & power (CCHP).

2.25 The Applicants would consider the application of each of these technologies and consult key stakeholders including Camden and Islington Borough Councils. Feasibility studies would be done as the building forms, the mix of uses, and likely energy demand profiles start to become available during the detailed design of the first major phase. These studies would consider issues wider than the purely technical, including:

- occupier acceptability;
- long-term operating business plans;
- availability and range of alternative suppliers;
- supply reliability for end user; and
- whole life carbon-saving potential.

Energy Efficiency

2.26 Building efficiency starts with the building envelope, with its massing and positioning. This in turn affects the choice of building systems needed and their capacities. It is when loads are significantly reduced that passive cooling or heating and thermal mass become potentially significant factors. These interactions point to:

- appropriately sized and designed windows, with recent experience showing that oversized windows fail to achieve electric lighting saving because of increased glare-blind use;
- whole-life assessment benefits of investing in the enhanced envelope thermal performance, to reduce systems capacity, with the potential to omit certain systems entirely;
- careful design of building systems to reduce electrical demand;
- applying HM Govt Energy Efficiency Best Practice Programme Energy Consumption Guides;
- well controlled and directed lighting, designed to reduce light pollution and permit off-grid PV street lighting; and
- consistent reduced peak energy demand, which offers the potential for reduced site-wide infrastructure investment needs.

Renewable Energy

2.27 As development of King's Cross Central progresses, detailed consideration would be given to the full range of active renewable energy systems to review their suitability and cost effectiveness. An initial review of options indicates that:

- **Solar electric photovoltaics (PV)** offer considerable future potential, but currently carry a considerable cost premium, particularly as grant aid is limited for developers. Recent experience suggests that the same funding can achieve considerably greater carbon reduction through investment in energy saving. Future-proofing buildings would be explored to ensure that buildings can, as far as practicable, later accept PV as it becomes viable. Likewise, demonstration elements to increase public awareness of the technology would be investigated. These may include off-grid powered street appliances like streetlights, bus stops, and ticket machines.
- **Solar hot water collectors** are likely to be viable for selected buildings but are expected to contribute only a small proportion of overall development energy needs.
- **Wind-generated electricity** using building integrated turbines may become a commercial possibility as the products now in research start to enter the market.
- **Biomass** is a rapidly developing field with a number of demonstration projects now underway. Most of this is relatively small-scale and so its applicability for a large development like King's Cross Central would need careful investigation.
- **The use of electricity Green tariffs** for the supply of electricity from renewable sources is largely dependent on occupier choice. Changes in the tax system to make renewable energy more competitive would encourage increased use of such sources. In practical terms this is likely to be the most deliverable source of significant renewable energy into London. Current proposals for major development of wind power generation in the Thames Estuary are relevant in this context.



Woking Town Centre CHP District Energy Station - Thameswey Energy Ltd © Woking Borough Council

2.28 On the basis of previous similar studies, it is anticipated that there is the potential for generating some 15% of the King's Cross Central energy needs from renewables, using currently available technologies. A proportion could be site-generated, but it is expected that because of the high-density form and the extent of heritage buildings, the majority would be renewables generated off-site. One of the primary issues for feasibility studies to address is the current prohibitive cost of providing large-scale renewable energy systems.

2.29 Prioritising visible renewable energy systems is important. There is a need to increase wider public awareness of renewables and, through this, to improve their wider acceptance, and stimulate occupant demand for it in buildings.

Supply Efficiency

2.30 There are a number of potential methods for improving energy supply efficiency. Those which are most relevant are:

- **Combined Heat & Power (CHP)** which offers the potential to reduce carbon emissions by simultaneously generating heat and electricity. Particular care is needed in matching its constant energy output against continually fluctuating building demands, particularly in summer. The potential for mini and micro scale CHP plants to serve parts of the development would be explored;
- **Combined Cooling, Heating & Power (CCHP)** with the opportunity to use surplus heat from CHP to deliver cooling to air-conditioned buildings. It tends to work best where there is use diversity across a selection of served buildings;
- **Energy Supply Companies (ESCOs)** are specialists who take responsibility for delivering a range of energy-related services. Often they operate CHP units and similar specialist plant, but they can operate larger renewable systems located on-site or remotely, and manage the complete systems and the delivery of energy to consumers.

Facilities Management Service

- 2.31 The applicants are committed to providing an energy information and monitoring service as part of the site-wide management. During the development stage this would provide the key point of responsibility for initiating site-wide feasibility studies, establishing and refining benchmarks and targets, providing carbon targeting briefs for each of the buildings, and monitoring and reviewing the individual building design energy proposals. The role would include liaison with Camden and Islington Borough Councils and energy providers. Once the development was established, the role could also involve the operational services of an ESCO. The implementation of buildings-in-use energy monitoring and dissemination needs careful resolution because data protection regulations mean that site-wide management has no automatic right to access, or use, energy data from occupants.

Fuel Poverty

- 2.32 Fuel poverty and affordable energy for homes is a key issue for the London Mayor. This is not a particular issue for new build because energy costs and warmth thresholds are satisfied by Building Regulations requirements. Nonetheless, there might be some benefits in providing further enhanced energy performance for social housing provision. This principle is embodied in the initial target for a 25% improvement over Building Regulations requirements.
- 2.33 The Housing Corporation Scheme Development Standards requirement in 2003/4 is for an EcoHomes 'Pass' rating with a 'Good' rating being recommended. In 2005/6 they propose to make the achievement of a 'Good' rating a minimum requirement with a 'Very Good' rating becoming a recommended item.

Heritage Buildings

- 2.34 For heritage buildings there is often a conflict between energy targets and the heritage requirements. The balance between these would be established in consultation with the planning/building control authorities on a building-by-building basis. The Applicants would seek to meet energy targets unless there is clear advice that the heritage aspects cannot be accommodated and alternative mitigation is not practical and cost-effective.

Future Proofing

- 2.35 King's Cross Central should have the ability to change with time in response to new standards and targets for carbon emissions. Feasibility studies would consider the ability to add technologies as they become more cost-effective and proven. This may involve initially providing some elements of infrastructure in anticipation of reasonable imminent future viability. This could facilitate the application of more easily adding centralised renewable technologies like fuel cells and mains hydrogen fuel, as they become available and cost-effective.

Public Awareness

- 2.36 King's Cross Central could play a major role in raising public awareness of the importance of energy efficiency and renewable energy. Public demonstrations of, for example, PV in the public realm in the form of street furniture or similar, may in themselves contribute little to the overall energy demand of the development. Nonetheless they may play an important part in increasing the public and commercial demand for low carbon technologies. The Applicants would therefore look to include these applications within the early phases of King's Cross Central.

