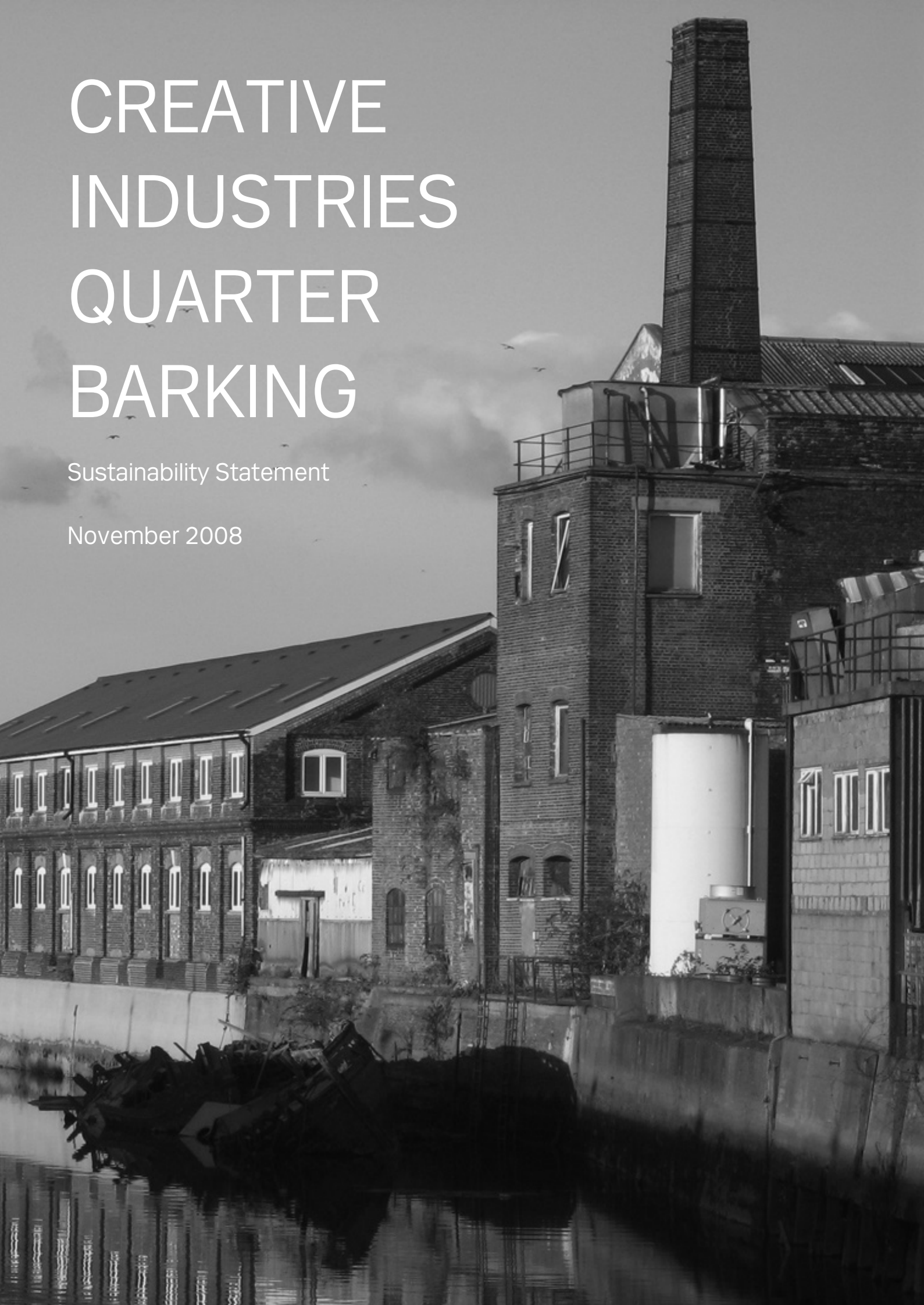
CREATIVE INDUSTRIES QUARTER BARKING

Sustainability Statement

November 2008



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Contents

1 Introduction & Methodology

The following statement has been prepared by Buro Happold Engineers in support of the planning application for the Creative Industries Quarter (CIQ) development, Barking, which is located in the London Borough of Barking and Dagenham (LBBD).

The proposed development consists of a mix of uses, including creative industries commercial space, office space, residential and small crèche and café/retail units, which have been provided to support the other uses within the development. The development with be made up primarily of new build which focus on the Granary and Malthouse buildings which will house the creative and office space.

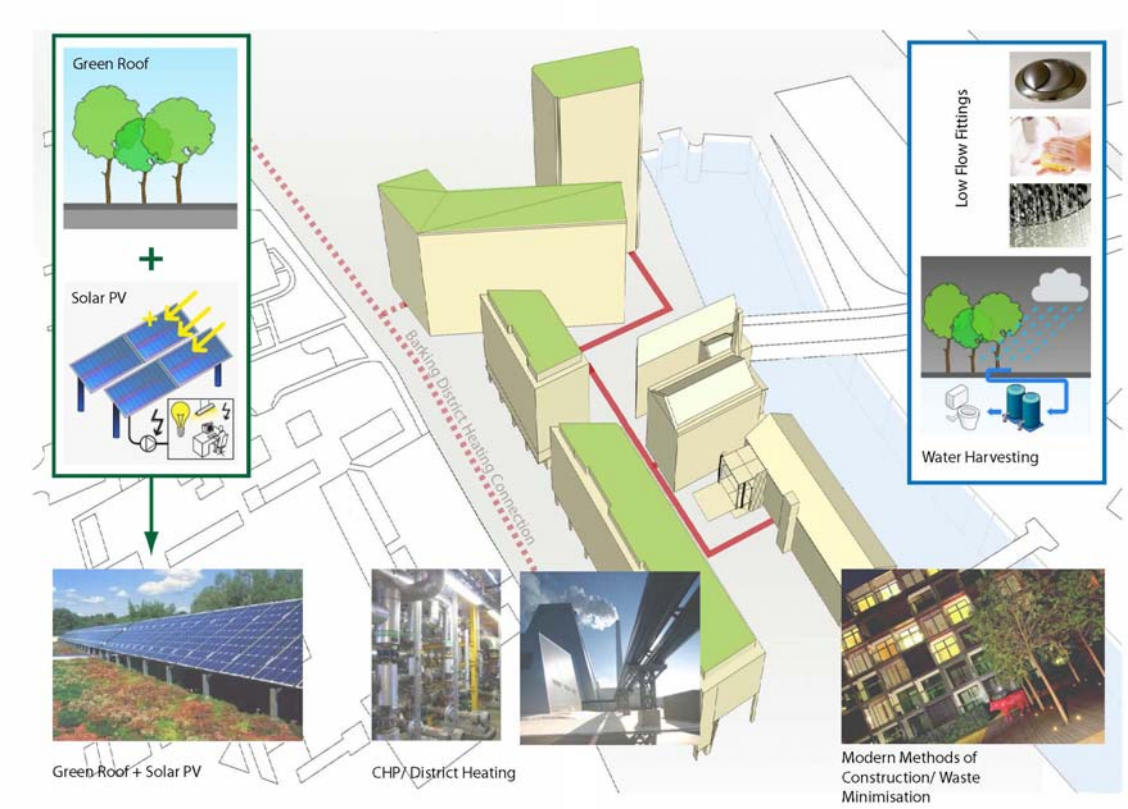


Figure 1 Creative Industries Quarter Sustainability Strategy

The CIQ Sustainability Statement identifies the sustainable design aims and objectives of the London Thames Gateway Corporation and relevant planning bodies, and outlines the strategy which will be employed to respond to each of these, thereby ensuring the appropriate degree of environmental sustainability within the scheme.

The structure of the Sustainability Statement is largely a response to the LBBD's prescribed Sustainability Statement template, it covers the following issues.

Part 1: Land Use, Noise, Air Quality and Transport

Part 2: Environmental Sustainability

- Sustainable Materials in Construction
- Sustainable Waste Management During Construction and Occupancy of Development
- Energy Efficiency and Renewable Energy
- Water Resources
- Nature Conservation and Biodiversity

Also appended to this document are the CIQ's Energy Statement, as required by the London Plan, and a summary of the BREEAM assessments which have been used as a framework to measure and develop the schemes sustainability strategy.

This statement is also supported by a dedicated Energy Statement, which can be found in Appendix A, along with summaries of the Code for Sustainable Homes and BREEAM preliminary assessments.

2 Relevant Planning Policies

The Sustainability Strategy which has been developed for CIQ is in response to a broad range of issues including the following planning policies and guidance:

2.1 National

At a national level the development of the CIQ sustainability strategy has been designed to address the requirements of a wide range of Planning Policy Statement (PPS) and Planning Policy Guidance (PPG) and Government agency guidance on sustainable design

In addition to meeting the requirements of the current Building Regulations the Department for Communities and Local Government (DCLG) has also made it mandatory (April 2008) that a Code for Sustainable Homes assessment be carried out, in affect forming a new requirement of the Building Regulations, for Residential developments. The assessment of the scheme against a number of different BREEAM methodologies is covered in more detail in Section 3.3.

2.2 Regional

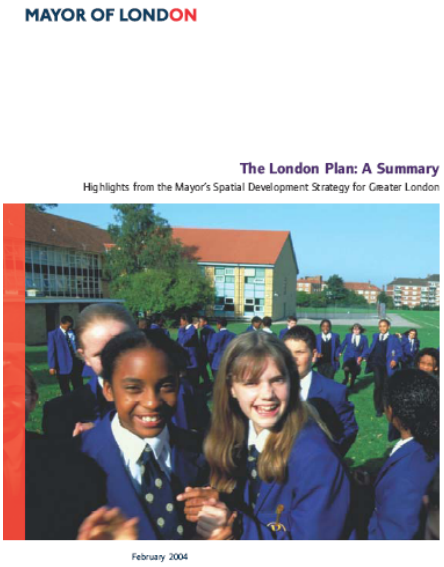
2.2.1 The London Plan: Spatial Development Strategy for Greater London, Greater London Authority (GLA), 2008.

The Mayor's London Plan sets out the planning requirements in the London context and identifies 6 main objectives:

- To make the most sustainable and efficient use of space in London by encouraging intensification and growth in areas of need and opportunity;
- To make London a better city for people to live in;
- To make London a more prosperous city with strong and diverse economic growth;
- To promote social inclusion and tackling deprivation and discrimination;
- To improve London's transport infrastructure; and
- To make London a more attractive, well-designed and green city.

Specific requirements are set out in the London Plan relating to sustainability (Policy 2A.1), energy assessment (Policy 4A.4), renewable energy (Policy 4A.7), waste management and aggregates (Policies 4A.21-25), air quality (Policy 4A.19), water supplies (Policy 4A.16), water quality (Policy 4A.17), reducing noise (Policy 4A.20), climate change (Policy 4A.1) and biodiversity (Policy 3D.14).

According to Policy 4A.6 of the London Plan developments are required to demonstrate that their heating, cooling and power systems were selected to minimise carbon dioxide (CO_2) emissions.



The Mayor will expect major developments to demonstrate that heating and cooling systems were selected according to the following order of preference:

- Connection to existing combined cooling, heat and power (CCHP) / combined heat and power (CHP) distribution networks;
- Site-wide CCHP/CHP powered by renewable energy;
- Gas-fired CCHP/CHP or hydrogen fuel cells, both accompanied by renewables;
- Communal heating and cooling fuelled by renewable sources of energy; and
- Gas-fired communal heating and cooling.

Policy 4A.3 sets out policy for broader sustainable design and construction issues, and states that future developments should meet the highest standards of sustainable design and construction including:

- Making the most effective use of land and existing buildings;
- Reducing CO_2 and other emissions that contribute to climate change;
- Designing new buildings for flexible uses throughout their lifetime;
- Managing overheating;
- Making the most effective and sustainable use of water, aggregates and other resources;
- Minimising energy use, including by passive solar design, natural ventilation, and vegetation on buildings;
- Supplying energy efficiently and incorporating decentralised energy systems (Policy 4A.6), and using renewable energy where feasible (Policy 4A.7);
- Minimising light lost to the sky, particularly from street lights;
- Procuring sustainable materials;
- Ensuring designs make use of space around the building;
- Reducing air and water pollution;

- Managing flood risk, including adopting flood resilient designs;
- Ensuring developments are comfortable and secure for users;
- Conserving and enhancing the natural environment, particularly in relation to biodiversity and enabling easy access to open spaces;
- Avoiding creation of adverse local climate conditions;
- Promoting sustainable waste behaviour in new and existing developments, includes supporting local integrated recycling schemes, CHP schemes and other treatment options;
- Encouraging major developments to incorporate living roofs and walls where feasible; and
- Reducing adverse noise impacts.

In addition, the London Plan also includes policies on reducing carbon dioxide emissions by 20% (Policy 4A.7) through the use of onsite renewable energy generation for new developments although LBBD is exempt from this requirements as a result of their superseding Energy Action Area policy (See Local Policy section).

The London Plan is supported by Supplementary Planning Guidance (SPG) for Sustainable Design and Construction, published in May 2006, which comprises guidance, standards ('essential' and 'Mayor's preferred') and case histories. The SPG deals with implementation of the environmental aspects of the above policy documents and is looking for enhancements on the current Building Regulations and adoption of good practice principles.

The CIQ Sustainability strategy has been designed to meet all the "Essential Standards" set out in the Mayor's SPG on "Sustainable Design and Construction", while also considering opportunities to incorporate any of the "Mayor's Preferred Standards", which do not endanger the viability of the scheme.

2.3 Local

An early design stage review of London Borough of Barking and Dagenham's LBBD Unitary Development Plan, Local Development Framework documents identified a range of sustainable design objectives which have also been used to drive the design process.

Barking and Dagenham's Unitary Development Plan (UDP) (1995)

The borough's planning policy document includes a number of policies that promote sustainable design and construction.

These include:

- Energy conservation: G40, DE9 and H20
- Micro climates: DE2

- Reuse and recycling of building materials: G53
- Water management and flooding: G34, G38, DE3 and SPG5
- Habitats and nature conservations: strategic policy G42,G43, G46, G50, G54 and DE3
- Noise and Vibration: G36
- New developments and sustainability: G46 and DE10

Local Development Framework

The Council is in the process of replacing its UDP with a Local Development Framework (LDF), which is expected to be adopted in 2008, full details of which can be found in the planning statement.

Sustainable design and construction issues will be addressed in both the core strategy and borough-wide development policies.

Barking Town Centre Interim Planning Guidance (IPG) (2004)

The IPG provides policy guidance that bridges the UDP (1995) and more recent, adopted national and regional policy. The IPG provides a framework for considering development proposals and highlights the main issues developers will have to consider, including sustainability issues, in any new development or redevelopment within the town centre. The IPG is a material consideration when deciding planning applications.

Figure 2 LBBD Green Roof Guide

Green Roofs Planning Advice Note (PAN) 1 (2005)

This PAN provides developers and architects with guidance on building green roofs.

Planning Advice Note (PAN) 3: Refuse and Recycling Facilities in New and Refurbished Residential Developments (2006)

This PAN provides guidance on what refuse and recycling facilities new developments should incorporate into their designs and offers advice on location, design and on-going waste management issues.

Barking and Dagenham's Local Biodiversity Action Plan (2005)

The Action Plan sets out a framework for the protection and enhancement of the borough's flora and fauna.

Planning Advice Note (PAN) 5: Sustainable design and construction

Using the definitions of development size, which are identified in the PAN 5, the CIQ Barking is considered a Strategic Development, which is referable to the Mayor and which requires the scheme to be assessed using the appropriate BREEAM methodology.

With respect to energy the CIQ site is located near the Barking Town Centre, which is designated an Energy Action Area.

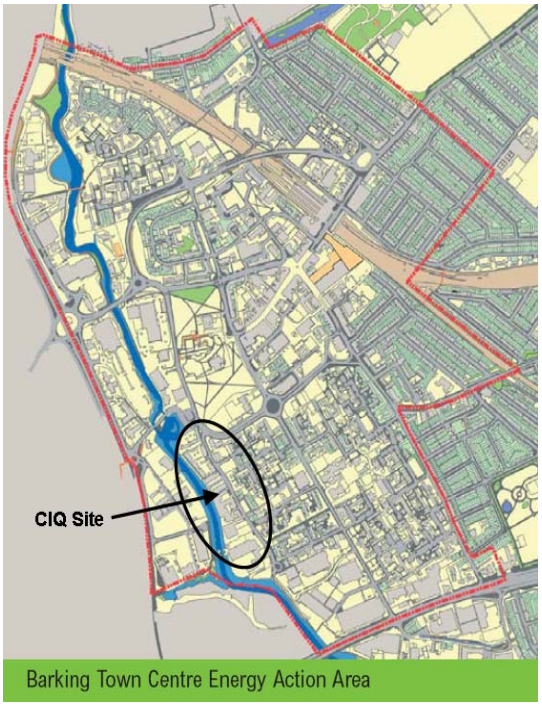


Figure 3 Barking Town Centre Action Area

Guidance on specific requirements are outlined in LBBD's 'A guide to the Barking Town Energy Action Area Implementation Plan'. Some of the key elements of the document are summarised as follows:

- New developments in Barking Town Centre are required to achieve a 32% reduction in Carbon Emissions on top of what is required by Building Regulations 2006. Developer can meet this target by:
- Achieving a 22% reduction in Carbon emissions by connecting to a town centre community heating network served by a low carbon heat source.
- Meeting their 10% renewable target through electricity – generating renewable energy technologies such as small scale wind turbines or photovoltaic panels.