3. Waste

Introduction

3.1 Minimising the amount of waste that society produces is a key aim of policy at both the European and the national level. For that waste which is produced, there is a requirement to significantly reduce the amount which is disposed of by way of landfill, and policy objectives are geared towards maximising alternative waste management options. These include re-use and recovery of materials for beneficial use and as a substitute for the use of virgin raw materials. King's Cross Central offers a significant opportunity to contribute to these objectives through design, the construction process, through the way that wastes are managed, and through the way residents and businesses are presented with options and opportunities.

Context

3.2 In May 2000 the Government published Waste Strategy 2000 (DEFRA, 2000) setting out its analysis of the waste management issues and challenges facing the United Kingdom and putting forward its targets, goals and indicators for meeting those. In order to meet obligations of European legislation, particularly the Landfill Directive (1993/31/EC) (EC, 2003), the amount of biodegradable municipal waste going direct to landfill must be reduced. Taking into account agreed derogations, the targets are:

- by 2010 to reduce biodegradable municipal waste landfilled to 75% of that produced in 1995;
- by 2013 to reduce biodegradable municipal waste landfilled to 50% of that produced in 1995; and
- by 2020 to reduce biodegradable municipal waste landfilled to 35% of that produced in 1995.

3.3 Although the Government acknowledges that household waste is a relatively small part of the overall waste stream, annual growth is in the order of 3% per annum and significant progress must be made towards managing it more sustainably if the EU requirements are to be met. Waste Strategy 2000 estimates that about 9% of household waste is recycled and a further 8% has energy recovered from it. Waste Strategy 2000 sets challenging targets to increase the recovery and recycling of municipal waste as follows:

- to recover value from 40% of municipal waste by 2005;
- to recover value from 45% of municipal waste by 2010; and
- to recover value from 67% of municipal waste by 2015.

3.4 'Recover' in this context means to obtain value from wastes through one of the following means:

- recycling;
- composting;
- other forms of material recovery (such as anaerobic digestion); and
- energy recovery (combustion with direct or indirect use of the energy produced, manufacture of refuse-derived fuel, gasification, pyrolysis, or other technologies).

- 3.5 Since an essential part of achieving the municipal waste recovery targets set out above is a drive towards more household waste recycling and composting, the following targets have also been set:
- to recycle or compost at least 25% of household waste by 2005;
 - to recycle or compost at least 30% of household waste by 2010; and
 - to recycle or compost at least 33% of household waste by 2015.
- 3.6 Achievement of these targets is reinforced through the publication of statutory Best Value performance measures for Waste Disposal Authorities.
- 3.7 The Government's approach to the achievement of the targets set out above is to use various measures in combination. Key among these is the need to change the perception of 'waste' from that of a problem to be dealt with to a resource to be used. This involves an emphasis on awareness raising, through schools and other initiatives in the community, the identification of new markets for recycled material, and the breaking down of the barriers to entry to those markets. These initiatives are supported by fiscal penalties on those producing and disposing of waste, such as the landfill tax escalator, and use of the Best Value regime to require waste collection and disposal authorities to significantly improve their recycling and recovery performance.
- 3.8 The key players are identified as being existing bodies active in or responsible for waste issues, such as the waste management industry, the Environment Agency, business, and local and central government, and recently formed organisations such as the Waste and Resources Action Programme (WRAP). It is recognised that the statutory plans prepared by regional and local authorities have a critical role to play in setting the agenda for delivery through new development where this is possible and appropriate.
- 3.9 London-wide, the Mayor of London has developed the national policy set out above through the publication of two documents. Firstly, the Mayor has published a Municipal Waste Management Strategy (MWMS) (GLA 2003b) which sets out the 2020 Vision for Waste, identifying where the city should be in 2020 with respect to waste, and setting out an operational strategy for the period to 2005/2006.
- 3.10 The second document is the London Plan (GLA, 2004) which sets out the regional planning framework for London. Waste issues are included in the cross cutting policies in Chapter 4.
- 3.11 The MWMS is led by waste minimisation and recycling. Waste reduction is to be promoted through the development of a Waste Minimisation Programme for London in partnership with stakeholders in the business and retail sectors in particular, and through promotion and education programmes targeted especially at school children. The MWMS commits to recycle or compost at least 25% of all household waste by 2005, at least 30% by 2010 and at least 33% by 2015.
- 3.12 The London Plan reflects the land-use elements of the draft MWMS. Policy 4A.1 includes the recycling targets set out above. Other policies set out the approach which London Boroughs should take in reviewing their unitary development plans. Included among these are the need to identify suitable sites for new facilities such as Civic Amenity sites, construction and demolition waste recycling sites, closed vessel composting, and requiring the provision of suitable waste and recycling storage facilities in all new developments.
- 3.13 The London Boroughs of Camden and Islington have prepared a number of documents, including unitary development plans and supplementary planning guidance, which set out their approach to the management of waste in the context of the regional policy framework set out by the Mayor of London. A key document is the London Boroughs of Camden and Islington King's Cross Opportunity Area – Planning and Development Brief (December 2003) which sets out specific guidance for the King's Cross Central development.
- 3.14 The Councils identify a need for new development to make provision for the storage of recyclable material and to enable, through design and site layout, kerbside collection of segregated materials. In addition, the theme of waste as a resource is promoted in combination with the possible opportunities for renewable energy provision through CHP schemes on a local scale.

3.15 A considerable amount of promotional material is available, aimed at raising awareness of the partnership schemes established with the voluntary and not-for-profit sectors to promote re-use and recycling initiatives within the residential and the business communities. These are targeted at householders particularly, with advice about how to minimise waste in the first instance through purchasing strategies and re-use, and guidance on how specific wastes can be recycled.

The Development Proposals

3.16 As a high density mixed-use development, King's Cross Central would include a range of uses including business and employment, residential, hotels, retail, leisure and community facilities.

3.17 Waste would be generated by the development at two stages. Firstly, the construction of the development itself has the potential to generate significant volumes of waste. Secondly, the users of and the visitors to the completed development would also generate waste, as phases become complete and occupied. The waste types that would be produced at King's Cross Central would include:

- construction and demolition waste;
- commercial and industrial waste;
- municipal solid waste;
- green waste; and
- waste from leisure uses.

3.18 The strategy for dealing with the waste generated at each of these two stages is set out below, following an initial consideration of the overall strategy to be adopted.

Waste Management Strategy – Overall Concept

3.19 Within King's Cross Central waste would be generated within and from the development itself. Consistent with policy at national, London-wide and local level, waste would be managed according to the principles of Best Practicable Environmental Option (BPEO), regional self sufficiency, the proximity principle and the waste hierarchy.

3.20 The aim would be to:

- first, minimise the amount of waste produced; then
- re-use as much as possible of that which is produced; then
- recover value from that waste which cannot be re-used, for example, through recycling, composting and for energy from waste schemes; and then
- dispose of residual waste through landfilling or incineration without energy recovery.

Waste Management Strategy – Construction Phases

3.21 The construction process uses primary materials and requires the transportation of those materials to the site, and of construction and demolition waste away from the site. The majority, if not all, of the trips away from site would be by road. Although the waste strategy for King's Cross Central has as key objectives to minimise the use of primary materials and material bearing trips, and to maximise non-road movements, in practical terms the scope for achieving the latter would be limited.

3.22 Issues relating to use of sustainable construction materials are addressed primarily in section 5. However a key to successful sustainable development is to incorporate this into the design from the outset, an approach advocated by CABE (2003). Minimisation of waste would be part of this process.

3.23 At its simplest, construction and demolition waste can be minimised through avoidance strategies. The most obvious is to re-use, where practicable, existing buildings and structures and to incorporate them into the scheme. This has been achieved at King's Cross Central, where a number of historic buildings would be re-used within the development.

3.24 Where demolition of existing buildings and structures is proposed, there is the potential to salvage materials for re-use, either with or without further processing or treatment. This would have the benefit of reducing the requirement for primary materials.

Recycling and Reusing Demolition Materials



At Brindleyplace over 1,850 square metres of granite paving that was previously overlain by tarmac surfacing was lifted, cleaned and relaid within the public realm.



At St George Wharf, Vauxhall St George crushed a disused cold store, generating around 10,000 tons of crushed concrete, which was re-used for temporary roads during construction, and recycled about 2,000 tons of steel.

At Riverside West they removed and recycled 1 million litres oil.

- 3.25 The crushing and screening of materials would almost certainly be required prior to their re-use within the development. This could be achieved either through the use of mobile plant within demolition areas or at a centralised processing and storage area.
- 3.26 Ideally, the aim would be to achieve, as far as practicable, a materials balance across the development area as a whole. The phased nature of the proposals mean that it may be practicable to reserve material for later use. This would generate a requirement for materials storage and processing areas and these would need to be identified. Even so, there would be an overall materials surplus across the whole development which would need to be removed from the site.
- 3.27 Although the surplus material would need to be removed from the King's Cross Central site, the extent to which material of an appropriate quality may be used on other development sites in the vicinity or elsewhere would be investigated from time to time. Alternatively, some of the material may be suitable as a feedstock for use in the nearby concrete batching plants. Any material which could not be so used would be removed to landfill.
- 3.28 Whilst the previous paragraphs have dealt mainly with the waste which might arise from demolition and excavation, waste would also be generated through construction, particularly through the on-site craft practices.
- 3.29 Packaging waste associated with the delivery of construction materials can be a significant issue. In a development of the scale of King's Cross Central, the objective would be to use purchasing power to either minimise the nature of such packaging, look at ways of re-using packaging, or to specify that it must be capable of being readily recycled.

- 3.30 Potentially, significant amounts of waste materials could be generated from the craft industries in the form of off cuts of wood, bricks, steel, glass etc. Where practicable, this would be minimised through purchasing to precise specifications which may, where appropriate within the design and method of procurement, include a degree of pre-fabrication.
- 3.31 Where waste generation is inevitable, site managers would ensure that it is collected and deposited in segregated containers to enable recycling either elsewhere on site or, more probably, through processing off-site and subsequent re-use in other products.

Waste Management Strategy - Use by Residents, Business and Visitors

- 3.32 King's Cross Central would be a place where people would live and work and which they would visit for shopping, culture and entertainment. It would be a vibrant mixed-use area with the potential to generate waste in many forms, including litter.
- 3.33 The strategy for waste management would be two stage. The first would be educational, promoting the issues of waste minimisation and re-use and recycling. The second would be development led, providing the practical opportunities to implement sustainable waste management practices.
- 3.34 The London Boroughs of Camden and Islington already have well developed information about recycling, re-use and 'sustainable' purchasing strategies available in a variety of media. The Councils are proactive in promoting this important message and target both households and businesses. Existing information includes:
- advice on waste avoidance through purchasing;
 - re-use of unwanted items either directly or indirectly through charity shops;
 - unwanted goods exchange;
 - junk mail prevention measures;
 - recycling services available;
 - home composting;
 - waste watch business network; and
 - educational visits to schools, residential groups and businesses.

Recycling strategies are now incorporated into all St George's major schemes for both residents' and business' waste.

- 3.35 It would be important for the new community at King's Cross Central to have access to this information from first occupation of the premises. Information packs would be made available, and regular feedback sought on the success of schemes and suggestions for improvements. Given the duration of the project the advice and information process would inevitably evolve as development progresses. This would provide the opportunity to include new initiatives, and would enable best practice to be incorporated as it is identified and evaluated.
- 3.36 Raising the awareness of waste as an issue must be supported through design solutions, both in the public realm and within homes, businesses and leisure facilities, to enable sustainable waste management to be achieved.
- 3.37 Designs would help householders to segregate and store waste into the various streams to be collected, as the waste collection authorities' residential collection service develop. Space would be provided for general waste containers and for recycling of cans, bottles, paper, plastics, textiles, etc. Storage areas would be secure and sited to be easily accessed by waste collection vehicles.
- 3.38 Since homes are likely to have limited or no outside storage space, secure communal recycling storage areas would be made available. Within homes, space could be provided to store small amounts of segregated, non biodegradable, waste prior to transfer to the appropriate communal containers. Alternatively, chute systems could be installed directly feeding the waste containers.
- 3.39 Within the commercial and leisure buildings it would be equally important to design in adequate waste segregation and storage areas.
- 3.40 These are clearly matters of detailed design, and throughout the period of design and construction of King's Cross Central, flexibility would exist to incorporate emerging best practice as each phase of the project was brought forward.

Minimising and Recycling Construction Waste

Argent uses a high degree of pre-fabrication, which cuts down considerably on primary material and packaging waste. Examples of where pre-fabrication has proven particularly successful are in façades, mechanical and electrical systems, and fully constructed washroom units.



St George has a collaborative trading agreement with British Gypsum including waste minimisation by pre-cutting materials in the factory and special recycling arrangements to handle any wasted product. At Alder Castle, Argent's minimised plasterboard wastage through design by using planning grids that reduced non-standard dimensions, avoiding off-cuts.



In general, St George have special skips on site for timber to be recycled into pulped or chipped products. They are also pioneering decontamination and trenching technologies and have established grey water recycling.