3 Part 1: Land, Use Noise, Air Quality & Transport

3.1 Land Use

The Barking CIQ site is located in Barking (postcode IG11), approximately 15km northeast of Central London, adjacent to Abbey Road. The site is currently occupied by buildings (such as the Malthouse) and concrete paths and stands just by the River Roding and the proposed development's footprint will fall within the boundaries of the land previously developed.

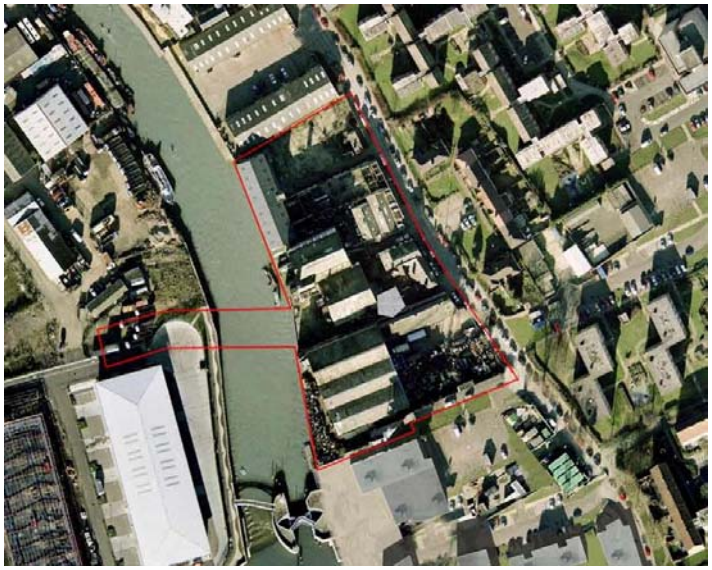


Figure 4 Creative Industries Quarter Site Boundary

The site has had a number of industrial uses over time and geotechnical studies which have been carried out indicate that, although there are isolated areas within the site where ground contamination could pose potential risks to people and the environment, contaminant sources are generally at low levels, and the proposed mitigation steps as part of the demolition construction process, will in fact restore value to the site for the benefit of the wider community.

Those areas of the site which are deemed to be of historical importance will be part of a comprehensive refurbishment so as to gain maximum value. The Malthouse and Granary will be conserved and new buildings will be built which compliment their re-use, thereby maximising the use of existing built structures and reducing demand on new construction materials

3.2 Noise

Noise impacts during the construction of the Creative Industries Quarter, once the Development is operational, are addressed in a separate Noise & Vibration Assessment undertaken by Buro Happold in support of this planning application.

3.2.1 Construction activities

During construction site activities that generate noise will follow British Standard (BS) 5228 to minimise nuisance to neighbours. Mitigation measures to minimise noise impacts of construction and demolition activities will be implemented by the contractor and include:

- The avoidance of extended, weekend and night-time working hours;
- Provision of lined and sealed acoustic covers for equipment, which must be in place during use of equipment;
- Regular maintenance of all equipment;
- Operation of equipment in the mode of operation that minimises noise;
- Shutting down equipment when not in use;
- Avoiding waiting or queuing on the public highway with engines running;
- Selection of piling methods which minimise noise and vibration;
- Noise reduction measures for temporary ventilation equipment;
- Handling all materials in a manner which minimises noise;
- Where audible warnings are necessary for reversing vehicle operations will be planned to minimise reversing;
- Fitting of silencers to all plant, machinery and vehicles;
- Design and use of site hoardings and screens, where practicable and necessary, to provide acoustic screening at the earliest opportunity. Where practicable, doors and gates should not be located opposite occupied noise-sensitive buildings; and
- Choice of routes and programming for the transport of construction materials, spoil and personnel.

Many of the initiative which are identified above will be addressed in the Considerate Constructors Scheme initiatives which will be adopted as part of the BREEAM and Code for Sustainable Homes Assessments and as such will be tested both during and after site works have been commenced.

3.2.2 Operation

A number of noise quality assessments have been undertaken which indicate that proposed development is in accordance with the guidance in PPG24 and BS 8233. This comprised an assessment of the appropriateness of the site for the proposed uses along with the proposed use.

Monitoring of the current noise levels and consideration of anticipated noise generated from the operation of the site suggest that the main source of noise is likely to come from local traffic, including that generated from the proposed public transport bridge. Where specific areas of the development are identified as having 'significant' noise issue, mitigation can be implemented in a number of forms, particularly material selection, (See Fig 5 for examples).

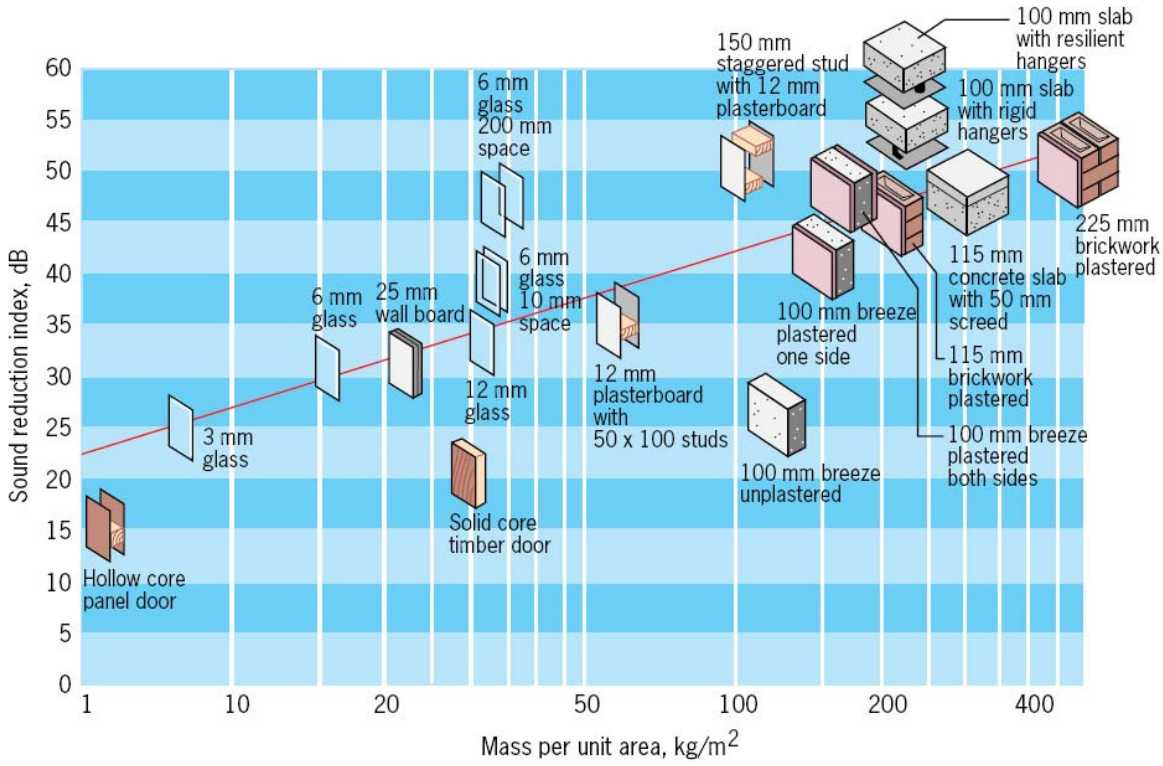


Figure 5 Breakdown of construction elements used to mitigate noise levels

The restriction of motor vehicle activity associated with the site itself and mitigation of the main onsite receptor areas through increased acoustic insulation to meet BS 6233, such as double glazed windows, are aimed at reducing the impact of noise and vibration as much as possible. As part of the Code for Sustainable Homes and BREEAM assessments further testing will be carried out at both design and post construction stages to ensure the desired acoustic targets are achieved.

3.3 Air Quality

As part of the design process an Air Quality Assessment has been undertaken by Buro Happold which forms part of the planning application.

3.3.1 Construction

The assessment identified dust from the construction process as the most significant impact. Construction dust, expected to only represent a nuisance to humans in the immediate proximity to the construction site, will be controlled through use of demolition zones, mostly on a floor by floor basis. Protected chutes will deliver demolition material to basement areas for efficient removal. Demolition operations will be enclosed at all times, reducing noise and dust emissions to neighbouring areas.

Other best practice measures to be adopted will include:

- Damping down of brick walls during building demolition;
- Regular inspection and wet suppression of material/soil stockpiles where necessary (including wind shielding or complete enclosure (where deemed appropriate), storage away from site boundaries, and restricted height of stockpiles);
- Appropriate orientation of material stockpiles;
- Provision of wet suppression during loading of vehicles; and
- Covering vehicles carrying dry spoil and other wastes.

3.3.2 Operation

A detailed modelling study indicated that the predicted increases in concentrations of PM10 and NO2 resulting from both the development traffic and buses along the public transport bridge would result in negligible impact to local

air quality.

A number of measures will minimise the sources of air pollution associated with the development and its construction. The Barking CIQ buildings are being designed to minimise fossil fuel energy use and meet high carbon reduction targets. This will contribute to lowering negative impacts on climate change. In addition, because of the development's central location and a number of design measures incorporated to minimise the reliance on individual car use, air pollution associated with traffic will be reduced.

3.4 Transport

The project is located in close proximity to the amenities of Barking Town Centre with relatively good access to public transport. The project is approximately 960m away from Barking underground and train station, which is one of the principal transport interchanges in East London providing C2C and Silverlink train services, as well as access to the District and Hammersmith & City Underground lines. Moreover, the proposed public transport bridge will enable buses to use a dedicated route at this location, providing 20 buses an hour. Proposals will allow the route to be used by trams if required in the future.

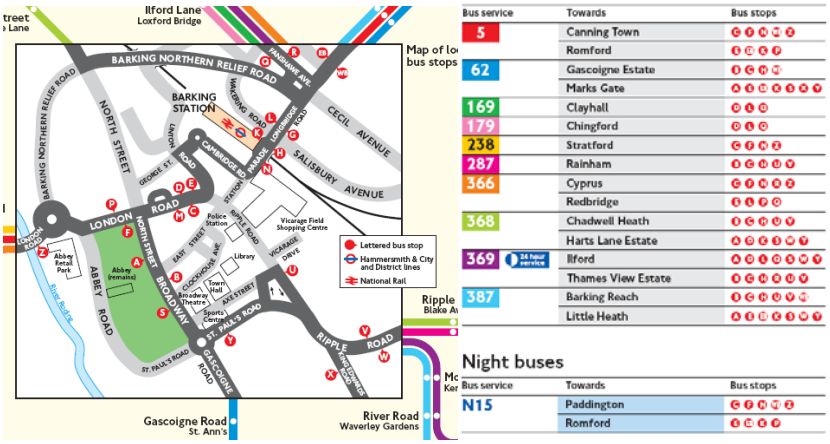


Figure 6 Local public transport infrastructure

This site's location will contribute to reducing the need for car use by the development users and therefore to lowering carbon emission associated with transport. This is further reinforced through a number of design strategies adopted on the project:

Vehicular access to the site will be via two under-croft car park accesses from Abbey Road, access will be restricted via control barriers. Car parking will be for residential and B1 office/creative industries users and in line with the Mayors London Plan Maximum parking standards. Further on street parking will be provided along the frontage of Abbey Road for Creative industries users. To minimise the traffic generated by the development provision has been made for six care club parks and preference has been made for disabled parking spaces.

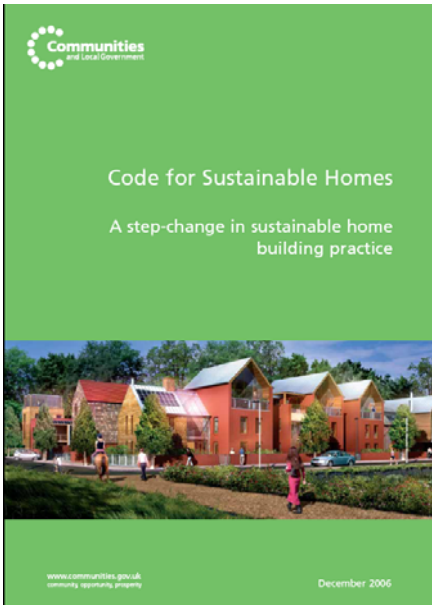
Light servicing i.e. deliveries (post / super market deliveries will be via an on-street delivery bay on the Abbey Road frontage. Servicing such as main deliveries, removal vehicles and refuse collection will be via the Square, accessed via the public transport bridge junction with Abbey Road. Access restrictions on the bridge approaches will be in the form of signage and surveillance cameras at the bridge entrance, thus this will allow vehicles to service the CIQ development without conflict.

Finally, cycle and parking numbers will exceed the London Plan and minimum cycle standards within the FFL guidance and will see provision for dedicated cycle parking for each of the distinct use types on the site. . All cycle parking will be weatherproof, secure and adequately lit as per BREEAM guidelines.

4 Part 2: Environmental Sustainability

This section of the statement address those issues identified in the PAN 4 on Sustainable Design and Construction.

4.1 Assessment Methods – BREEAM and Code for Sustainable Homes



In order to align this Sustainability Assessment with the aims of the LBBD a number of preplanning BREEAM assessments have been undertaken to both assess and structure the developments environmental credentials.

Consequently much the of the information which has been presented within this statement has been derived directly from one of the assessments which have been carried out. Full details of the each assessment can be found in the Appendix C and Appendix D.

The CSH and non-domestic BREEAM methodologies measure the sustainability of a home, using a point score system, against the following design categories:

Table 1.1 Code for Sustainable Homes assessment areas

• energy/CO2 [include min requirements]	**• management**
• pollution	**• surface water run-off [include min requirements]**
• water [include min requirements]	**• ecology**
• health and well-being	**• waste [include min requirements]**
• materials [include min requirements]	

As indicated in Table 1.1 The CSH includes a number of issues with mandatory minimum credit levels, the Energy and Water requirements (See Table 1.2) being the most demanding .

Table 1.2 Minimum Code for Sustainable Homes Standards which will be met

Minimum Requirements for the Code for sustainable Homes				
	Energy		Water	
Code Level	**TARGET**	**POSSIBLE SOLUTION**	**TARGET**	**POSSIBLE SOLUTION**
4*	44% CO2 reduction (Part L1 2006)	Incorporation of CHP and Photovoltaic	105l/p/d	Utilisation of low flow fittings throughout and dedicated rainwater harvesting

Note that a formal assessment is only possible once detailed design is complete, which is beyond the scope of this work. An indicative pre-assessment has been included as an appendix in order to provide a steer for what 'Sustainability measures' have been targeted.

All of the enclosed assessments are the result of extensive consultation with the Applicant and relevant stakeholders, in addition to the design team. In summary all assessments have been carried out have achieved their respective required ratings, these being Code for Sustainable Homes (CSH) ' Level 4' (68.74%); BREEAM Office 'Very Good' (69.89%). An additional BREEAM Bespoke assessment will be undertaken on the creative industries space as part of the detailed design process. Unprecedented demand for BREEAM Bespoke assessments in the United Kingdom have resulted in extended bespoke credit guidance development by the Building Research Establishment (BRE). This process has been initiated and will be developed prior to detail design on creative industries areas. To ensure that these element of the scheme meet the demanding sustainability target assets for the rest of the development these areas have been assessed using the BREEAM office methodology, which is able to capture most, if not all, of the relevant specifications by virtue of shared building envelope and services arrangements.

It is worth noting that the BREEAM suite of environmental assessment methodologies have been developed for the assessment of individual buildings, which posses, a number of difficulties when assessing a masterplan which consists of a number of buildings of different use type. In particular the recent drive to align the BREEAM assessment method with a building specific assessment, similar to the buildings regulations can create some conflicts when it comes to assessing elements of the scheme which are shared between buildings and even those which may be designed to contribute to the public realm. Wherever possible a notional boundary has been created around each building use to allow it to be assessed in isolation.

4.2 Sustainable Materials in Construction

The environmental impact related to the use of materials will be minimised in a number of ways and the strategy will look to prioritise the sourcing of materials using the Reduce, Re-use, Recycle principles prior to the specification of new materials.

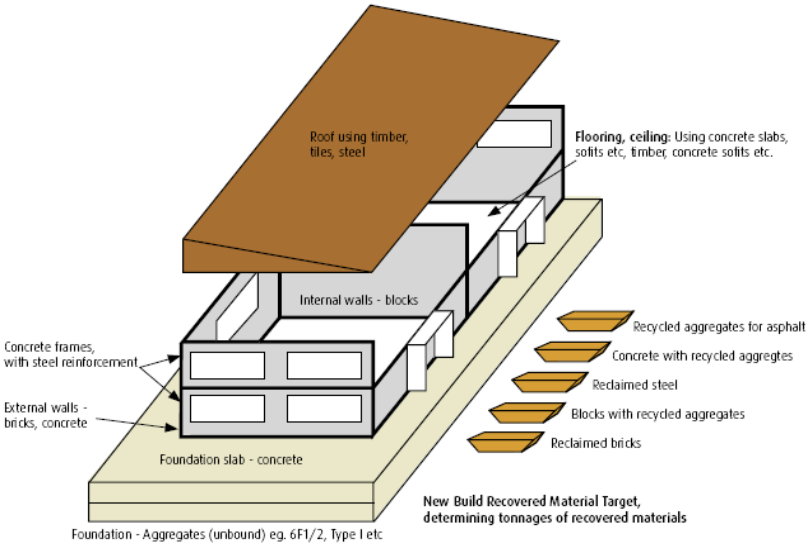


Figure 7 Opportunities for reduced consumption of materials on CIQ structural elements

The development will be constructed using high quality, long-lasting materials, avoiding the health dis-benefits associated with sub-standard materials. Where compatible with aesthetic and economic criteria building materials will be specified that have a low environmental impact under the Building Research Establishments (BRE) Green Guide to Housing Specification and achieve an A rating.

High density residential developments are often at a disadvantage when assessed using the Green Guide for Housing Specification, due to its focus on house construction types as opposed to flat/apartment style dwellings. Consideration has however been given, wherever possible, to the use of construction types which minimise the environmental impact of the proposed buildings including the use of 'ground granulated blastfurnace slag' within the concrete structures (providing it can be sourced within the UK) and reduction in overall material used in the refurbished elements by incorporating precast hollow core planks for the upper floors.

Wherever possible insulation specification will be aimed at eliminating hydrochlorofluorocarbon's (HCFC's) and ozone depleting materials. This will be conducted in the next phase of the design process.

At least 75% of timber will be obtained from certified sources under recognised schemes such as the Forest Stewardship Council. No timber will be obtained from tropical sources.

4.3 Sustainable Waste Management (during construction and occupancy)

4.3.1 Construction Phase

In general, accordance with the principles of the Waste Strategy for England and Wales (2007) a principal aim during demolition and construction will be to reduce the amount of waste generated and exported from site. All contractors will be required to produce a Site Waste Management Plan and investigate opportunities to minimise and reduce waste generation, such as:

- Re-use of materials in-situ such, as in the case of the Granary and Malthouse buildings, which will in effect be put through a major refurbishment;
- Re-use of materials on-site wherever feasible, e.g. re-use of crushed concrete from demolition process for fill; and re-use of excavated soil for landscaping, such as may be used for the ELT foundations;
- Re-use and recycling of materials off-site where re-use on site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use of re-processing); and
- Examine the potential of sourcing aggregate from demolition waste / local sources (up to 30 kilometres (km) away).

At detail design stage a key driver behind the design of the residential buildings will be the aspiration to use Off site pre-fabrication. Early design work suggests this is most likely to be achieved through the use of pre fabricated structural elements, modular cladding, toilets, mechanical and electrical risers. This will not only reduce construction times and help deliver but will reduce the waste from inefficient onsite construction practices.

4.3.2 Operational Phase

The strategy for the operational phase will utilise a number of initiatives to achieve the overriding objective of minimising house hold waste and waste generated from the commercial premises. Consideration has been given to the benefits of a centralised waste collection scheme, with the possibility of delivering waste direct to the local waste handling facility. This system could offer a range of benefits including ability to co-manage household and commercial waste streams, operating co incidentally with householders recycling initiatives, in turn designed to reduce space requirements for waste storage and reducing waste transportation. At a micro level both commercial and residential elements of the development will befit from waste facilities which promote recycling through the separation of waste streams. To this end each dwelling in the residential element of the scheme will be equipped with 3 under-sink waste bins to recycle domestic refuse.

4.4 Energy Efficient Design and Renewable Energy

The CIQ energy strategy has been developed in response to the energy demands for the site and, in the context of the Greater London Authority's "The London Plan " and "Green light for Clean Power" policy documents, will develop a holistic approach to reduce the carbon emissions from the development. Full details of the Energy strategy which has been developed for the CIQ scheme can be found in the Energy Statement in Appendix A of this document.

In responding to the 'The London Plan' and LBBD requirements the CIQ proposal will reduce its overall carbon emissions by:

- Reducing the demand for energy by design and construction of energy efficient buildings, avoidance of mechanical ventilation wherever possible, reduction of heat losses by means of insulation, and use of low-energy appliances;
- Using energy as efficiently as possible, for example avoiding transmission losses through use of localised generation of energy, efficient distribution of energy, for example through district/community heating schemes, and use of high efficiency appliances such as low-energy luminaires;
- Utilise low or zero carbon technology, in particular develop a strategy which utilises CHP and Photovoltaics to generate both heat and electricity onsite and avoids introducing renewable heating technology, such as Biomass or GSHP technology, which may be in conflict with the LBBD's future plans for the Barking Power Station; and
- Build flexibility into the CIQ district heating network so that it can be integrated with the Barking District Heating network, as and when it comes online.

Buro Happold believes in a holistic approach to carbon mitigation based on hierarchy where the most effective measures used to reduce carbon emissions are those that cost the least.

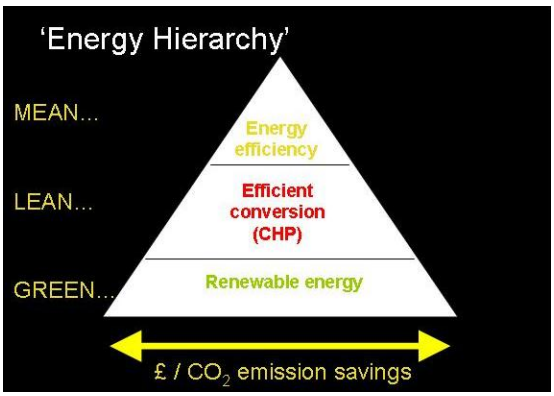


Figure 8 Carbon reduction hierarchy

4.4.1 Reducing Energy Consumption

This section sets out the energy efficiency measures proposed as part of the scheme .

- The thermal performance of the building envelopes, the utilisation of solar gain in the winter season and the air tightness are the three key elements that are considered to reduce heat losses. A summary of some of the initial optimisation studies can be found in Appendix B;
- The vast majority of the site will be naturally ventilated however in some areas a mixed mode strategy will be adopted to ensure both energy efficiency and appropriate comfort levels can be maintained;
- The need for electric lighting will be minimised by ensuring good access to daylight for all living spaces. Low energy fittings will be used wherever possible;
- Individual metering to all individual units will be provided. Options for the provision of on-display metering will also be considered where it is felt this might increase awareness of energy efficiency and influence behaviour; and
- Develop Planned Preventive Maintenance (PPM) strategies during the detailed design process for buildings and infrastructure to ensure systems are maintained operating at their optimum efficiency.

4.4.2 Supplying Energy Efficiency

This section outlines how energy is supplied efficiently to the two buildings.

A decentralised combined heat and power (CHP) will generate the base load domestic hot water for the development.

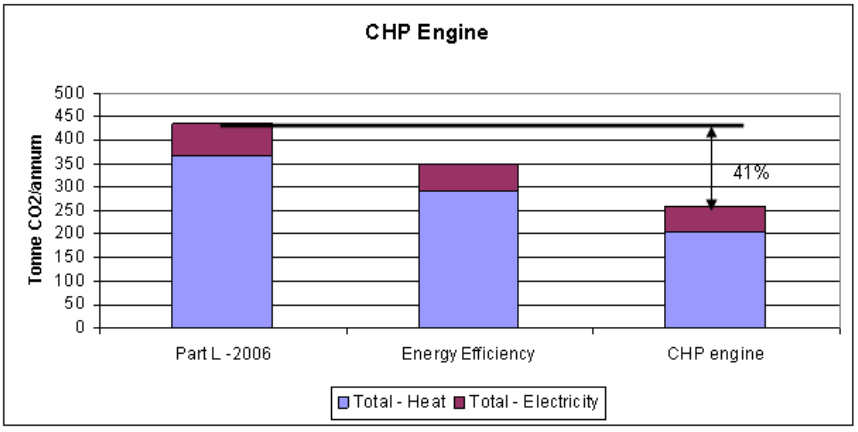


Figure 9: Carbon mitigation through CHP engine

As shown in Figure 9 only 3% of CO2 reduction must be reduced through a renewable source to get to the 44% CO2 requirement for the code for sustainable homes.

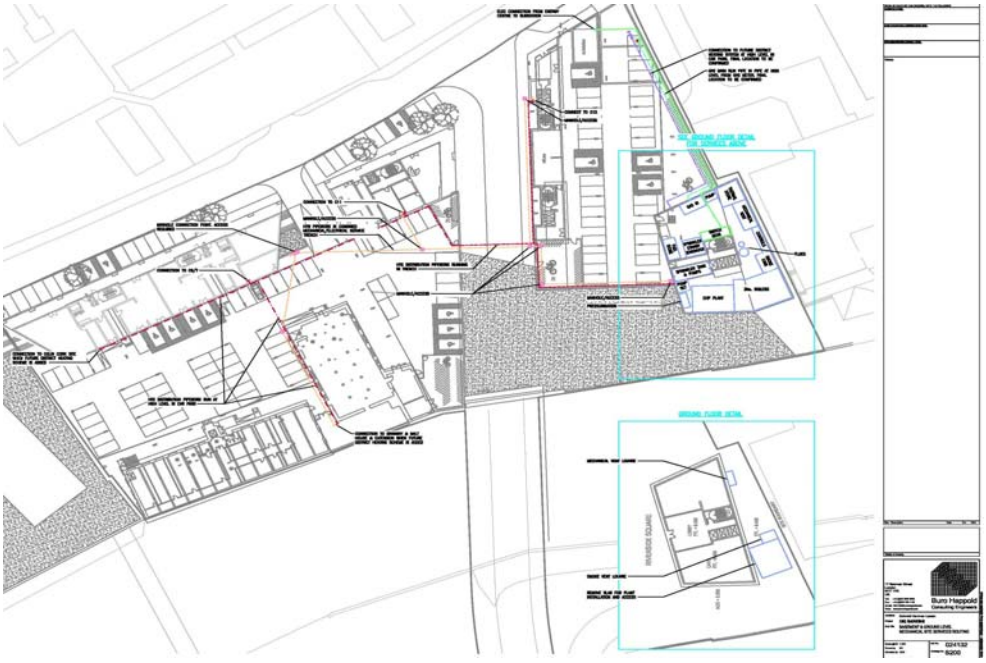


Figure 10 District Heating configuration

To gain maximum benefit from the provision of a CHP plant it is proposed that a single 200kWe CHP unit is used in combination with a district heating system to provide thermal energy, and sometimes electricity, to a series of buildings in a development. They are particularly well suited when a mixed variety of buildings with diversified loads are present in the same site enabling reductions in overall plant size to be made with subsequent cost savings.

The CIQ energy centre and district heating system will be designed to allow connection to the Barking District Heating network. Provision has also been made for an additional district heating 'spur' to installed at the northern most segment of the heating network. This sour will offer the future flexibility to link the CIQ site to the Colin Cork site should it be commercially viable.

4.4.3 Supplying Energy from Low Carbon Energy Source (Photovoltaics)

Solar photovoltaic (PV) cells transform the photons within sunlight into useful electrical energy. They are made from semi-conductor material and can be integrated into the fabric of the building, as a roof covering, as glazing or mounted on the building. In the CIQ development the PV system could be mounted on the flat roof and could be tilted at 30 degrees to the horizontal to maximise output over the year.

PV systems require little maintenance. Regular inspection of the PV arrays for damage or dirt and annual servicing of inverters and electric controls is required. PV is ideally suited to residential and commercial applications due to its low maintenance requirement.

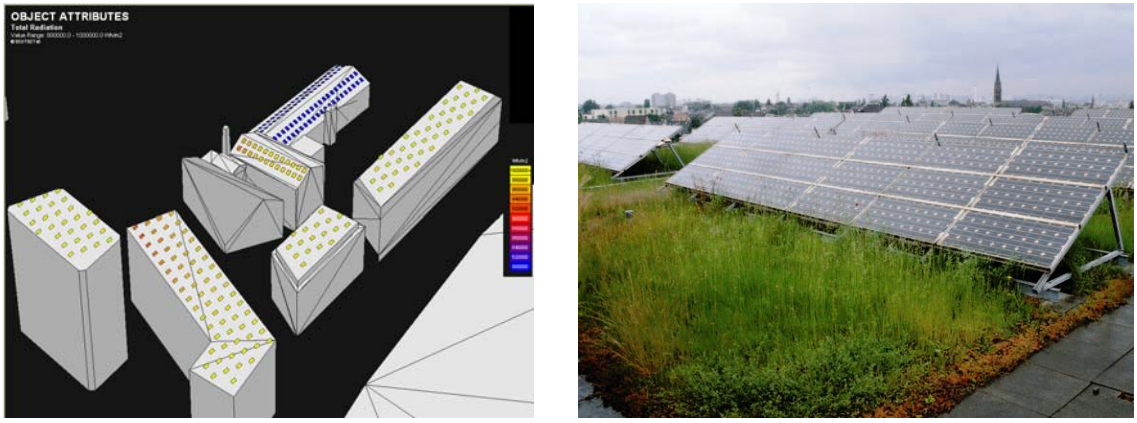


Figure 11: PV panels insolation optimisation and likely configuration

LBBD sets a target of 10% CO2 reduction through a renewable technology generating electricity. This target is much more challenging than that of the Code for Sustainable Homes, as it restricts the developer in terms of the technological solution which can be employed irrespective of site and project opportunities.

Extensive analysis has been undertaken to establish the optimum configuration for the installation of PV within the scheme. In order to obtain a usable result the following inputs have been assumed to estimate the amount of CO_2 emission that can be saved through these PV panels.

- PV panel capacity: 101 kWh/m2/yr
- Electricity CO_2 factor: 0.422 kWh/m2/yr

In summary, the annual electricity generated from the PV panels corresponds to 11% of the annual electricity demand from the development. Moreover, it reduces the sites totalCO2 emissions (incl. estimated small power loads) by 7.5%, which is a very good result for a scheme of this location and density.

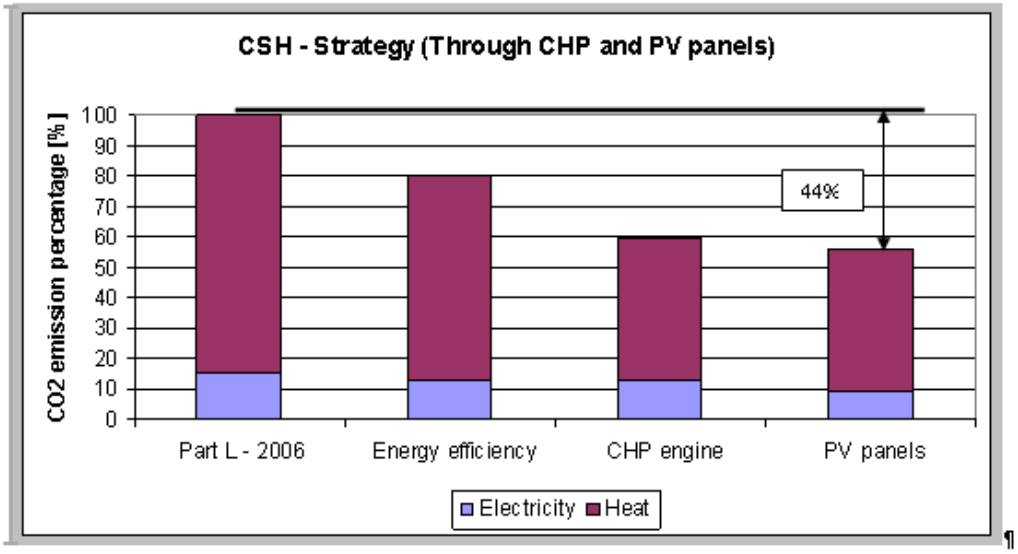


Figure 12 Energy strategy impact on Site wide CO_2 emissions

By combining the initiatives described above, the CIQ energy strategy is able to achieve the maximum carbon reduction (See Fig 12) deemed possible on a mixed use scheme of this size and location, without the aid of biomass boile.

In doing so the proposed strategy not only achieves Code Level 4 requirements for 'Energy and Carbon Dioxide Emissions(+44% CO_2 reduction), meets the LBBD requirement for a 32% improvement on Building Regulations, has facilitated a notional 22% reduction through the LBBD district heating system(once online) but it is also able to meet a substantial amount of its annual electrical demand (11%) through Photovoltaic electrical generation.

4.5 Water Resources

Protection of water resources and the promotion of water efficiency practices is another key driver behind the CIQ sustainability strategy. To achieve the this the following water use hierarchy has been implemented:

- Reduce;
- Re-use; and
- Recycle.

4.5.1 Water consumption reduction

In order to conserve water resources, all buildings within the scheme will benefit from fit-out with low water consumption appliances, such as dual flush toilets and aerated shower heads. To aid in the efficient running of dwellings in the development tenants will be provided with information on the efficient operation of all services, including the use of A rated Energy Efficiency white goods, which will be supplied. Commercial elements of the scheme will also benefit from low flow fittings including low flow showers to accommodate the cyclist facilities.

Final specification of green roof build-up will give preference to either no irrigation requirements or, during the initial bedding in period, only minimal irrigation requirements.

Wherever practical and viable, rain water will be collected and used for irrigation or toilet flushing. The water consumption use will be assessed using the appropriate BREEAM / CSH methodology.

4.5.2 Rainwater Harvesting

Rainwater harvesting is the collection, conveyance, filtration and storage of rainwater for use as a non-potable water supply. Rainwater harvesting has been selected over greywater recycling based on the simplified infrastructure required. Further feasibility studies will be undertaken at detail design to establish the practical reuse of the rainwater. This feasibility will also take into account the SUDS constraints and opportunities which exist within the site.