- 3.41 Within the public realm, waste containers would be provided at key locations in appropriate numbers. Particularly in the entertainment areas and near fast food outlets, appropriate sized containers would be provided and emptied frequently. The public should have the opportunity to segregate their waste in the public realm which requires appropriately designed and clearly signed containers.
- 3.42 The Site Management Company is likely to have an important role in street cleaning and litter collection in public areas, and for maintenance of landscape areas. Wherever practicable, the wastes collected would be appropriately segregated for recycling or composting.
- 3.43 An important element in the success of the waste management strategy would be monitoring the effectiveness of the measures introduced in the early phases and learning from experience. The context for this evaluation is the milestones set out in the National Waste Strategy for the years 2005, 2010 and 2015 (see para 3.5 above) and the London Mayor's view that these targets can be exceeded for 2010 and 2015.
- 3.44 King's Cross Central gives the opportunity to implement simple and progressive waste management practices. In their collection services the Councils may wish to monitor the volumes of segregated and un-segregated wastes that are collected, evaluate the results and decide whether there are any specific issues that warrant further attention. For example, they could monitor the extent to which recyclables were being segregated appropriately, and to review/develop the education programs and/or design solutions for later phases accordingly.
- 3.45 The King's Cross Opportunity Area – Planning and Development Brief (para 3.4.34) suggests that an area of land between the CTRL and the North London Line (the 'Linear Land') may present opportunities to incorporate new waste management facilities which may include, for example, clean bulking facilities. This will be examined further and is the subject of ongoing feasibility studies.

4. Water Supply and Surface Water Disposal

Introduction

- 4.1 One of the consequences of climate change is its impact on water supply and management. Summer rainfall is likely to reduce and winter rainfall likely to increase together with the likelihood of flash flooding. This is compounded by demand for more water, at higher delivered quality, and with reduced environmental impact for the treated discharges.
- 4.2 The imperative for better water management is moving higher up the political and economic agendas year on year. Whilst formal legislation does not yet include enforcement of specific targets, planning authorities are keen to see applicants demonstrate that every effort is made to minimise the impact on water resources and the aquatic environment.
- 4.3 The Applicants would look to include specific measures and water economy features to enable potable water consumption to be reduced within the King's Cross Central design proposals. Given the difficulties in evaluating the effectiveness of water economy features, the Applicants would use the BREEAM / EcoHomes methodology and target at least 40% of the potable water consumption credits available. This approximates to about a 20 to 30% reduction on typical water consumption.
- 4.4 The suggested quantitative water savings are tentative, reflecting a general lack of actual water use-monitoring & targeting, and apparent wide variation in consumption between individual consumers. This situation is reinforced by a lack of incentive because of water's relatively low cost, and a lack of legislative limits on consumption.
- 4.5* It has been agreed with Thames Water Utilities, the incumbent drainage authority, that the principle of restricting proposed storm and foul flows to the existing maximum combined flow from the same area of the site would be acceptable. Following a hydraulic study undertaken in conjunction with Thames Water, the maximum allowable or "existing" combined flow from the site to existing combined sewers has been accepted as 2547 l/s. This approach is often referred to as "the principle of equivalent discharge".
- 4.6* As part of the development proposals it is proposed, in accordance with sustainability objectives, and in particular sustainable drainage scheme (SuDS) principles, to reduce the total combined flow to the existing combined sewers by 10% below the agreed "existing" discharge from the site. The proposed maximum combined storm and foul peak discharge from the site to the existing combined sewers would therefore not exceed 2292 l/s.

* Paras 4.5 and 4.6 above relate to the Main Site development. In addition, the new drainage infrastructure provided within the Triangle Site would achieve a stormwater discharge to the existing sewers 10% less than the existing maximum allowable discharge, calculated on the principle of equivalent discharge (74 l/s). The new drainage infrastructure would be designed such that peak discharge from the Triangle Site to the existing sewers would not exceed 67 l/s. Foul water discharge would be to the York Way sewer.

Context

- 4.7 The London Plan refers to the protection and conservation of water supplies. A range of measures to secure London's needs is set out. These are:
- ensuring that adequate sustainable water resources are available for major new development;
 - minimising the use of treated water;
 - maximising rainwater harvesting opportunities;
 - using grey water recycling systems;
 - reaching cost-effective minimum leakage levels; and
 - keeping under review the need for additional sources of water supply.
- 4.8 King's Cross Central is a constrained site and would have a high building density as well as a significant proportion of retained heritage buildings. The remaining land available for the handling and treatment of bulk water would consequently be limited. Thus the emphasis would likely to be on investigating ways that the publicly accessible areas could have improved water handling, and on individual site enhanced water management. The canal also offers a potential opportunity to become an integrated part of the development's water cycle.
- 4.9 Using Eco-Footprinting and similar environmental assessment methods indicates a comparatively small impact for water consumption compared to energy and other aspects. This is because of the relative abundance of water in the UK. Nonetheless, the locally available water sources are reaching their limits against a continuing increase in demand. Thus the level of resource input and the overall environmental impact of water supply and treatment is likely to rapidly rise in future.

Market Influences

- 4.10 Society expects and demands good quality water. On an individual basis people are getting used to the fact that the cost of water is expected to rise appreciably year on year as higher investment goes into repairing an aging infrastructure, improving the quality consistency, and to satisfy increasing demand. As yet this expectation does not translate into an expectation or willingness to pay a premium for buildings that have enhanced water efficiency. There is no current evidence that water efficiency makes a building more desirable for the broad range of potential occupiers. This may change over the programme for King's Cross Central completion, but at present it does not appear to be a market driver.
- 4.11 A building's actual water consumption, like energy, is largely governed by how individual building occupants decide to fit-out, use and manage their building. How they do this tends to vary widely with the consequence that there are only indicative average water consumption benchmarks available for selected building types. This means that, at present, water consumption targeting and verification is far from a defined science.
- 4.12 Recent experience of implementing treated recycled water schemes has illustrated concerns within the industry about current UK water-quality liability issues. Unlike some other countries, the UK public does not have an awareness and an acceptance that piped water could be of different quality standards. Consequently, to minimise the perceived risk of litigation when asked to adopt these systems, the water utilities are suggesting that recycled water either has to be cleaned to (almost) potable water quality, or its non-potable uses must be limited to those where there is no direct contact with people. This would preclude, for example, recycled greywater use for above ground irrigation, or rainwater use for washing clothes, as is more generally applied in Germany. There is, of course, the possibility that water company attitudes and perceptions may change over time.

Application Methodology

4.13 Economy in use of water would inform the brief for the design and fit-out of buildings with the aim of reducing overall water environmental impact. Building briefs would specifically require the consideration of water saving, recycling and supply options. When constructing the base build of speculative office and residential buildings, the Applicants would employ good practice in the consideration of water consumption. The future management of water use would then be the responsibility of tenants or residential occupants, but they would generally not be expected to totally remove the base systems.

4.14 The feasibility of a range of water conservation and management options would be considered as part of the design process. These are outlined below.

Reduced Demand

4.15 Various water efficiency measures can be implemented in order to reduce demand for mains water consumption. Water efficiency leads to reduced impacts associated with its supply and disposal, including energy, (c. 0.5kWh per cubic metre of water supplied), chemicals, carbon emissions and use of resources. The following measures would be considered as part of the ongoing design process to establish the most cost effect means of achieving the water consumption target reductions:

Residential

- outlet flow limiters;
- low flush toilets;
- short final run-outs for domestic hot water; and
- grade 'A' domestic appliances.

Commercial

- as residential list above;
- tenant sub-metering;
- waterless urinals;
- water saving criteria for choice of water systems 'blow-down';
- water saving criteria for choice of cooling towers drift and water treatments;
- Passive Infra Red auto-control taps where appropriate; and
- water saving criteria for choice of fit-out appliances.



4.16 Reducing demand for water has the effect of reducing the volume of used water to be subsequently handled, treated and disposed of. In particular, where foul water is discharged to sewers, it reduces the required capacity of the sewer system and reduces the peak capacity needed at remote treatment works. Hence reducing the need for water has a double benefit of reducing the resource use, including energy, of both supply and effluent discharge.

Non-potable Supplies

4.17 A water conservation strategy relies on the effective supply of water of suitable quality. Traditionally in the UK this has all been at the one potable quality level. There are potential alternatives to this, which involve delivery of water at different quality levels for different uses. Often these have a secondary benefit of reducing discharge volumes of wastewater to conventional foul and surface water sewers. These potential alternatives include:

- groundwater abstraction;
- greywater recycling;
- blackwater recycling; and
- rainwater harvesting.

- 4.18 It may not be technically or economically feasible to employ some of these systems centrally. However, it may be possible to use them on a small scale, either locally or widespread, to provide a sustainable water source to a group of buildings or to a single building.

Groundwater Abstraction

- 4.19 King's Cross Central is underlain by a water holding chalk aquifer, which continues throughout London, and has historically comprised the city's main source of water. The ability to extract enough water is a function of the local chalk depth and water conveying fissures within the chalk, as well as the water quality.
- 4.20 Abstraction boreholes are subject to licensing from the Environment Agency. Each proposal is assessed on its individual merits and detailed analysis of its impact on other existing local abstraction points. Establishing the actual viability of individual boreholes involves its drilling, opening up of the fissures (borehole development), and then pumping yield tests. The involvement of a licenced utility to operate the borehole is needed to provide for the potable water liability expectations of the end consumers. This is of course subject to reaching satisfactory commercial arrangements with a licensed utility.

Greywater Recycling

- 4.21 With a relatively high proportion of residential land use, a significant supply of relatively lightly contaminated waste 'greywater' could be sourced from showers and baths.
- 4.22 It should be noted however, that the extensive use of greywater requires substantial additional infrastructure both within the buildings and externally. Given the low cost of water and the expense of additional greywater equipment at present, greywater recycling rarely proves to be an economical solution.

Blackwater Recycling

- 4.23 Water from flushing WCs and from kitchen sinks is termed blackwater. To recycle blackwater requires a high degree of treatment and therefore resource consumption, largely due to its high organic and chemical content. The volume of potentially available blackwater is likely to be comparable to the volume of greywater, and could be combined and treated sufficiently to serve a proportion of non-potable water demands within the development.
- 4.24 The extra resources needed and the risks incurred in treating blackwater, with its faecal element, are considerable, and would need to be rigorously assessed to ensure reliability and sustainability justification. The current liability position probably means that unless the water is treated to potable standards, it cannot be used where it could come into direct contact with people, for example for above ground irrigation. The involvement of a licenced utility with the experience to operate such systems would be required. Even so, blackwater re-use is unlikely to prove feasible at a large scale on a multi-tenancy site with limited land availability for the treatment infrastructure.

Rainwater Harvesting

- 4.25 Rainwater can be collected, stored and, with virtually no treatment, used for non-potable uses. Ideally, the rainwater should be collected directly from roofs to minimise its contamination and so reduce the treatment needs and cost of operation. Overall, the potential for recycling rainwater across King's Cross Central is likely to be limited due to the relatively high density of the development and the low annual rainfall in this region of the UK. It may be possible to serve 5 to 10% of the development's non-potable demand from rainwater harvesting.
- 4.26 Where rainwater recycling has been successfully implemented, it is normally related to direct capture of roof rainwater, its local storage, and use in the immediate building or site. As such, the potential for rainwater recycling would be considered on a site-by-site / phase by phase basis, to establish its suitability and viability. It should be noted that rainwater collection is not compatible with 'Green' vegetation roofs.
- 4.27 Rainwater could be used as part of a separate system to provide water for private and estate irrigation at King's Cross Central.

Supply System

- 4.28 The applicants have tested the feasibility of a new conventional mains supply of potable water to satisfy the full demand of all uses within the development and this option is reflected in the Development Specification Parameter Plans. However, the site offers the potential of using the canal as a source of water, for example to mitigate mains demand. The use of the canal would allow a reduction in the resource consumption needed for the delivery of water to the site. The quality of the canal water would be investigated to establish the feasibility of its treatment and use.
- 4.29 Initial discussions have taken place with licensed utilities for the potential use of the canal as a water resource. Its viability would depend on detailed technical investigations and agreement of appropriate licensing and commercial terms. There are other users other than King's Cross Central along the canal who could potentially use the canal water and hence comprehensive agreements would need to be in place to ensure future water source reliability.

Sustainable Drainage Systems (SUDS)

- 4.30 The treatment of storm run-off would follow current guidelines on sustainable design in high density, central locations. The intention is to control the timing and volume of flows to acceptable standards. As explained at paragraph 4.6, it is proposed to reduce the total combined flow to the existing combined sewers by 10% below the agreed "existing" discharge from the site. The proposed maximum combined storm and foul peak discharge from the site to the existing combined sewers would not exceed 2292 l/s.
- 4.31 It is also the intention to improve the quality of water run-off from the developed site. This would take into account the expected increase in peak run-off as a result of changing rainfall patterns. The potential range of methods, to be investigated further, is in part determined by the topography, soil properties and development layout. Requirements for any special ground surface finishes would be subject to agreements with local authorities. The range of potential techniques includes landscape features used to improve the quality of the run-off.