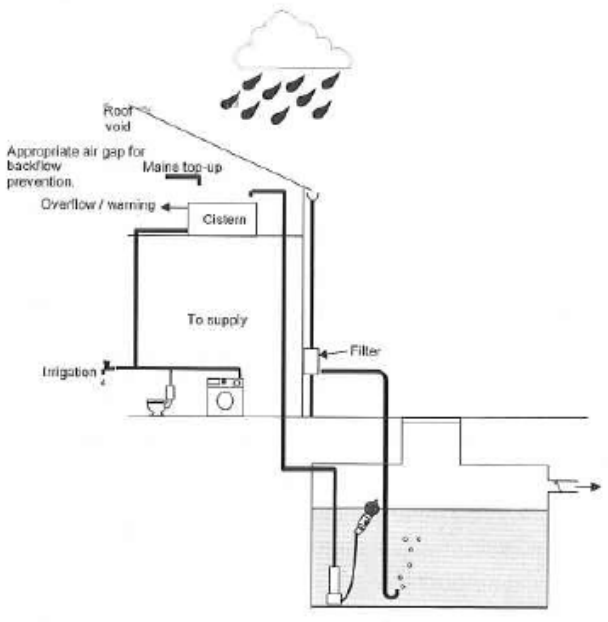


Figure 13 Rainwater harvesting & attenuation system

Due to their size, the storage vessels will be usually buried underground, and are constructed from concrete or glass-reinforced plastic. Underground storage can also be done via modular plastic matrices with >90% void space. These are wrapped in a geotextile and can be used as storage or attenuation devices.

After the initial capital cost, there will be some operation and maintenance (O&M) cost throughout a rainwater harvesting system's lifetime, and this becomes more significant the smaller the system.

4.5.3 Run Off rates

To manage runoff flow rates from the proposed development it is proposed that peak discharge rates be restricted to those of the existing site. To meet this criterion and avoid/reduce the need for attenuation storage, the area of impermeable surfaces that connect to the surface water drainage system should not be increased within the proposed development. Exact attenuation rates and capacity requirements have been agreed in consultation with the Environment Agency.

Where use of soak aways are not possible surface water runoff from the sites will be attenuated in a below ground storage tank before being discharged to the public combined sewer. The drainage strategy also incorporates Sustainable Urban Drainage Systems (SUDS).

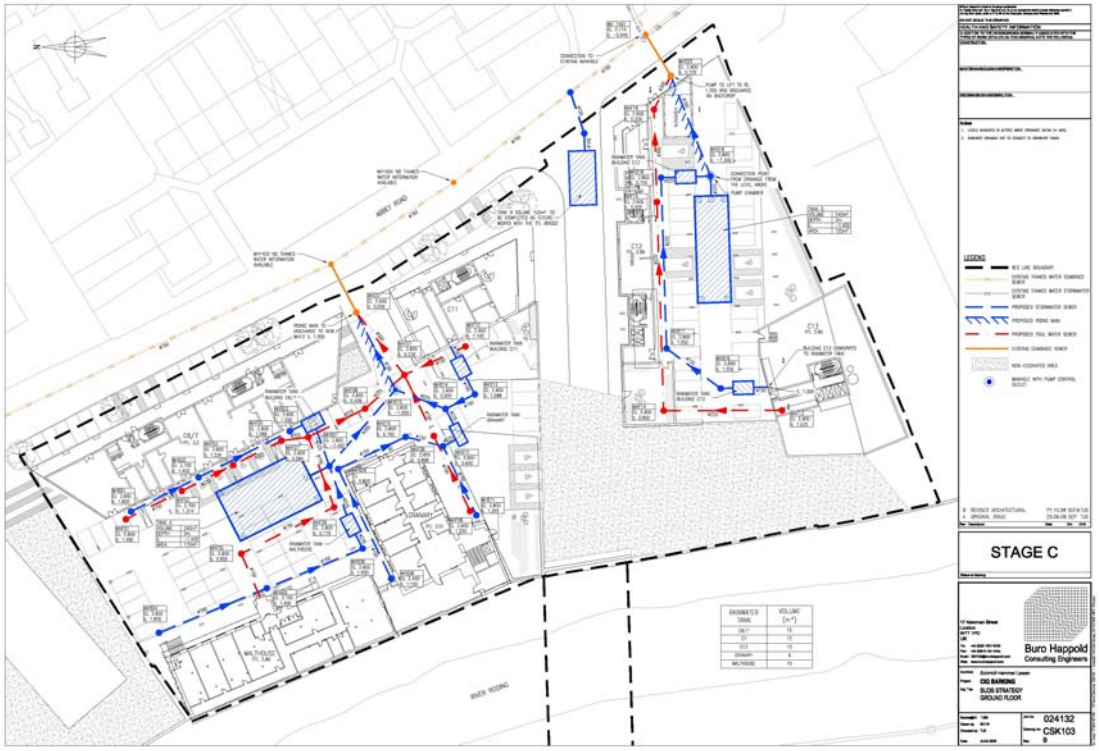


Figure 14 Rainwater Harvesting & Attenuation

In addition to the provision of attenuation tanks, consideration has also been given toward the following systems:

- Drainage swales;
- Rain gardens (Bio-retention devices); and
- Infiltration devices.

The above mentioned systems in addition to a number of attenuation storage options, such as balancing ponds and surface storage, were illuminated through a detailed feasibility study as a result of the relatively high water table and space limitations.

4.6 Nature Conservation and Biodiversity

The Development proposal is to includes a comprehensive landscape strategy which is supported by ecology assessment and advice from The Environmental Dimension Partnership (EDP). A detailed report from EDP will also accompany the planning application which details, amongst other things, the ecological value associated with the existing site and recommendation on how to the biodiversity of the site could be enhanced.

The development proposal includes a mix of public, semi-public and private amenity space which has been designed to enhance the biodiversity of the site while realising the sites ultimate goal of promoting the creative industries within the Barking and Dagenham area.

Through selection of the site the scheme has ensured that the site development does not result in the loss of any greenfield areas or sites which may be of ecological value to the area, as confirmed by the Ecological Appraisal issued by EDP in support of the planning application.

The proposed scheme will make the best possible use of brownfield land by providing medium - high density, mixed-use development, which maximises its use of space through its multi storey nature. The existing site consists largely of hard standing and the existing buildings are in a poor state of repair. The scheme will, therefore, result in the reuse of a site that currently holds little ecological value and generate ecological enhancements in the form of open space and green roof provision.

Figure 15 Proposed green roof layout

The CIQ Barking proposal will benefit from extensive provision of green roofs. Among the many recognised benefits of green and brown roofs are the increase in biodiversity through direct planting and the attraction and support of local ecological systems through the provision of habitat. The green roof specification will incorporate a mix of extensive and semi intensive roofs to maximise its biodiversity value, while not compromising the proposed provision of Photovoltaic technology on a number of the site rooftops. This will be undertaken in accordance with LBBD PAN 1 guidance.

Appendix A – Energy Statement

Buro Happold

024132 Creative Industries Quarter, Barking

Energy Statement
October 2008

Revision 01

Revision	Description	Issued by	Date	Checked
00	Draft issue for review	OMD	24/10/08	FSR
01	Final Issue	OMD	30/10/08	FSR

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author	**Oliver Martin Du Pan**
signature	
date	**30/10/08**
approved	**Fin Robertson**
signature	
date	**03/11/08**

Contents

1 Introduction

1.1 Development Commitments

The development partners are committed to a strategic approach to carbon emissions reduction in the development.

The proposed energy strategy achieve the following:

- Achieving Code for Sustainable Homes Level 4 under for the residential elements of the development;
- Achieving BREEAM 'Very Good' for all commercial elements of the scheme with a clear aspiration to achieve a BREEAM excellent rating where this is not in conflict with the broader site wide sustainable design goals;
- Achieve 10% CO_2 reduction through on-site renewable technology generating electricity where this is feasible, or provide the highest CO_2 reduction deemed possible where site specific constraints have been identified;
- Design buildings to minimise their in use carbon emissions by passive and active design measures;
- Design in the flexibility to allow for a future connection with Barking's power station, if/when it becomes operational; and
- Implement a centralised combined heat and power (CHP) engine.

2 Baseline Energy Assessment

The following section sets out estimated carbon dioxide emissions from the Barking CIQ development based on the gross floor areas within the outline planning application. The method is in line with best practice at outline planning stage.

2.1.1 Methodology

2.1.1.1 Assessment Type

At the outline planning application stage a limited amount of information is available on which to base the prediction of energy consumption. The basic information is related to gross floor area (GFA) and class of use. Using this information it is possible to make an assessment of future carbon dioxide emissions from the development, however this is subject to a significant margin of error until detailed designs are fully developed.

It should be recognised that at the detailed design stage energy assessments will be developed for each building.

2.1.1.2 Tailored Benchmarks and Part L 2006

As outlined above the energy and carbon dioxide emissions baseline assessment has been carried out using a tailored benchmark approach. Tailored benchmarks have been developed according to the method described

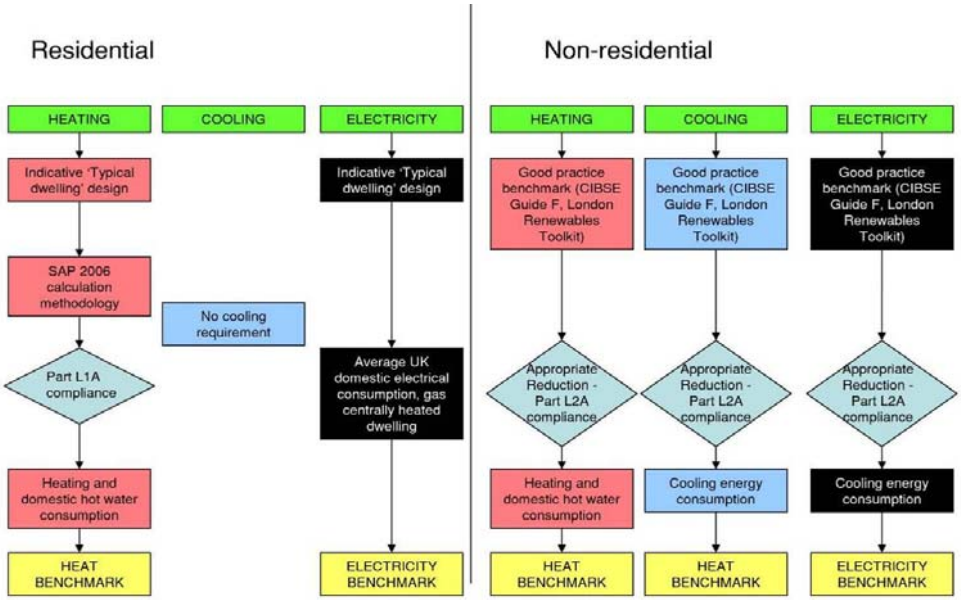


Figure 1: Adjustment method for energy consumption benchmarks for Part L 2006 compliance

in **Figure 1** for dwellings and non-dwellings.

In developing these tailored benchmarks it is important to note the following:

- The latest edition of the Chartered Institute of Building Services Engineers (CIBSE) Guide F offers the most comprehensive source of up to date energy consumption benchmarks
- The 'good practice' benchmarks published in CIBSE Guide F are considered as an upper limit for design for new buildings. At the time of publication the 2002 revision of Part L of the Building Regulations Approved Documents was applicable for new buildings.
- The 2006 revision of the Building Regulations Approved Documents represents an improvement on the 2002 Part L as follows:
- Naturally ventilated residential dwellings: 20% reduction in CO_2 emissions
- Naturally ventilated non-residential dwellings: 23.5% reduction in CO_2 emissions
- Mechanically ventilated non-residential dwellings: 28% reduction in CO_2 emissions
- In order to reflect the reduced energy consumption, and hence carbon dioxide emissions of buildings built to comply with Part L 2006 it has been necessary to adjust the benchmarks to reflect these changes.

2.1.2 Energy Consumption and Carbon Dioxide Emissions

The energy demands are calculated based on the proposed area of development and the relevant benchmarks described in the previous section. The following assumptions have been made:

- Figures are good practice benchmarks thus assuming a better than typical values performance versus 2002 benchmarks.
- Figures for the creative industries have been reduced by 28% since that it has been assumed that they were mechanically ventilated.
- The creative industries (commercials) are standard air conditioned, event though mixed mode ventilation is proposed.

Table 1 gives a breakdown of energy consumption and carbon dioxide emissions by development land use.

Table 1: Predicted energy consumption and dioxide emission for the Barking CIQ development

Section	Type	Area	Annual Heating Load	Annual Cooling Load	Annual Electrical Load	Heating and DHW	Cooling	Electricity
Block		m^2	MWh/yr	MWh/yr	MWh/yr	0.228 Tonne CO_2/MWh	0.136 Tonne CO_2/MWh	0.422 Tonne CO_2/MWh
						Tonne CO_2/annum		
C11	Parking	230.4	0	0	5	0	0	2
	Commercial	209	17	7	24	4	1	10
	Residential	2,327	186	0	92	42	0	39
C12	Parking	323	0	0	6	0	0	3
	Commercial	53	4	2	6	1	0	3
	Residential	5,169	414	0	204	94	0	86
C6/7	Parking	219	0	0	4	0	0	2
	Commercial	1,188	98	39	135	22	5	57
	Residential	3,438	275	0	135	63	0	57
C13	Parking	288	0	0	6	0	0	2
	Commercial	123	10	4	14	2	1	6
	Residential	3,281	263	0	129	60	0	55
Malthouse	Parking	57.6	0	0	1	0	0	0
	Commercial	1,464	121	48	167	28	6	70
Granary	Parking	230.4	0	0	5	0	0	2
	Commercial	1,248	103	41	142	23	6	60
Foyer/Exhibition	Parking	12	0	0	0	0	0	0
	Commercial	99	8	3	11	2	0	5
Office Extension	Parking	230	0	0	5	0	0	2
	Commercial	961	79	31	110	18	4	46
Sub Total	Parking	1,590	0	0	32	0	0	13
	Commercial	5,345	441	174	609	100	24	257
	Residential	14,215	1,137	0	560	259	0	236

2.1.3 Total Energy Consumption and Carbon Dioxide Emission Summary

Based on the broken down energy and Carbon Dioxide breakdowns in Table 1 it is possible to establish totals for the residential and commercial elements of the scheme. The results of this process can be seen Table 2 and are illustrated in Fig1 & Fig 2.

Table 2: Table energy consumption and CO_2 emissions

	Annual energy Consumption [MWh/annum]		Annual CO_2 emissions [Tonnes CO_2/annum]	
	Residential	Commercial	Residential	Commercial
Heating	1,137	441	259	100
Cooling	0	174	0	24
Electricity	560	609	236	257

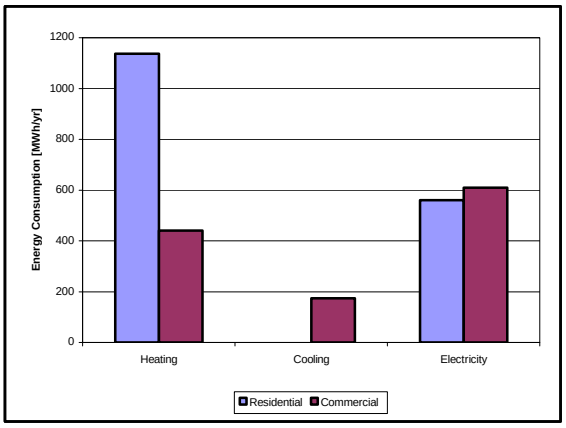


Figure 2: Annual energy consumption by type

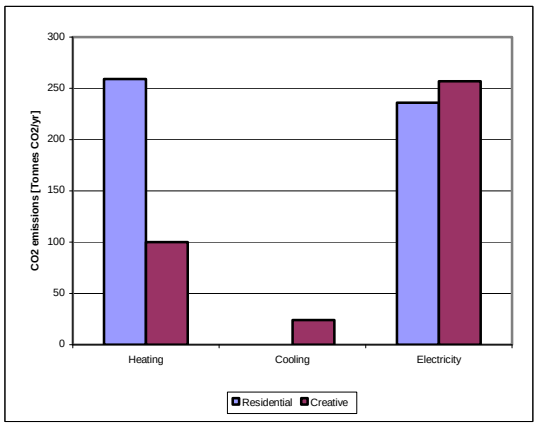


Figure 3 Annual CO2 emission distribution

3 Carbon Mitigation Strategy

3.1.1 Approach – an energy hierarchy for can mitigation

The approach to carbon mitigation in the Barking CIQ development is based on the application of the energy hierarchy shown in Fig. 4.

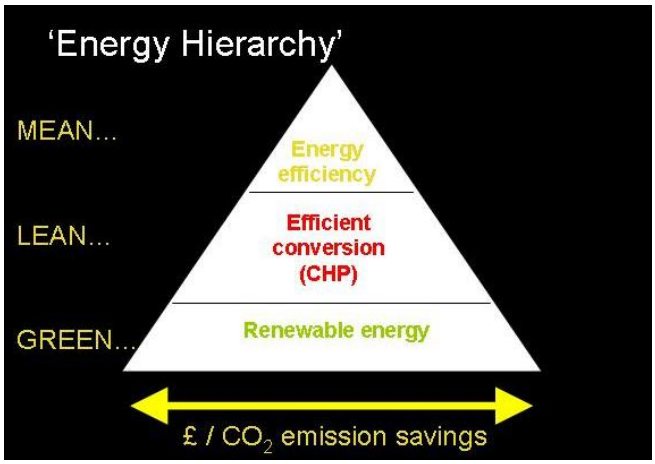


Figure 4: Energy hierarchy applied to mitigate carbon emissions in the Barking CIQ development

The energy hierarchy sets out a route to carbon mitigation and lower carbon development which ensures that the most effective measures to reduce carbon emissions are implemented first. The use of more expensive and technically complex measures for carbon mitigation are then optimised by applying them to carbon emissions which have been significantly reduced by measures higher up the energy hierarchy.

Carbon Mitigation through Energy Efficiency

The most effective measures for carbon mitigation are energy efficiency and demand reduction. Broadly these are split into passive design measures (demand reduction) and active design measures. Passive design measures include building form, massing and orientation. Often these measures are low cost as they are design driven and can be made at an early stage. Improvements to building fabric and air-tightness are other ways of reducing energy demand passively. Active design measures cover high efficiency building services equipment including: heating, lighting, cooling; building occupant equipment; building user education.

Carbon Mitigation through Efficient Conversion and Supply of Energy

Once carbon savings have been made through efficient use of energy and demand reduction measures the reduced energy consumption can be supplied through efficient distribution networks with efficient conversion of primary energy. High voltage electrical distribution and provision of energy through combined heat and power (CHP) yield significant carbon dioxide emissions.

Carbon Mitigation through Renewable Energy Supply

The final carbon mitigation technique applied in the Barking CIQ development is often the most expensive, in cost per unit carbon mitigation terms, and high profile. Supplying energy from renewable sources is an important element of the carbon mitigation approach in the Barking CIQ development but is only applied once elements higher on the energy hierarchy have been implemented. Energy and CO2 Mitigation

3.1.2 Mitigation through Passive Design

The key passive design features within the Proposed Development include:

- Enhanced U values have been adopted, which fall below the elemental maximum average values set out in Part L of the Building Regulations:
- Element U Value (W/m·K)
- Walls 0.25
- Roofs 0.14
- Floors 0.20
- Windows 1.40
- Windows will contain low-E argon filled double glazed units with a solar transmission (G value) of 0.2 (compared with 0.65 for clear double glazing)
- Balancing the ratio of glazing to solid wall so that larger glazing areas are in living rooms; and
- Air tight construction to control infiltration to below 6 $m^3/m^2/h$, well below the requirements of the 2006 Part L1 and Part L2.

As part of the energy strategy development for the development extensive work has been undertaken to optimise the thermal performance of each building in particular those elements of the scheme which are new build where wall to window ratios can be modified. The results of this study can be found in Appendix B of the Sustainability Statement.

4 Carbon Mitigation through a Combined Heat and Power (CHP) Engine

Combined heat and power (CHP) is the simultaneous on-site generation of electricity and heat in an efficient manner. It is a way of delivering energy in a more sustainable and more efficient way because of the use of waste heat inherently generated in the thermodynamic cycle for producing power that otherwise would be rejected to the environment. A preliminary CHP assessment is given in Annexe A.1.

4.1.1.1 Benefits

There are two main benefits to using CHP:

- Financial: the electricity is generated at a lower cost and closer to the end-user than imported grid supply and waste heat is used for space and hot water heating resulting in lower utility bills;
- Environmental: using the waste heat on site displaces fuel use for heating and so reduces CO_2 emissions.

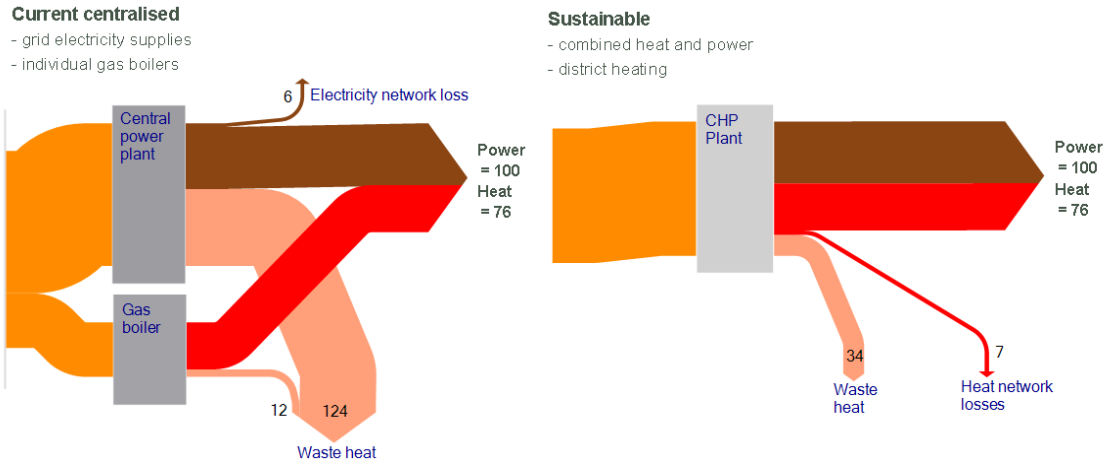


Figure 4: CHP efficiency versus conventional energy provision

4.1.1.2 Precedents

CHP is well suited to large developments with a relatively constant heat demand diversified across the day as would be expected in this case. Case study examples include swimming pool heating (e.g. Carterton Leisure Centre), large hospitals (e.g. Edinburgh Western General) and multi-use developments with well diversified loads (e.g. Nottingham University).

5 Community Heating

To gain maximum benefit from the provision of a CHP plant it is proposed that a single unit is used in combination with a district heating system to provide thermal energy, and sometimes electricity, to a series of buildings in a development. They are particularly well suited when a mixed variety of buildings with diversified loads are present in the same site enabling reductions in overall plant size to be made with subsequent cost savings.

When the CHP is powered with fossil fuel, it cannot be considered renewable energy, but an optimised and more efficient way of delivering energy; hence fitting in the "Lean" approach. CO_2 savings will be calculated on the basis of a more efficient delivery of energy.

The electricity produced by CHP systems can be used locally (e.g. private wire networks) or exported to the grid in order to contribute to the financial viability of the project.

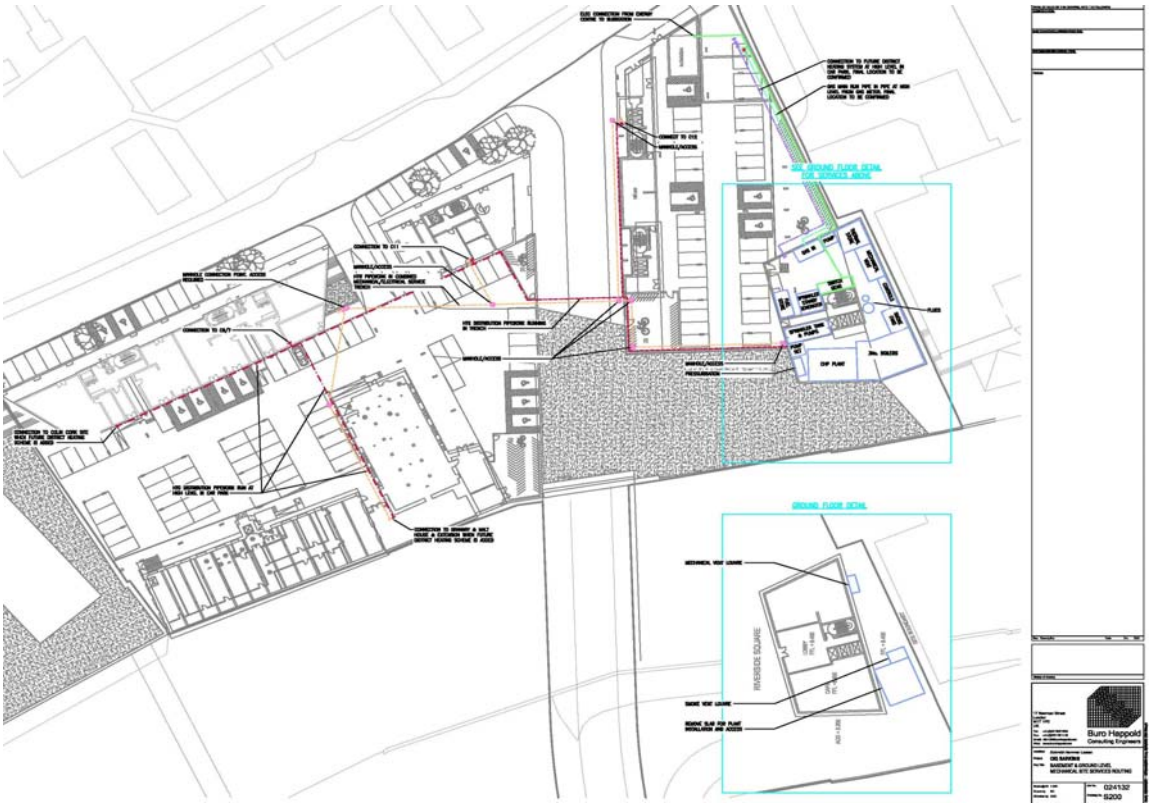


Figure 5 CIQ District heating configuration

The community heating network has been developed in accordance with LBBD's requirement for future connection to the proposed Barking community heating system. See the following section for more details. Until the Barking power plant is operational the CIQ district heating network will be serviced mainly by a 200kWe CHP which is supported by high efficiency gas boilers to deal with peak loads. It is proposed that a single CHP plant be installed as part of the first phase to ensure maximum carbon reduction for the site. While subsequent phases are being built out the CHP will be set to operate for a reduced number of hours so as to allow it to run at a higher capacity and hence efficiency.

5.1.1.1 Barking Community Heating Network

The CIQ energy centre and district heating system will be designed to allow connection to the Barking District Heating network. Provision has also been made for an additional district heating 'spur' to installed at the northern most segment of the heating network. This sour will offer the future flexibility to link the CIQ site to the Colin Cork site should it be commercially viable.

6 Renewable Options

The aim of this study is to investigate ways to reduce the carbon footprint, associated with the operational energy demand for the development, as much as possible within economic, commercial, architectural and spatial constraints. On-site renewable energy sources can be used to reduce both electricity and gas consumption.

Methods of generating 'renewable energy' are listed in the London Plan and Renewables Toolkit as follow:

- Solar hot water (solar collectors);
- Photovoltaics (a system for converting light to electricity);
- Wind turbines;
- Heating boilers or combined heat and power (CHP) plant using biomass as a fuel;
- Ground source heat pumps;
- Borehole cooling;
- Solar air heating;
- Ground cooling; and
- Micro hydro-electric schemes.

These are the systems initially considered by the design team for this development. Table 3 provides a preliminary analysis that has been used to select those technologies which it is believed could feasibly be implemented on the CIQ site.

Table 3: Pros and Cons Assessment for alternative renewable technologies

Renewable	Pros and Cons	
Solar hot water (solar collectors)	Competes with CHP engine to supply summer domestic hot water base-load. Reduces area available for green roofs (sedum)	X
Photovoltaics	Can be mounted on horizontal or vertical surface, although maximum output achieved when at angle of 25-35° to horizontal facing due south. Output 90% of max when horizontal and 70% when vertical facing due south, 56% when facing east or west. Should be free from	✔

Renewable	Pros and Cons	
	overshadowing.	
Wind turbines	Potential for integrating a number of vertical axis wind turbines on the higher roofs. Could pose a planning risk.	✔
Heating boilers or (CHP) using biomass as a fuel	Require large volumes of storage at ground floor or basement level. Supply chain for biomass fuels not well established for London, although developing rapidly. Deliveries will have impact. Very cost effective. Barking council does not want Biomass combustion on this site.	X
Ground source heat pump (GSHP)	Competes with Barking's district heating system.	X
Borehole cooling	Borehole water is used for cooling either by cooling supply air via cooling coils or by being pumped through chilled ceilings, beams or floors.	X
Solar air heating	Similar to solar panels but air is blown through collectors rather than water and used for warm air heating. Current products are designed for individual houses.	X
Ground cooling	Make-up air for ventilation is drawn through serpentine ductwork buried underground. Only suitable for small buildings with large ground area.	X
Micro hydro-electric schemes	Discussion with the Environment Agency indicates that this option cannot be taken further as the EA is concerned with snagging issues associated with locating turbines in the Roding	X

Based on the feasibility carried out above, only two technologies offered a realistic possibility of providing renewable electricity generation on the CIQ site. Following more detailed study of the wind and photovoltaic technology applied to the site, a strategy has been developed which incorporates PV technology. This strategy was formed based on the both reliability and average expected output of PV in comparison to wind turbine technology. Please see Annexe A.2 and A.3 for a preliminary photovoltaic and wind turbine study.

7 Conclusion

The carbon mitigation strategy for the CIQ Barking development will follow the Mean, Lean, Green strategy, in doing so the proposed strategy not only achieves Code Level 4 requirements for 'Energy and Carbon Dioxide Emissions(+44% CO_2 reduction), meets the LBBD requirement for a 32% improvement on Building Regulations, has facilitated a notional 22% reduction through the LBBD district heating system(once online),

Annexe A.1 CHP Assessment

7.1 A.1.1 CHP - Energy Analysis

The behaviour of a CHP engine in this site has been analysed using EnergyPro, a specialist CHP sizing tool. This software requires different input parameters such as:

- The annual heating demand (1578 MWh/yr thermal)
- The annual electricity demand (1201 MWh/yr electric)
- Weekly profiles for the energy demands
- The annual external temperature

Moreover, the CHP engine is assumed to only operate from 6 am to 11 pm and is shut down for maintenance two days per month.

Results:

The results obtained when incorporating a 200 kWe CHP engine in the system:

- CHP heating proportion factor: 78%
- Annual operating time: 4,117 hrs/annum
- Electricity generated: 824 MWh/annum
- Heat generated: 1,240 MWh/annum

This CHP engine reduces the total CO_2 emissions of 130 tonnes CO_2 per year, which corresponds to approximately 15% of the total site emission.

7.2 A.1.1 CHP Financial Analysis

Different sizes of CHP engine (100kWe to 500kWe) were modelled using specialist software based on the estimated energy demands given above. The model outputs in terms of electricity and heat generated and the gas used were then input to a financial model. The following cost / revenue assumptions were made:

- CHP capital cost ranges from £1,000/kWe for the 100 kWe to £770/kWe for the 500 kWe.
- CHP installation cost: £50,000 for all unit sizes
- CHP maintenance cost ranges from £19/MWh for the 100 MWh to £12/MWh for the 500 kWe.
- Natural gas cost: £23/MWh

- Savings from avoided electricity import costs: £100/MWh (and assuming maximum use of electricity on site, and export of the excess)
- Electricity export value: £50/MWh
- Savings from avoided heat cost (i.e. from individual domestic gas fired boilers): £55/MWh
- 1,500 kW total natural gas boilers capacity at £50 /kW
- 300 metres of district heating pipe at £1,000/m

The output of the financial modelling exercise is summarised in the graphs below.

Figure 6 1 shows how payback varies with unit size, reaching a minimum around the 150kW to 200kW scale.

Figure 7 shows how the NPV of a range of unit sizes varies with discount rate. This demonstrates again that a unit around the 200kW size would be optimum in economic terms.

Further analysis is required to refine these figures, in particular taking into account the procurement / delivery model eventually adopted as this will significantly impact the assumptions made regarding revenue/savings and cost.