Infiltration

- 4.32 Run-off can be reduced in quantity, and its quality improved, by returning it to groundwater by infiltration. With much of the site being made-up ground or heritage buildings the extent to which rainwater can be returned to shallow groundwater, or minor aquifers, through infiltration is likely to be limited. In addition, ground contamination issues would need careful consideration.

Retention

- 4.33 The quality of run-off can be increased greatly by retention in an on-site water body for sufficient time. The development would consider the potential for water body elements, although this has to be balanced against the impetus for a high density of buildings and the historic environment.

Filtration

- 4.34 The quality of run-off can be improved also by passing flows through simple wetlands features or engineered reedbeds. These methods are unlikely to have widespread applicability at King's Cross due to the nature and density of the urban landscape. Nevertheless, opportunities to incorporate filtration features into the storm water system would be investigated.

Attenuation

- 4.35 The use of attenuation would be incorporated where appropriate to avoid any increase in site run-off compared with existing quantities. This is particularly the case where there are increased areas of managed impermeable hard landscape increasing the volume of rainwater run-off reaching the drainage system. The hydrology of the canal would be a key factor in determining the quantity and timing of peak discharge flows from the site. Close consultation with the Environment Agency would be undertaken to agree and then implement a scheme that is effective with an appropriate minimum impact.

5. Construction Materials

Introduction

- 5.1 Sourcing and use of construction materials are important considerations in the environmental sustainability of development. Choices of construction materials and practices adopted on site make important contributions to safeguarding the environment.
- 5.2 The scale of the King's Cross Central project means that large volumes of materials would be consumed during construction. In order to promote and adopt the principles of sustainability, materials usage should become less linear and move towards a more cyclic pattern, whereby waste materials are used extensively, and buildings and other elements of the development are designed for future re-use and recycling
- 5.3 This section explains the strategy for the selection and use of construction materials and explains how realistic targets would be set.
- ### Context
- 5.4 In 1994 approximately 30% of UK industrial energy was consumed annually for the manufacture and transportation of building materials. This figure represented approximately 10% of overall UK energy consumption (CIRIA, 1994).
- 5.5 Reductions in energy expended on the production of building materials represent an opportunity for manufacturers to help the UK contribute to reducing the emissions of carbon dioxide. EC and UK commitments to improve energy efficiency are outlined in Section 2.
- 5.6 At present over 90% of non-energy related minerals extracted in the UK are used as construction materials. Currently 360 million tonnes of materials are used in construction each year, and around 70 million tonnes of construction and demolition wastes are produced, of which 13 million tonnes are unused construction materials (BRE 2002).
- 5.7 Central Government has introduced a series of legal and market instruments that are intended to influence and shape the selection and use of materials:
- **Landfill tax** – inert wastes deposited in a landfill are now subject to a tax of £14 per tonne which is intended to rise to £15 per tonne in April 2004.
 - **Climate Change Levy** - a tax on energy from carbon sources that is payable by all sectors throughout the UK.
 - **Aggregates Levy** – from April 2002, the extraction and use of primary aggregate has been taxed in order to encourage the re-use and recycling of materials. About 17% of all aggregates used in 1999 were recycled; the Government's aim is to increase this figure to 25% by 2006.
- 5.8 The London Plan includes several policies relevant to materials selection and use.
- 5.9 Policy 4A.4 sets a standard of 80% re-use of demolition waste materials, and 60% re-use of that waste as aggregates in London by 2011.

- 5.10 Policy 4A.5 supports Policy 4A.4 by requiring that UDPs should:
- identify and safeguard aggregate resources suitable for extraction;
 - adopt the highest environmental standards for aggregates extraction in line with National Minerals Policy Guidance;
 - support the development of aggregate recycling facilities in appropriate and environmentally acceptable locations, with measures to reduce noise, dust and visual intrusion to a practical minimum;
 - safeguard wharves with an existing or future potential for aggregates handling and ensure adjacent development is designed accordingly to minimise the potential for conflicts of use and disturbance;
 - protect existing railhead capacity to handle and process aggregates; and
 - minimise the movement of aggregates by road.
- 5.11 Policy 4B.6 states that the Mayor will, and boroughs should, ensure future developments meet the highest standards of sustainable design and construction including re-use of land and buildings, and conservation of materials.
- 5.12 Camden Council, in Policy EN12 of the adopted Camden UDP, and in Supplementary Planning Guidance (SPG) (July 2002) seeks to encourage the selection and use of materials that cause the least environmental harm.
- 5.13 The London Boroughs of Camden and Islington King's Cross Opportunity Area Planning & Development Brief (December 2003) includes consideration of materials selection and use. Para 3.4.24. states that materials for new developments:
- " ... should be chosen carefully, taking into account both aesthetic qualities, noise reduction and insulation properties, recycled content and whole life impacts. For example, the Councils would expect materials specifications to promote the use of timber from sustainable sources, low PVC and VOC materials, including paints, pipes and ducting."
- 5.14 At para 3.4.34 the brief calls for the promotion and use of sustainable materials within developments.
- 5.15 Islington Borough Council, in Chapter 3 Environment Section 3.1.2 of the Adopted Islington UDP discusses Policy Statements ENV1 and EN2 which address the issues of new development, and states that wherever possible buildings should be seen:
- " ... in a wide context that extends beyond the functional requirements of the immediate users, to include such matters as:
- ... use of environmentally friendly building materials."
- 5.16 In August 2003 Islington Council published their Supplementary Planning Guidance Green Construction Consultation draft. This SPG recommends (Section 2.2) that green materials should be considered and selected at the design stages and sets out guidance as to how this can be achieved.
- ### Relevant Considerations
- 5.17 The selection and use of construction materials should take into account the whole life cycle of the materials.
- 5.18 Thus, consideration has to be given to materials in their unrefined raw state, the inputs to refining the material, the outputs of the refinement process, the transportation of the material to the site, the storage and handling on site, the use of the material, and ultimately the fate of the material as a waste.
- 5.19 The environmental issues that are relevant to construction materials, and which are taken into account in the assessment of the sustainability of construction, are set out below (based on BRE 2000).

- 5.20 **Air pollution** including:
- **climate change** caused by the release into the atmosphere of “greenhouse gases” such as carbon dioxide and methane;
 - **ozone depletion** caused by release of certain halogenated gases which damage the stratospheric ozone layer;
 - **acid deposition** arising from the release of gases such as sulphur oxides, ammonia, and nitrogen oxides; and
 - **summer smog** (photochemical smog and low level ozone generation) caused by the build up of gases such as nitrogen oxides and volatile organic compounds (common pollutants from road traffic).
- 5.21 **Water pollution**, particularly eutrophication as a result of the addition of nutrients such as phosphates and nitrates which can over-enrich aquatic ecosystems.
- 5.22 **Resource depletion** including:
- **Fossil fuel depletion** – our primary fuels for transport and power generation;
 - **Minerals extraction** – the prime concern being the environmental impacts associated with the extraction process; and
 - **Water extraction** – over extraction of water resources is an increasing concern.
- 5.23 **Land pollution** particularly as a result of disposal of construction waste to landfill.
- 5.24 **Ecological damage** including:
- **Ecotoxicity** – toxic materials damaging ecosystems; and
 - **Human toxicity** – as a result of the release of heavy metals and other potentially toxic materials into the environment.

Application

- 5.25 Having identified the environmental issues associated with the selection and use of construction materials, this section sets out a strategy for selection and purchasing of those materials.

Materials and Purchasing Strategy

- 5.26 The Applicants’ materials and purchasing strategy would be based upon three principles:
- The first principle focuses on best practice on site, specifically addressing reducing material usage, use of recycled materials, and waste minimisation (see also Section 3, Waste).
 - The second principle focuses on suitable design with the intention of promoting sustainable techniques and principles.
 - The final principle is that materials selection should follow a hierarchy based on sustainability criteria.
- 5.27 The strategy would act as a guide to contractors, designers and others on the principles of reducing material impacts on the environment and would lead to specification clauses and targets for all designers, contractors and suppliers. The strategy would ensure that materials are an important consideration in design and long-term operation.
- 5.28 Any strategy must be able to cope with changing tastes, markets, practices, technologies and requirements. It must therefore be flexible. Whilst the objectives of environmentally sustainable development are well defined, the mechanisms to achieve the goals, and set the targets, have to be responsive and adaptable.
- Best Practice in the King’s Cross Central Development**
- 5.29 In undertaking the King’s Cross Central development the following issues would be considered:
- 5.30 **Reduce volume of materials used** - By actively considering the volumes of materials required as part of the structural design process, and by selecting appropriate loading criteria, the amount and types of material required for a structure can be significantly reduced. Loading criteria would be reviewed for each building type and use within the development.

Material Efficiency

At St George's Wharf and Imperial Wharf, St George used flat slab concrete frames minimising scaffolding, reducing waste by 8-10% and taking half the time to build.



Dry forms of construction were employed, which improve energy efficiency and increase speed of production.

Key Performance Indicators at St George's Wharf demonstrate savings of 16% in programme time and a reduction in operative days by 39% for the concrete frame whilst defects were halved from 8 to 4 per dwelling.



5.31 **Use recycled material** - Where practicable, materials from those buildings, structures and other surfaces which must be demolished in order to implement the development would be salvaged for re-use or recycled. Materials suitable for a specification of a higher than usual recycled content include concrete, aggregates (concrete and brick present on site could be recycled into aggregate for hardcore), aluminium, timber board products, plasterboard and carpet.

5.32 **Minimise waste** - Waste generation is inevitable in any construction project. However with careful design to ensure a reduction in the amount of off-cuts, good on site housekeeping in terms of suitable storage of materials, waste stream segregation and recycling, it is possible to reduce volumes. Waste management is considered in greater detail in Section 3.

5.33 **Use impact reduction methodologies** – It is possible to assess a structure using techniques such as consideration of embodied energy (the components of embodied energy being the manufacturing, the transportation and the disposal energy), life cycle analysis, BREEAM assessment (assesses overall building performance) and the Ecopoints scheme. A UK Ecopoint score is a measure of the overall environmental impact of a particular product or process. These techniques provide insight into the potential environmental impacts of a structure throughout its life and provide a stimulus to reduce those impacts.

- 5.34 **Design for adaptability and flexibility** - Installed flexibility and adaptability within the design of commercial buildings allows for a greater degree of freedom in terms of their use and re-use. This can be achieved by design features such as higher floor-to ceiling heights and larger column spacing. When trying to incorporate flexibility into designs, the needs of occupiers is a major consideration. Features such as easily movable partitions within offices enable changes to be made in response to the needs of occupiers. There are also environmental benefits in terms of reduced impacts from repeated refurbishment.
- 5.35 **Design for future deconstruction and re-use** - the component parts of structures should be clearly labelled (grade, mill certificate etc) to help identify the suitability of material for re-use. The use of modular components in a design can also facilitate future use. The use of joining techniques that can be undone easily without damaging the components also offers long-term benefits.
- 5.36 **Criteria for material selection** - an environmental preference should be devised when costs and specification are equal for like materials.

Landscape Construction and Management

- 5.37 Landscape provision across the site would follow the materials use and purchasing strategy. It should be possible to use appropriate materials that have been recovered or recycled in the landscaping on site. Both soft and hard landscaping would adopt a sustainable approach.
- 5.38 The Applicants intend to re-use historic surfaces reclaimed from site areas, wherever practicable, as part of the landscape strategy. Landscape works across the site would take into account conservation and heritage requirements.
- 5.39 The possibilities for the marketing and sale of any reclaimed, recycled and reusable materials that can't be used in redevelopment at King's Cross Central would be explored.

Soft Landscaping

- 5.40 Soil production may be possible during the early stages of the development after demolition is complete. An area of the site could be set aside for the production of topsoil and sub-soils for use in areas of landscaping. Cost savings could be made from producing soils on site. There would be environmental benefits from not using imported soils which could be used elsewhere, and transport impacts would be avoided. Topsoil can be made from site-won subsoil and crushed rubble combined with organic composts, green composts and organic waste streams. The resulting soil is not initially as well structured as an imported topsoil, but can support and maintain vegetation. If the constructed topsoil is managed carefully and creatively a natural soil structure would be established relatively quickly.

Hard Landscaping

- 5.41 Materials for hard-scape would be selected taking into account the criteria for building materials previously outlined in this section. Where practicable, reclaimed aggregates from demolition would be used. The saving in transportation and disposal costs of demolition wastes, together with the purchase and transportation costs of new materials, should outweigh the costs of the crushing operation. The recycled aggregate could be used for hardcore, backfill, hard standings etc, while other recycled and reclaimed materials could be used in the road sub-base, topping etc.
- 5.42 The possibilities for the marketing and sale of any reclaimed, recycled and reusable materials that can't be used in of the construction of the King's Cross Central should be explored.