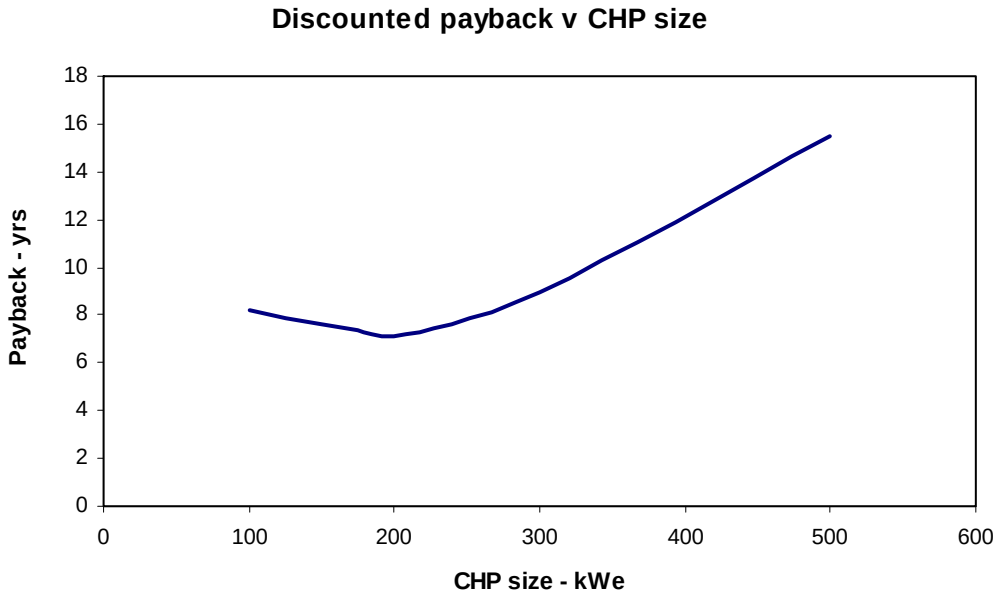


Figure 6: variation of payback with unit size (at a 10% discount rate)

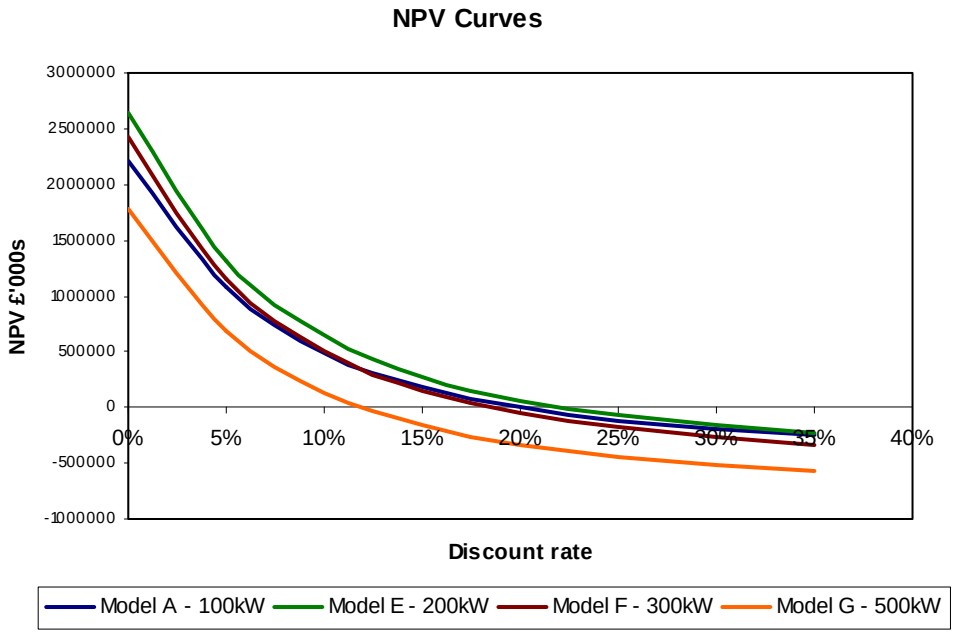


Figure 7: variation of NPV with discount rate

Annexe A.2 Photovoltaic (PV) Panels

In order to establish the potential benefit which could be gained through the provision of Photovoltaic's on the CIQ scheme, a study has been undertaken assessing usable roof area, orientation, shadow cast and efficient configuration. As shown in Fig. 7 below, PV technology is a valid technology since a large amount of PV panel may be added on the exposed roofs of the development. It has been estimated that 1400 m^2 of exposed PV panels may be installed, using the a efficient configuration.

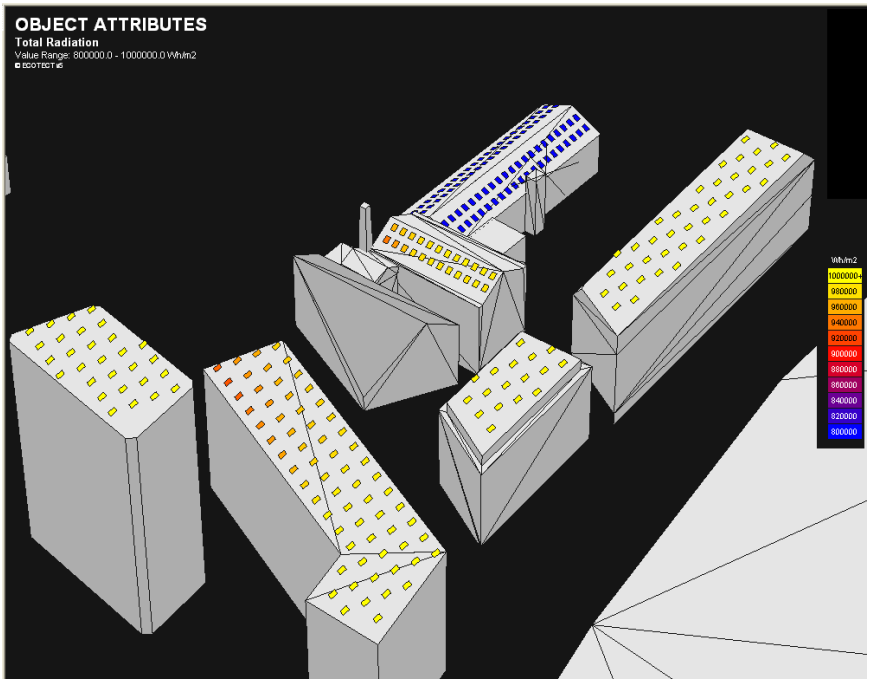


Figure 8 Ecotect analysis of Solar Insollation

These following inputs have been assumed to estimate the amount of CO_2 emission that can be saved through these PV panels.

- PV panel capacity: 101 kWh/m2/yr
- Electricity CO_2 factor: 0.422 kWh/m2/yr

The figure below gives in blue the estimated electricity demand from the development and in pink the electricity generated from the PV panels at every hour.

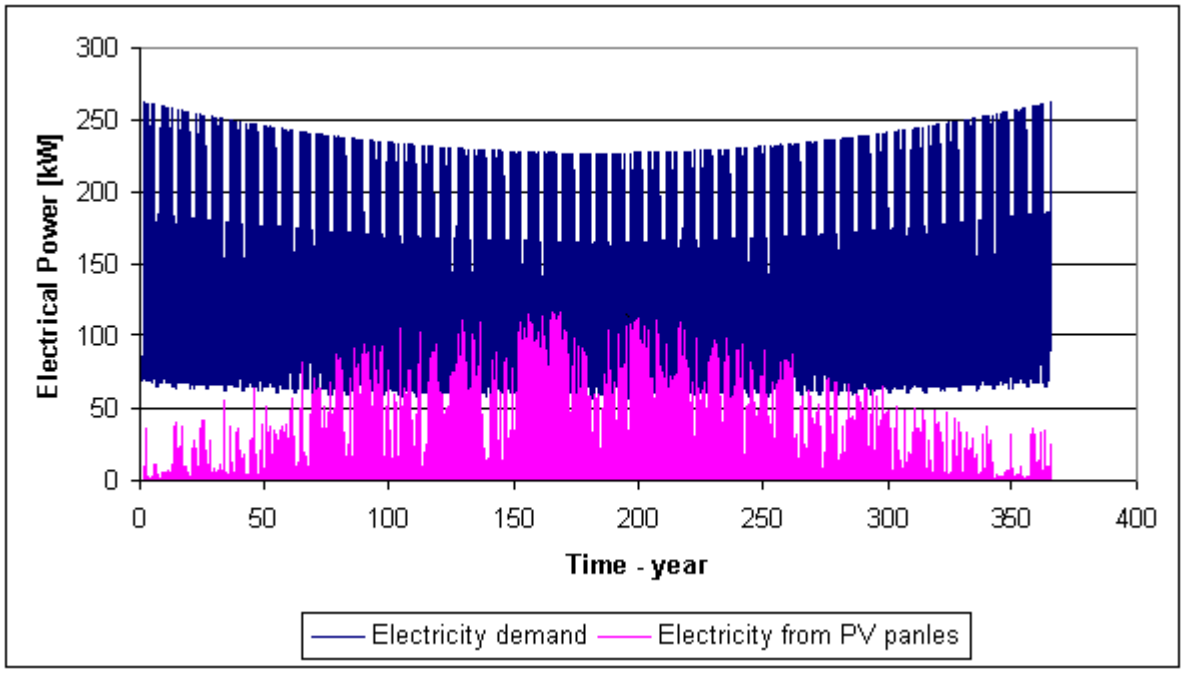


Figure 9 Energy demand Vs PV power generation

The annual electricity generated from the PV panels corresponds to 11% of the annual electricity demand from the development. Moreover, it reduces the sites CO_2 emissions of 7.5%.

Annexe A.3 Wind Turbines

In a similar study to that carried out on the potential for PV provision for the CIQ site, a study was undertaken to assess the potential for the generation of wind power. As the capacity factor on this specific site is not currently known two different calculation procedures will be established: 1) According to the London tool kit; 2) According to an existing project in Elephant & Castle.

1) According to the London Toolkit

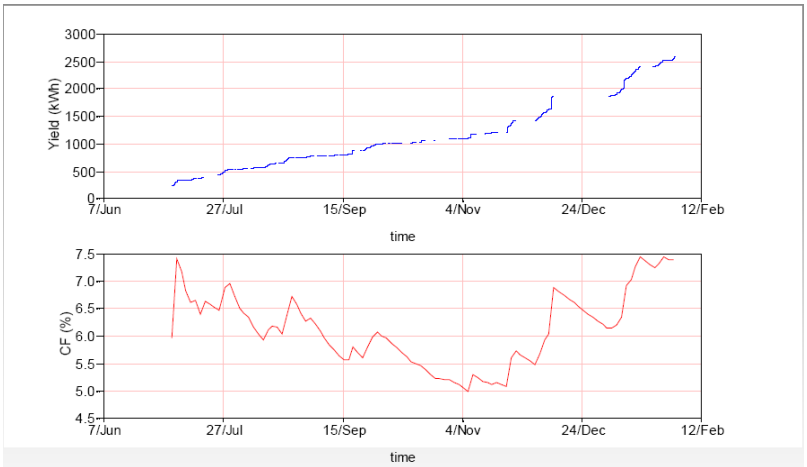
According to the London toolkit, assuming an average wind speed of 5 m/s (typical in London), the electrical yearly output for a 6kW proven wind turbine is of 11,622 kWh.

This corresponds to 11,622 [kWh/yr] * 0.422 [kg CO_2/kWh] = 4,904.5 [kg CO_2/yr].

The site's total CO_2 emissions are estimated to approximately 759 tonnes of CO_2 per year after adding a 200 kWe CHP engine. Hence, according to the London toolkit, the wind turbine reduces the CO_2 emissions of approximately 0.65%.

2) According to the Elephant & Castle Experience

As shown in the figures below, this proven turbine installed in Elephant & Castle has generated less electricity than estimated in the London toolkit.



The mean value capacity factor of this turbine is of approximately 6.25%. Assuming this value as the average capacity factor, the annual electricity generation may be calculated as:

6.25[%] * 6[kW]*24[hrs]*365[days] = 3,285 [kWh]

This corresponds to 3,285 [kWh/yr] * 0.422 [kg CO_2/kWh] = 1,386.3 [kg CO_2/yr]

Hence, according to this estimation, the wind turbine reduces the site's CO_2 emissions of approximately 0.2%.

Based on the results from the feasibility work undertaken wind power is not considered to be a practical solution to the CIQ Barkings energy needs and this option should be discounted unless no other options are available.

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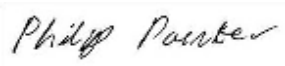
Appendix B – SAP optimisation results

DESIGN NOTE

	Barking CIQ	**Number**	**024132**
Subject	**Assumptions for Part L1 (SAP) Calculation**		
Author	Lindsey Malcolm	**Approved**	Philip Pointer
Signed		**Signed**	
Date	12/08/08	**Date**	12/08/08

1 Summary

This design note outlines the results obtained from the Standard Assessment Procedure (SAP) for a selection of dwellings in the Barking CIQ development. These calculations were undertaken in order to assess the dwelling emission rate (DER) in line with the intention to achieve compliance with Level 4 of the Code for Sustainable Homes (CSH).

As this is a preliminary study representative geometries were used to provide guideline DER values to offer an initial estimation of the requirements necessary to achieve CSH Level 4. The values detailed below are for reference only, more detailed analysis will be required as the design develops.

2 Model Detail

The models were developed based upon the assumptions previously issued [1].

The following variants were modelled in order to provide a representative sample:

- One, two & three bed flats in a corner location (two external walls)
- One & two bed flat in a terrace location (one external wall)
- Two bed flat in a terrace location (two external walls)
- One & two bed penthouse in a corner location
- One & two bed penthouse in a terrace location

The flats modelled were assumed to be located on a middle floor of the building with dwellings above and below, therefore no ground floor or roof was modelled. The penthouses however all had flat roof

[1] 080730 - Barking CIQ - Design Note - SAP Assumptions.pdf, L. Malcolm, (30/07/2008)

constructions.

Furthermore the flats modelled were generic representations of their type. In reality not all flats of the same type identified here have the same floor and external wall area.

For each flat/penthouse type two scenarios were run:

1. Base case following assumptions outlined previously
2. Increased glazing ratio from 30-35%

3 Results

The results obtained for individual dwellings are combined to provide an area-weighted DER value as is consistent with Part L1A requirements. The percentage improvement quoted below is based upon an area-weighted Target Emission Rate (TER).

1. Base case:

   AW-TER: 20.29 kg.Co_2/m^2

   AW-DER: 10.52 kg.Co_2/m^2

   Percentage Improvement: 48%

2. 35% Glazing

   AW-TER: 20.29 kg.Co_2/m^2

   AW-DER: 10.74 kg.Co_2/m^2

   Percentage Improvement: 47%

For both cases it can be seen that the improvement obtained is greater than the 44% requirement for CSH Level 4.