Establishing Targets

- 5.43 The future delivery of the King's Cross Central strategy must consider future building standards and industrial best practice. This means that targets have to be flexible, be based on simple practical and enduring themes, be measurable, and reflect the strategies ultimate goals. It is important that the measures proposed are capable of being delivered by the applicant. For this reason, the Applicants have identified targets based to a considerable extent on the BREEAM standards (as outlined in Section 1) applied at the design and specification stage and consistent with achieving the overall 'Very Good', aspiring to 'Excellent' rating.
- 5.44 The Applicants would use the BREEAM assessment as the mechanism to set targets for construction materials. Points are available for achieving each of the targets listed below. The Applicants, in committing to achieve BREEAM 'Very Good', and aspiring to 'Excellent', would seek to obtain as many points as possible for each building through achieving these targets, consistent with achieving other targets set in this Environmental Sustainability Strategy:
- For like materials when other considerations are equal, 80% of all high mass elements (external walls, roofs, upper floors) would attain an "A" rating under the BREEAM standard.
 - For like materials when other considerations are equal, 80% of all medium and low mass elements (floor finishes and coverings, internal walls and partitioning, suspended ceilings and finishes, doors) would attain an "A" rating under the BREEAM standard.
 - For like materials when other considerations are equal, 80% of all other elements (internal paints, insulation, hard landscaping) would attain an 'A' rating under the BREEAM standard.
 - The remaining 20% of each of the above three categories of materials would attain a 'B' rating under the BREEAM standard for like materials when other considerations are equal.
 - At least 50% of all aggregate used on the site would come from reclaimed materials and sources.
 - All suitable aggregate from the demolition of buildings would be used on site.
 - All materials such as paints, sealants and flame retardants would where practicable be water based, non toxic and should not contain VOCs (volatile organic compounds).
 - The use of chemically treated timber would be kept to a minimum, and where possible environmentally friendly timber treatments would be used.
 - All timber products would be from sustainable sources and would be identified by a recognised eco label such as the FSC (Forestry Stewardship Council) logo so far as practicable.
 - No ozone depleting chemicals would be used during the construction of King's Cross Central.
 - All textile based floor finishes and coverings would use natural fibres sourced from sustainable sources.

6. Implementation of the Strategy

Introduction

- 6.1 This section explains the mechanisms which would be established to ensure the successful implementation of the King's Cross Central Environmental Sustainability Strategy throughout the processes of design, construction and operation. The Applicants are fully committed to this Environmental Sustainability Strategy and would be responsible for driving its implementation down through the supply chain from the outset.
- 6.2 Relevant environmental requirements for the construction phase are defined in a Code of Construction Practice. This would set the parameters for the Construction Environmental Management Plans which would be a requirement of construction contracts. In the longer term, as the elements of the development are built out, the ongoing estate management of the completed sections of the development would include an Environmental Management System.
- 6.3 These documents would address the environmental issues considered in this report. They may also include measures related to heritage buildings and townscape, biodiversity, noise, air quality, ground remediation, and transport.

Code of Construction Practice

- 6.4 The Code of Construction Practice for the development would set the environmental framework for each construction contract, and would incorporate relevant planning conditions and other environmental requirements and constraints that may be imposed or otherwise adopted through the planning process. Each Contract would include a Construction Environmental Management Plan which would follow the framework set by the code.

The Environmental Management System (EMS)

- 6.5 The EMS for King's Cross Central would also incorporate relevant planning conditions and other environmental requirements and constraints that may be imposed or otherwise adopted through the planning process.
- 6.6 The EMS would be reviewed and developed so that, following construction, it would continue to provide a framework within which environmental issues can be effectively managed during the occupation and use of the buildings.
- 6.7 The EMS would be modelled on the international standard ISO 14001 'Environmental management systems – Specification with guidance for use'. It would be integrated with other project management systems; for example quality assurance, risk management, and health and safety.

Applicants' Commitments

6.8 The key commitments made by the applicants in the context of this Environmental Sustainability Strategy for King's Cross Central are as follows:

- The Applicants are committed to the development and implementation of a Code of Construction Practice which would set the framework for the individual Construction Environmental Management Plans for each construction Contract.
- The Applicants are committed to the implementation of a comprehensive Environmental Management System (EMS) which would cover the post-construction estate management activities at King's Cross Central in the long term. The EMS would be modelled on ISO14001.
- The remit of the EMS would include all those areas addressed in this Environmental Sustainability Strategy. It may also cover other issues addressed within the Environmental Statement and the Green Travel Plan. In particular the EMS would include:
 - energy reduction strategy;
 - sustainable waste strategy;
 - sustainable water strategy; and
 - materials use and purchasing strategy.
- The responsibility for maintaining the EMS would fall on the Applicants and the estate management company which would be set up to manage the King's Cross Central estate.

6.9 Recognising that the commercial climate within which the principles of environmental sustainability must be applied is changing as businesses and their investors become increasingly aware of environmental issues, and as Government Policy and fiscal measures come increasingly to the fore, the Applicants' would actively promote awareness of the issues addressed in this Environmental Sustainability Strategy to those seeking to commission / purchase and / or occupy new buildings.

References

BRE (2000)	The Green Guide to Housing Specification. An Environmental Profiling System for Building Materials and Components	H M Govt (2001)	Planning Policy Guidance (PPG) 13 - Transport
BRE (2002)	The Green Guide to Specification	H M Govt (2002)	Building Regulations Approved Document Part L
BRE (various)	Building Research Establishment Environmental Assessment Method (BREEAM) Various Editions for Different Building Types	H M Govt (2003)	Energy White Paper: Our Energy Future – Creating a Low Carbon Economy
CABE (2003)	Creating Excellent Buildings - A Guide for Clients	H M Govt (2003)	Planning Policy Statement (PPS) 22: Renewable Energy
CIRIA (1994)	Environmental Assessment - Report SP096	LB Camden (2000)	Unitary Development Plan
DEFRA (2000)	Waste Strategy 2000 for England and Wales	LB Camden (2002)	Supplementary Planning Guidance
EC (2003)	The Landfill Directive (Council Directive 1993/31/EC)	LB Camden (2002)	Unitary Development Plan Chapter 13 King's Cross Opportunity Area Public Local Inquiry - Inspector's Report
GLA (2003a)	The Mayor's Draft Energy Strategy - Green Light to Clean Power	LB Camden (2003)	Deposit Draft Unitary Development Plan
GLA (2003b)	The Mayor's Draft Municipal Waste Management Strategy - Rethinking Rubbish in London	LB Camden and Islington (2003)	King's Cross Opportunity Area Planning and Development Brief
GLA (2004)	The London Plan	LB Islington (2002)	Unitary Development Plan
		LB Islington (2003)	Green Construction - Supplementary Planning Guidance
		RCEP (2000)	Energy – The Changing Climate



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