Appendix C – Preliminary Code for Sustainable Homes Assessment

Cat.	CSH ID	Issue	Credit Criteria	Prime DTM Responsibility	Credit Definition	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	Points Awarded (High risk of losing)	Points Awarded (Low risk of losing)	Assessment Comments / Assumptions
1. Energy/CO2	**Ene1**	Target Emission Rate (TER) as defined by 2006 Building Regulation Standards	Up to 15 credits are available where evidence provided demonstrates that the building achieves a percentage improvement above the requirement for CO2 emissions as set out in the Building Regulations.	* Buro Happold - Services - SAT	Points for percentage improvement over Building Regulations Approved Document L (2006) – Conservation of Fuel & Power; calculated using SAP:2005 . 10% : min requirement to achieve (★)	1	1.26				1.26	
					. 14%	1	1.26				1.26	
					. 18% : min requirement to achieve (★★)	1	1.26				1.26	
					. 22%	1	1.26				1.26	
					. 25% : min requirement to achieve (★★★)	1	1.26				1.26	
					. 31%	1	1.26				1.26	
					. 37%	1	1.26				1.26	
					. 44% : min requirement to achieve (★★★★)	1	1.26				1.26	**Input basic energy strategy**
					. 52%	1	1.26		1.26			
					. 60%	1	1.26					
					. 69%	1	1.26					
					. 79%	1	1.26					
					. 89%	1	1.26					
					. 100% : min requirement to achieve (★★★★★)	1	1.26					
					. a `zero carbon home' : min requirement to achieve (★★★★★★)	1	1.26	1.26				
	Ene2	Building fabric	One credit is awarded where evidence is provided to	* Buro Happold - SAT * Schmidt Hammer Lassen	Heat Loss Parameter (HLP) ≤1.3	1	1.26				1.26	Assumed target for SAP calcs to be conducted.
					Heat Loss Parameter (HLP) ≤1.1	1	1.26				1.26	
	Ene3	Internal lighting	One credit is awarded where evidence is provided to demonstrate the provision of direct sub-metering of	* Schmidt Hammer Lassen	Where the following percentage of fixed fittings are dedicated energy efficient fittings ≥40% of fittings	1	1.26				1.26	As below
					≥75% of fittings	1	1.26				1.26	See EST website for details of suppliers of fixings
	Ene4	Drying space	One credit is awarded where evidence provided demonstrates sub-metering of energy		For providing space and posts, footings and fixings for drying clothes in a secure environment for each unit on the site	1	1.26				1.26	Internal cloths drying Assumed. Ventilation fans must not be light switch controlled but controlled by humidistat.
	Ene5	Eco Labelled white goods			Information is provided on purchasing and benefits of efficient white goods, where such goods are not supplied with the new home OR Where fridges, freezers and fridge/freezers have an A+ rating under EU Energy Efficiency Labelling Scheme	1	1.26				1.26	Achievable without issue most likely using information on white goods in a Buiding Users Guide
					Where washing machines and dishwashers have an A rating and/or washer driers and tumble driers have a B rating under EU Energy Efficiency Labelling Scheme	1	1.26		1.26			
	Ene6	External Lighting	One credit is awarded where evidence provided		Where all space lighting is provided by dedicated energy efficient fittings, taking into account the needs of people who have visual impairments	1	1.26				1.26	Assumed possible
					Where all burglar security lighting is: • A maximum of 150W • Fitted with movement detecting and daylight shut-off devices Where all other security lighting is provided with energy efficient fittings and daylight shut-off devices	1	1.26				1.26	Assumed possible
	Ene7	Low or Zero Carbon Energy Technologies	One credit is awarded where evidence provided		Where at least 10% of total energy demand is supplied from local renewable or low carbon energy sources	1	1.26				1.26	As below
					Where at least 15% of total energy demand is supplied from local renewable or low carbon energy sources	1	1.26				1.26	Assumed possible pending full energy feasibilty study and excluding Barking CHP
	Ene8	Cycle Storage	One credit is awarded where evidence provided demonstrates energy efficient external luminaires are specified and all light fittings controlled for the		Where provision is made for the safe, weather-proof and secure storage of cycles as follows: • 1 and 2 bedroom dwellings – storage for 1 cycle • 3 bed dwellings – storage for 2 cycles • 4 bed dwellings and larger – storage for 4 cycles In 50% or more of dwellings in a development	1	1.26				1.26	Assuming 180 1-2Beds & 180 3&4beds we would require approx. 540 cycle stands (requires areas breakdown by dwelling/bedroom)
					In 95% or more of dwellings in a development	1	1.26		1.26			Difficult to achieve
	Ene9	Home Office	One credit is awarded where evidence provided		For the provision of a space and services which allows the occupants to set up a home office in a quiet room	1	1.26				1.26	Assumed possible
						29	36.40	1.26	3.78	0.00	25.20	
						Cat 1 has contributed			25.20	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
2. Water	Wat1	Internal potable water consumption	First Credit: One credit is awarded where evidence provided		Where predicted water consumption (calculated using the Code water calculator) accords with the following levels: <120 l/p/d : min requirement to achieve (★) and (★★)	1	1.50				1.50	
					<110 l/p/d	1	1.50				1.50	A range of low water consumption appliances such as dual flush toilets, aerated shower heads/ sub 149ltr baths and white goods/white good selection information & possibly requiring some greywatw
					<105 l/p/d : min requirement to achieve (★★★) and (★★★★)	1	1.50				1.50	
					<90 l/p/d	1	1.50					
					<80 l/p/d : min requirement to achieve (★★★★★) and (★★★★★★)	1	1.50					
	Wat2	External non-potable water consumption	Up to ten credits are available on the basis of net		For providing a system to collect rain water for use in external irrigation/watering e.g. water butts	1	1.50		1.50			
						6	9.00	0.00	1.50	0.00	4.50	
						Cat 2 has contributed			4.50	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
3. Materials	Mat1	Environmental impact of materials			min requirement to achieve (★): At least three of the following 5 key element of construction are specified to achieve a BRE Green Guide 2006 rating of at least D – Roof structure and finishes – External walls – Upper floor – Internal walls – Windows and doors	Req	Req				Done	See below
	Mat1	Environmental impact of materials	Up to four credits are available where evidence provided demonstrates that		Where the total building points achieved under the CSH materials calculator is as follows: • Score of at least 3 points	3	0.90				0.90	Specification to be developed during detailed design. Assumed more than two A rated materials based on basic structural elements.
					• Score of at least 6 points	3	0.90				0.90	
					• Score of at least 9 points	3	0.90		0.90			
					• Score of at least 12 points	3	0.90		0.90			
					• Score of 15 points Scores are achieved as follows for each of the specifications: • A+ rating = 3 • A rating = 2 • B rating = 1 • C, D or E = 0 Scores achieved for each of the following elements are added to give the total building score: • Roof • External Walls • Internal Walls (incl. party walls and partitions) • Floors – upper and ground floors • Windows	3	0.90		0.90			
	Mat2	Responsible sourcing of materials – basic elements	One credit is awarded where evidence provided demonstrates that		Where materials used in keybuilding elements are responsibly sourced (e.g. timber certification, EMS etc.) Between 0.3 points and 1.8 points (for details see Technical Guidance Manual)	6	1.80		0.60	1.20		
	Mat3	Responsible sourcing of materials – finishing elements	One credit is awarded where evidence provided demonstrates that		Where materials used in secondary building and finishing elements are responsibly sourced (e.g. timber certification, EMS etc.) Between 0.3 Points and 0.9 Points (for details see Technical Guidance Manual)	3	0.90		0.60	0.30		
						24	7.20	0.00	3.90	1.50	1.80	
						Cat 3 has contributed			3.30	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
4. Surface Water	Sur1	Reduction of surface water run-off from site			min requirement to achieve (★): Ensure that peak run-off rates and annual volumes of run-off will be no greater than the previous conditions for the development site	Req	Req				Done	Must be achieved will require attenuation system if scheme results in a net increase in hard standing
			Up to three credits can be awarded on the basis of the predicted potable		Where rainwater holding facilities/sustainable drainage (SUD) is used to provide attenuation of water run-off to either natural water courses or municipal systems. • Hard surfaces	1	0.55		0.55			Refer to EA guidance on SUDS initiatives. Possible rainwater attenution tanks to accomadate hard standing run off.
					• Roofs The percentage peak time attenuation should be provided as follows • 50% in low flooding risk areas • 75% in medium flooding risk areas • 100% in high flooding risk areas	1	0.55			0.55		As above - Green roof provision unlikley due to energy strategy including PVs. Could incorporate rainwater collection.
	Sur2	Flood risk	Up to three credits can be awarded on the basis of the predicted potable water consumption for sanitary use within the building.		Where evidence is provided to demonstrate that the assessed development is located in an area of • medium/high annual probability of flooding (subject to plans being approved by the relevant statutory bodies) and where • the ground level of buildings, car parks and access routes are above the flood level; • an appropriate assessment of how the building will react to flooding (including the use of resilient construction where necessary) to mitigate residual risk	1	0.55			0.55		Refer to EA guidance
					• low annual probability of flooding	1	0.55	0.55				
						4	2.20	0.55	0.55	1.10	0.00	
						Cat 4 has contributed			1.10	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
5. Waste	Was1	Household Waste Storage & Recycling Facilities			min requirement to achieve (★): Where there is adequate space for the containment of waste storage for each dwelling. This should allow for the greater (by volume) of the following EITHER accommodation of all external containers provided under the relevant Local Authority refuse collection/recycling scheme. Containers should not be stacked to facilitate ease of use. They should also be accessible to disabled people particularly wheelchair users and those with a mobility impairment OR at least 0.8m3 per dwelling for waste management as required by BS 5906 (Code of Practice for Storage and On-site Treatment of Solid Waste from Buildings)	Req	Req				Done	Achieved through provision of necessary space for storage of domestic waste (as per measurement criteria).
			Up to three credits available, depending on the dry NOx emissions from delivered space heating		Where the following recycling facilities are provided: • 3 internal storage bins for recyclable waste with – min total capacity of 60ltr – no individual bin smaller than 15ltr – all bins in a dedicated position that is accessible to disabled people	2	1.83				1.83	As above & below
					Where full recycling facilities are provided: • 3 internal storage bins with – min total capacity of 30ltr – no individual bin smaller than 7ltr – all bins in a dedicated position that is accessible to disabled people AND EITHER A Local Authority collection scheme for recyclable materials covering at least three streams of waste with sufficient space for the storage of the bins provided without stacking (within 10m of an external door) and which is accessible to disabled people OR Where there is not a Local Authority collection scheme for recyclable materials, 3 external bins with: – min total capacity of 180ltr – no individual bin smaller than 40ltr • All bins to be in a dedicated position (within 10m of an external door), which is accessible to disabled people	2	1.83				1.83	Full recycling facilities provided for domestic elements of the scheme
	Was2	Construction waste			min requirement to achieve (★): Ensure there is a site waste management plan in operation which requires the monitoring of waste on site and the setting of targets to promote resource efficiency	Req	Req				Done	Achieved through Construction EMS or DCMP which incorporates monitoring
			First Credit: One credit is awarded where evidence provided		Where the site waste management plan includes procedures and commitments that minimise waste generated on site in accordance with WRAP/Envirowise guidance	1	0.91				0.91	As per criteria
					Where the above is achieved and the plan includes procedures and commitments to sort, reuse and recycle construction waste either on site or through a licensed external contractor	1	0.91			0.91		As per criteria
	Was3	Composting facilities	Two credits are awarded where evidence provided demonstrates that the assessed development is situated in a flood		Where home composting facilities are provided in houses with gardens or a communal/community composting service provided in other dwelling types suitable for normal domestic non-woody garden, food and other compostable household wastes. Account should be taken concerning the accessibility of these facilities to disabled people	1	0.91		0.91			It is thought unlikley that the proposed mix of highrise domestic buildings and space utilisation will allow the 'Composting' criteria to be met. Further discussion required with LB Barking
						7	6.40	0.00	0.91	0.91	4.57	
						Cat 5 has contributed			5.48	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
6. Pollution	Pol1	Global warming potential (GWP) of insulant	Where evidence provided demonstrates the use of refrigerants with a global warming potential (GWP) of less than 5 or where there are no refrigerants		Where all insulating materials avoid the use of substances that have a global warming potential (GWP) of 5 or more (and an Ozone Depleting Potential of zero) in either their manufacture or composition for the following elements • Roof (including loft access) • Walls internal and external (including doors, lintels and all acoustics insulation) • Floor (including foundations) • Hot water cylinder, pipe insulation and other thermal stores	1	0.70				0.70	As per criteria
	Pol2	Nitrous Oxide (NOx) emissions	Up to three credits available, depending on the dry NOx emissions from delivered space heating energy:		Where NOx emissions from any space heating and hot water systems accord with the following EITHER Dry NOx level <=100mg/KWh OR Boiler class 4 under BS EN 297:1994 Between 0.5 points and 2 points (for details see Technical Guidance Manual)	3	2.10	2.10				Unlikley due to high Nox leves associated with CHP units
						4	2.80	2.10	0.00	0.00	0.70	
						Cat 6 has contributed			0.70	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
7. Health & Wellbeing	Hea1	Daylight	One credit is awarded where evidence provided demonstrates that at least 80% of net lettable office floor area is		Homes must meet the following standards before points can be awarded: • Kitchen to achieve minimum average daylight factor of at least 2% • Living rooms, dining rooms and studies to achieve a minimum average daylight factor of at least 1.5% • Kitchens, living rooms, dining rooms and studies to be designed to have a view of the sky	3	3.50			1.30		1 credits awarded for achievment of required ADF in living areas. Although some kitchens are also anticipated to meet the criteria this is unlikey to be undiform throughout the scheme, equally it is unliklyVOS component will be achievable due to site layout.
	Hea2	Sound insulation	One credit is awarded where evidence provided demonstrates that all desks are within a 7m radius of a		Points are awarded for achieving higher standards of sound insulation than required by Part E of the Building Regulations, and demonstrating it by either using post-completion testing (PCT) or Robust Details (RD) • Between 1 and 4 points (for details see Technical Guidance Manual)	4	4.67				1.17	Acieved by performing a greater number of sound & reverberation tests than rerquired by Part E, which indicaticate compliance with the performance requirements of Part E
	Hea3	Private space			For the provision of outside space that is at least partially private, and that is accessible to disabled people	1	1.17		1.17			It is thought unlikley that the proposed mix of highdensity domestic buildings and space utilisation will allow the Private space criteria to be met.
	Hea4	Lifetime Homes	One credit is awarded where evidence provided demonstrates that an occupant controlled glare control system (e.g. internal or		Where all the standards of Lifetime Homes have been complied with, that is: • access to the dwelling (Standards 1-5); • general standards of accessibility within the dwelling (Standards 6-7, 11, 14, 15 and 16); • potential future adaptability of the dwelling (Standards 8, 9, 10, 12 and 13)	4	4.67				4.67	May be required by LB Barking
						12	14.00	0.00	1.17	1.30	5.84	
						Cat 7 has contributed			7.14	of the	68.05	points awarded overall

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
8. Management	**Man1**	Home User Guide	First credit: Where evidence provided demonstrates that an appropriate project team member has been appointed to		Where there is provision in each home of a simple user guide that covers information relevant to the 'non-technical' tenant/occupant on the operation and environmental performance of their home, together with information that the user guide is available in alternative accessible formats	2	2.22				2.22	As per criteria
					Where the guide also covers information relating to the site and its surroundings	1	1.11				1.11	As per criteria
	Man2	Considerate Constructors Scheme	First credit: Where evidence provided demonstrates that		Where there is a commitment to comply with best practice site management principles and a regular audit under a nationally or locally recognised independent certification scheme such as or comparable to the Considerate Contractors Scheme	1	1.11				1.11	As per criteria
					Where the commitment is to go significantly beyond best practice including a regular audit under a nationally or locally recognised independent certification scheme such as, or comparable to, the Considerate Contractors Scheme	1	1.11				1.11	As per criteria
	Man3	Construction site impacts	First credit: Where evidence provided demonstrates that there is a commitment to comply with best practice site management		Where there is a commitment and strategy to operate site management procedures on site that cover **2 or more** of the following items: • CO2 or energy arising from site activities • CO2 arising from transport to and from site • Water consumption arising from site activities • Best practice air pollution controls • Best practice water pollution controls • 80% of site timber is reclaimed, reused or responsibly sourced	1	1.11				1.11	Assume as a minimum: • CO2 or energy arising from site activities • CO2 arising from transport to and from site • Best practice air pollution controls • Best practice water pollution controls
					Where there is a commitment as above that covers **4 or more** of the items listed	1	1.11				1.11	As above.
	Man4	Security			Points are achieved by complying with 'Secured by Design – New Homes' (Section 2: Physical Security). This will include working closely with an Architectural Liaison Officer or Crime Prevention Design Advisor from the local Police Force	2	2.22				2.22	As per criteria
						9	10.00	0.00	0.00	0.00	9.99	
						Cat 8 has contributed		9.99	of the	68.05	points awarded overall	

Cat.	Issue ID	Issue	Credit Criteria		Measurement Criteria	Max. possible credits	Max. possible points	Points we can't get	Points we haven't got but could gain	High risk of losing	Low risk of losing	Assessment of Work
9. Ecology	**Ecol1**	Ecological value of site	One credit is awarded where evidence provided demonstrates that the footprint of the proposed development		Where development land is of low ecological value as defined by either • The BRE Ecological Value Checklist OR • A report prepared by a suitably qualified ecologist OR Where a suitably qualified ecologist confirms that the site will remain undisturbed by the works	1	1.33				1.33	Existing site is largely hard standing or built structure which should meet BRE criteria for 'Low Value'. See RH
	Ecol2	Ecological enhancement	One credit is awarded where evidence provided demonstrates that		Where ecological features have been designed for positive enhancement in accordance with the recommendations of a suitably qualified ecologist	1	1.33				1.33	Advice will be sort from EAD consultants in order to achieve ecological enhancement on soft landscaping elements
	Ecol3	Protection of ecological features	One credit is awarded where evidence provided demonstrates that the construction		Where all existing features of ecological value are maintained and adequately protected from damage during site preparation and construction works	1	1.33				1.33	Ecological Feautres will be protected as per project Demolition and Contruction Management Plan (DCMP), designed to meet this criteria.
	Ecol4	Change of ecological value of site	First Credit: One credit is awarded where evidence provided demonstrates the change in		Where the resulting change in ecological value is as follows calculated using the Code Change (see Technical Guidance Manual for details) in Ecological Value Calculator • Minor negative change (-9 to -3)	1	1.33				1.33	Advice will be sort in order to achieve ecological enhancement on soft landscaping elements>Ecology report indicates that where all recommedation are adopted a postive enhancment of the site will result.
					• Neutral (<-3 to +3)	1	1.33				1.33	As above
					• Minor enhancement (<+3 to +9)	1	1.33			1.33		As above
					• Major enhancement (>+9)	1	1.33					As above
	Ecol5	Building footprint	First Credit: One credit is awarded where evidence provided		Where the total combined floor area: footprint ratio for all houses on the site is greater than 2.5:1; and Where the total combined floor area: footprint ratio for all flats on the site is greater than 3.5:1	1	1.33				1.33	As per criteria
					Where the total combined floor area: footprint ratio for all dwellings on the site is greater than 3.5:1	1	1.33				1.33	Anticipated that domestic building will be greater than four storeys
						9	12.00	0.00	0.00	1.33	9.31	
						Cat 9 has contributed		10.64	of the	68.05	points awarded overall	

Appendix D – Preliminary BREEAM Assessment

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		Credit Title	Credit Criteria	Owner	Available Credits	Allocated Credits	Possible Additional Credits	Action / Comments
Management	M1	Commissioning	**First credit:** Where evidence provided demonstrates that an appropriate project team member (commisioning agent) has been appointed to monitor commissioning on behalf of the client to ensure commissioning will be carried out in line with current Building Regulations and (where applicable), best practice. **Second Credit:** Where evidence provided demonstrates that seasonal commissioning will be carried out during the first year of occupation, post construction (or post fit out).	LTGC	2	2	-	Specialist Agent to be used for commisioning
	M4	Considerate Constructors	**First credit:** Where evidence provided demonstrates that there is a commitment to comply with best practice site management principles. **Second credit:** Where evidence provided demonstrates that there is a commitment to go significantly beyond best practice site management principles.	LTGC	2	2	-	Specialist Agent to be used for commisioning
	M5	Construction Site Impacts	Up to four credits are awarded where established good practice is adopted on site in line with the BREEAM Construction Site Impacts Checklist A3. Use the BREEAM calculators to determine the number of credits achieved	LTGC	4	3	1	Target of 32 point set for the CSS program
	M12	Building Users Guide	One credit is awarded where evidence provided demonstrates the provision of a simple guide that covers information relevant to the tenant/occupants and non-technical building manager on the operation and environmental performance of the building.	SHL	1	1	0	A building user guide will be produced as per BREEAM guidance
Health & Wellbeing	HW1	Daylighting	One credit is awarded where evidence provided demonstrates that at least 80% of net lettable office floor area is adequately daylit.	SHL	1	0	0	Unlikley to achieve due to window sizes on the re-use building facades.
	HW2	View Out	One credit is awarded where evidence provided demonstrates that all desks are within a 7m radius of a window.	SHL	1	1	0	View out likley to be achieved in the majority of required spaces.
	HW3	Glare Control	One credit is awarded where evidence provided demonstrates that an occupant controlled glare control system (e.g. internal or external blinds) is fitted.	SHL	1	1	0	Glare control to be added on allrequired windows
	HW4	High Frequency Lighting	One credit is awarded where evidence provided demonstrates that high frequency ballasts are installed on all fluorescent and compact fluorescent lamps.	BH	1	1	0	High frequency to be specified whereever possible
	HW5	Internal and external lighting levels	One credit is awarded where evidence provided demonstrates that all internal and external lighting, where relevant, is specified in accordance with the appropriate maintained illuminance levels (in lux) recommended by CIBSE.	BH	1	1	-	Internal & external lighting to be designed to CIBSE standards to be specified whereever possible
	HW6	Lighting Zones	One credit is awarded where evidence provided demonstrates that lighting, in all occupied areas, is zoned to allow separate control.	BH	1	1	0	Lighitng will be zoned to maxiimise user comnfort.
	HW8	Potential for Natural Ventilation	One credit is awarded where evidence provided demonstrates that external façade windows to all occupied areas are openable and at least on opposite sides for accommodation over 7m deep. The openable area should be equivalent to 5% of the gross floor area of the building. This should have an even distribution across the office area so as to promote adequate cross ventilation.	BH	1	0	-	Provsion for 'Natural ventilation' will be made whereever possible however unlikley to be achieved uniformly across the various building use types, in particular the refurbished elements of the scheme, as such the credit cannot be awarded.
	HW9	Internal air pollution	One credit is awarded where evidence provided demonstrates that air intakes serving occupied areas avoid major sources of external pollution and recirculation of exhaust air.	BH	1	1	0	Intake and extracts to be appropriately spaced in order to avoid indoor air pollution.
	HW11	Ventilation Rates	One credit is awarded where evidence provided demonstrates that each space within the development achieves recommended minimum fresh air rates	BH	1	1	0	Ventilation rates will be design as per CIBSE best practise.
	HW14	Thermal Comfort	One credit is awarded where evidence provided demonstrates that thermal comfort levels are assessed at design stage, this is used to evaluate appropriate servicing options, and appropriate thermal comfort levels are achieved.	BH	1	1	1	Thermal Comfort has been modelled through the project in order to establish optimum occupant comfort conditions
	HW15	Thermal Zoning	One credit is awarded where evidence provided demonstrates that local control is available for temperature adjustment in each area to reflect differing load requirements.	BH	1	1	0	Thermal controls will be designed to allow occupants comntrol over thermal conditions in individual areas.
	HW16	Microbial Contamination	One credit is awarded where evidence provided demonstrates that the risk of waterborne and airborne legionella contamination has been minimised. AND One credit is awarded where evidence provided demonstrates that no humidification is present , or only steam humidification is provided.	BH	1	1	0	All wet systems designed to minimise the risk of microbial contamination.
	HW17	Acoustic Performance	Where evidence provided demonstrates that the building design can be shown to achieve indoor ambient noise levels that fall within the following ranges in occupied offices: a) 35-40dB LAeqT in small offices b) 40-45dB LAeqT in medium offices c) 45-50dB LAeqT in large offices	BH	1	0	1	BH Acoustician confirmed that additional work requird to assess lower limit. RFP issued to go to DW

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		Credit Title	Credit Criteria	Owner	Available Credits	Allocated Credits	Possible Additional Credits	Action / Comments
Energy	E01	Reduction of CO2 emissions	Up to 15 credits are available where evidence provided demonstrates that the building achieves a percentage improvement above the requirement for CO2 emissions as set out in the Building Regulations.	BH	15	6	0	Part L calculation indicate that CO2 likley to improve on building regulaitons by approx 23%
	E02	Sub-metering of Substantial Energy Uses	One credit is awarded where evidence is provided to demonstrate the provision of direct submetering of substantive energy uses within the building.	BH	1	1	0	Provision will be made for sub metering of substantive energy uses.
	E03	Sub-metering of Areas/Tenancy	One credit is awarded where evidence provided demonstrates sub-metering of energy use by tenancy/areas is installed within the building.	BH	1	1	-	Provision will be made for sub metering of any individual tenant areas.
	E04	External Lighting	One credit is awarded where evidence provided demonstrates energy efficient external luminaires are specified and all light fittings controlled for the presence of daylight.	SHL	1	1	0	External lighting will be designin as per CIBSE best practise.
Transport	T1	Provision of Public Transport	**First Credit:** One credit is awarded where evidence provided demonstrates good access is available to and from public transport networks for commuting. **Second Credit:** One credit is awarded where evidence provided demonstrates there is good access to and from public transport networks for business travel.	SHL	2	0	0	As part of the scheme a additional public transport linkages are being designed in association with TFL. It is not known at this time what services will be therfore no credit can be awarded.
	T2	Transport CO2	Up to ten credits are available on the basis of net CO2 emissions resulting from commuting.	SHL	10	8	0	Based on provisoin of only 26 car parking spaces 4 credits can be awarded.
	T5	Cyclist Facilities	**First credit:** Where evidence provided demonstrates that there is adequate provision of covered, secure and well lit cycle racks and showers. **Second credit:** Where in addition to the above, evidence provided demonstrates adequate provision of changing facilities and lockers for clothes or a dedicated drying space for wet clothes.	SHL	2	2	0	Provision of cyclist parking and showers along with locker facilites means two credits can be awarded
	T8	Travel Plan	One credit is awarded where evidence provided demonstrates that a travel plan has been developed and tailored to the specific needs of the users of the assessed development.	SHL	1	1	0	The production of a travel plan which considers various means of transport will allow credit to be awarded
Water	W1	Water Consumption	Up to three credits can be awarded on the basis of the predicted potable water consumption for sanitary use within the building.	SHL	3	2	0	Use of low flow fittings and rainwater harvesting for WC will result in a water usage of approx 3.13m3/person/year which results in 2 credits.
	W2	Water Meter	One credit is awarded where evidence provided demonstrates that a water meter with a pulsed output will be installed on the mains supply to each building.	BH	1	1	0	Provision of water meter will enable the credit to be achieved
	W3	Major Leak Detection	One credit is awarded where evidence provided demonstrates that a leak detection system is specified or installed and is capable of identifying major leaks both within the building and between the building and the site boundary, and should cover all mains water supplies to the building.	BH	1	1	1	Diffiucult to achieve using the Granary and Malthouse buildings.
	W4	Sanitary Supply Shut Off	One credit where evidence provided demonstrates that proximity detection shut off is provided to the water supply to all urinals and WC's.	BH	1	1	0	Sanitary shut off will be supplied to reduce the risk of water leakage
Materials & Waste	MW1	Materials Specification - Major Building Elements	Up to four credits are available where evidence provided demonstrates that the major building elements specified have an 'A rating', as defined in the Green Guide to Specification.	SHL	4	1	1	Based on the current materials specification it should be possible to achieve at least one credit for internal partitioning. The re-use of large amount of the buildings envelope makes achjievment of other credits difficult.
	MW3	Floor Finishes	One credit is awarded where evidence provided demonstrates that carpets and other floor finishes are specified by the future occupant or, in tenant areas of speculative buildings, where carpets or floor finishes are installed in a limited show area only.	SHL	1	1	0	Credit achieved
	MW5	Reuse of Building Façade	One credit is awarded where evidence provided demonstrates that at least 50% of the total façade (by area) is reused and at least 80% of the reused façade (by mass) comprises in-situ reused material.	SHL	1	1	-	Fascade is being re-used hence it is likley to achieve the requirments of the credit.
	MW6	Reuse of Building Structure	One credit is awarded where evidence provided demonstrates that a design reuses at least 80% of an existing primary structure and for part refurbishment and part new build, the volume of the reused structure comprises at least 50% of the final structure's volume.	SHL/BH	1	1	-	As above
	MW7	Recycled Aggregates	One credit is awarded where evidence provided demonstrates significant use of crushed aggregate, crushed masonry or alternative aggregates (manufactured from recycled materials) are specified for 'high grade' aggregate uses (such as the building structure, ground slabs, roads, etc.).	BH	1	0	-	Difficult to achive 30% crteria to to site constraints
	MW8	Responsible Sourcing of Materials	Up to three credits are awarded where evidence provided demonstrates materials used in structural and non-structural elements are responsibly sourced.	SHL	3	1	-	Responsible sourcing of materials being investigated. No data available at the time of assessment
	MW12	Storage of Recyclable Waste	One credit is awarded where evidence provided demonstrates that a central, dedicated storage space is provided for materials that can be recycled. This can be either within the building itself, or on site using skips, (provided there is good access for collections and it is within easy reach of the building).	SHL	1	1	0	Recycling storage to be provided as per BREEAM and LA requirment

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Land Use & Ecology	LE1	Reuse of Land	One credit is awarded where evidence provided demonstrates that the footprint of the proposed development largely falls within the boundary of land previously developed.	SHL	1	1	0	Reuse of site will allow the credit to be achieved
	LE2	Contaminated Land	One credit is awarded where evidence provided demonstrates that the land used for the new development has, prior to development, been defined as contaminated, and where adequate remedial steps have been taken to decontaminate the site prior to construction.	BH	1	1	0	It is likley that some cotamination will need to be treated therfore the credit canbe awarded.
	LE3	Ecological Value & Protection of Eco Features	One credit is awarded where evidence provided demonstrates that the construction zone is defined as land of low ecological value and all existing features of ecological value will be fully protected from damage during site preparation and construction works.	EDP	1	1	0	Vaue of land has been assessed as low by EDP Ecologists
	LE4	Mitigating Ecological Impacts	**First Credit:** One credit is awarded where evidence provided demonstrates the change in ecological value of the site, as a result of development, is less than zero and equal to, or greater than, minus nine species, i.e. a small negative change. **Second Credit:** Once credit is awarded where evidence provided demonstrates there is no negative change in the ecological value of the site as a result of development, i.e. equal to, or greater than, zero species.	EDP	2	2	0	Mitigation steps will be implemented to miniminse environmental impact in order to ensure no negative change to overall ecological value results from the redevelopment of the Malthouse and Granary elements of the CIQ site
	LE5	Enhancing Site Ecology	**First Credit:** One credit is awarded where evidence provided demonstrates that the design team (or client) has I) appointed a professional to advise & report on enhancing / protecting site ecology; and ii) implemented the professional's recommendations for enhancement / protection. **Additional credits:** Up to two credits are awarded where in addition to the above, evidence provided demonstrates a positive increase in the ecological value of the site.	EDP	3	2	0	2 credits can be awarded based on the appointement of a suitably qualified ecologist who has informed the landscape strategy and the implementation of the ecologists recommendations. It is believed that a further credit could be awarded pending the detailed development of the site landscape plan.
	LE6	Long Term Impact on Biodiversity	**First Credit:** One credit is awarded where evidence provided demonstrates that the client has committed to achieving the mandatory requirements and at least two of the additional requirements as listed in the credit Compliance Requirements. **Second Credit:** One credit is awarded where evidence provided demonstrates that the client has committed to achieving the mandatory requirements and at least four of the additional requirements as listed in the credit Compliance Requirements.	EDP	2	2	0	Unlikeley that those areas on the site selected for biodiversity enhancment will be under the control of tenants within the commercial spaces
Pollution	P1	Refrigerant GWP - Building Services	Where evidence provided demonstrates the use of refrigerants with a global warming potential (GWP) of less than 5 or where there are no refrigerants specified for use in building services.	BH	1	1	0	Refrigerant GWP will be < 5
	P2	Preventing Refrigerant Leaks	**First Credit:** One credit is awarded where evidence provided demonstrates that refrigerant leaks can be detected or where there are no refrigerants specified for use in the building or development. **Second Credit:** One credit is awarded where evidence provided demonstrates that the provision of automatic refrigerant pump down is made to a heat exchanger (or dedicated storage tanks) with isolation valves or where there are no refrigerants specified for the development.	BH	2	0	1	Refrigerant leak detection being investigated , difficult to achieve if feasible do to limited supply of required plant.
	P4	Insulant GWP	One credit is awarded where evidence provided demonstrates that the specification of insulating materials avoids the use of substances with a global warming potential (GWP) of 5 or more in either manufacture or composition	SHL	1	1	0	All insulation materials to be of low GWP and zero ODP
	P6	NOx Emissions of Heating Source	Up to three credits available, depending on the dry NOx emissions from delivered space heating energy: 1 credit where dry NOx emissions are 100 mg/kWh (at 0% excess O2); 2 credits where dry NOx emissions are 70 mg/kWh (at 0% excess O2); 3 credits where dry NOx emissions are 40 mg/kWh (at 0% excess O2).	BH	3	0	0	BH to re-confirm Nox levels of proposed CHP unit, unlikley to meet criteria
	P7	Flood Risk / Water Run-off	Two credits are awarded where evidence provided demonstrates that the assessed development is situated in a flood zone that is defined as having a low annual probability of flooding. OR One credit is awarded where evidence provided demonstrates that the assessed development is located in a zone defined as having a medium annual probability of flooding and the ground level of the building, car parking and access is above the design flood level for the site's location. Additional credit:	BH	3	0	0	Designs to mitigate possible possible impact of flooding from river rioding unable to include all carpark areas therefore no credit can be awarded.
	P8	Minimising Water Course Pollution	One credit is awarded where evidence provided demonstrates that on site treatment such as separators/interceptors or filtration have been specified for areas at risk from pollution, i.e. manoeuvring areas, car parks, waste disposal facilities, delivery facilities or plant areas.	BH	1	1	-	SUDs measure will be implemeted where feasible
	P11	Renewable & Low Emission Energy	**First Credit:** Once credits is awarded where evidence provided demonstrates that a feasibility study considering renewable and low emission energy has been carried out and the results implemented. **Additional Credits:** Up to two credits are awarded where the first credit is achieved and where evidence provided demonstrates that a percentage of total energy demand for the building/development is supplied from local renewable, or low emission energy, sources.	BH	3	3	0	Renewable energy initiatives likley to reduce the site CO2 by in excess of 20%
	P12	Reduction of night time light pollution	One credit is awarded where evidence provided demonstrates that the external lighting design is in compliance with the guidance in the Institution of Lighting Engineers (ILE) Guidance notes for the reduction of obtrusive light, 2005.	SHL	1	1	0	All external lighting to be designed as per ILE guidelines

Preliminary Stage	
69.69	Points
VERY GOOD	Rating

	Unachievable - no further consideration required
	Additional Credits Available (Preliminary)
	All Credits Achieved / No further credits possible (Preliminary)
	Achieving target
	Not achieving target
	Proposed Enhancement

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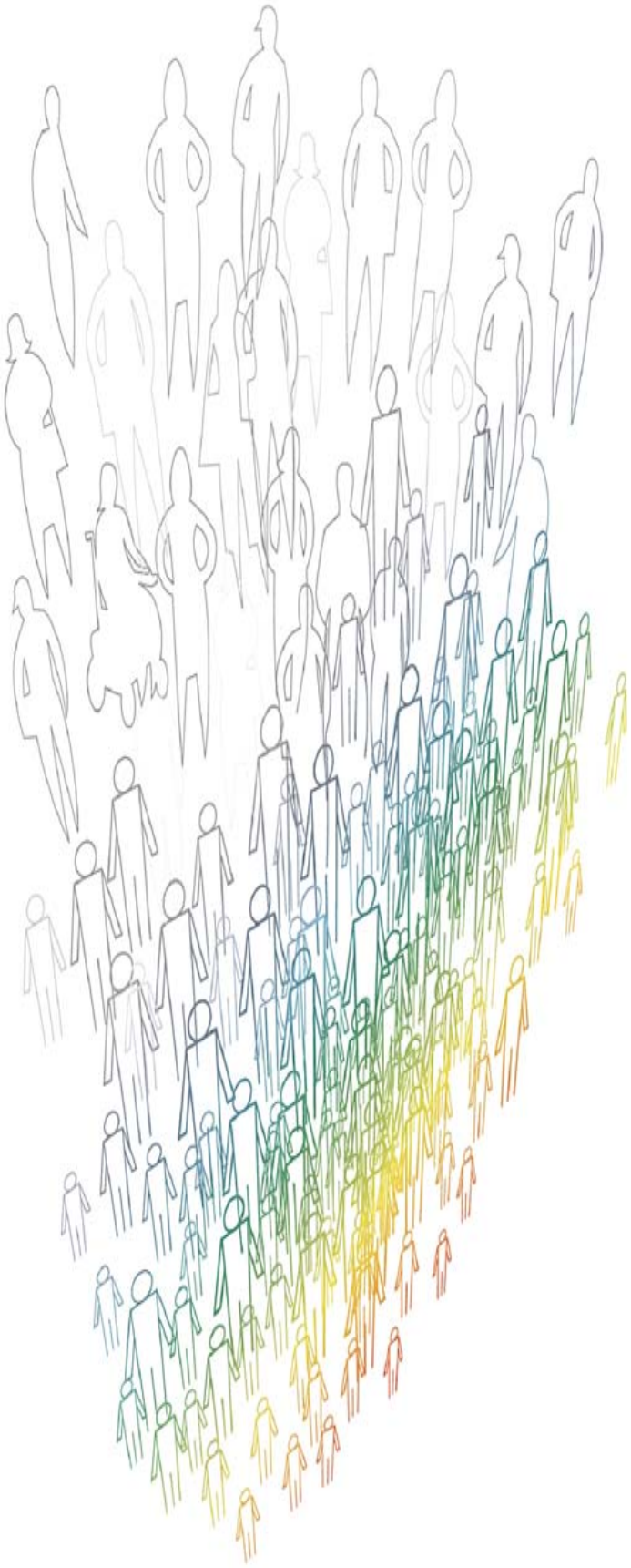

This document has been prepared by:

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For and on behalf of:

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