8. Design considerations

8.1 The character of our local environment has an important influence on quality of life. This character has been shaped by previous generations and it is our responsibility to ensure that future generations inherit an environment of at least equal quality. Listed buildings form one element of the historic environment. However, perhaps of greater importance is the wider environment and more 'ordinary features' which combine with the landmark buildings to create local distinctiveness. The appearance of new buildings can play a major part in the overall character and quality of an area and they can also do much to shape the image of the city. Good design of buildings is therefore extremely important. There is no simple definition of what constitutes good design. The best buildings are only ever produced by designers of real ability.

8.2 Successful developments are more than a collection of buildings and their car parks and service areas. The character of the space around buildings is vital in defining a development's quality, creating an attractive setting, relating to the wider townscape or landscape and, if possible, creating habitats. The design of external spaces in association with new built development should be regarded as an integral part of the design process for all but the smallest developments. Well landscaped sites can provide several benefits, including a setting for buildings, attractive spaces for a range of activities, provision of accessible waste and recycling storage facilities, screening of unattractive areas, the visual assimilation of developments into the landscape, a contribution to the visual amenity of the locality as well as a crucial component of improving climate change resilience, as shown in Figure 8.1.

Allerton Bywater Millennium Community

8.3 A high quality environment is also important to the economic well being of the district. As a consequence Leeds should be recognised as a good place in which to live, work, visit and invest, as much for its quality of life as its economic performance.

8.4 In acknowledgement that good design helps to make communities more sustainable, Leeds City Council adopted the '**Ten Urban Design Principles**' as policy guidance in 2005 (see Appendix 1). Guidance on important issues such as urban grain, density and scale in scheme designs is covered in Neighbourhoods for Living: A Guide to Residential Design in Leeds (Leeds City Council 2007).

Figure 8.1:

WELL DESIGNED LAYOUT

1 **Buildings retained** (refer to 8.14)
2 **East west roads** - maximises potential for passive solar gain
3 **Orientation** - main glazed elevations within 30° of south for passive solar gain. Also suitable for solar panels (roof pitch 35-40°)
4 **Overshading** - larger buildings to the north (south elevations not obstructed by other buildings)
5 **Shelterbelt** - shelter from prevailing SW winds (planted on Flood Risk area)
6 **Shelterbelt** - shelter from cold winter NE winds (linking site to Green Corridor)
7 **SUDS** - wetland pond
8 **Pedestrian/cycleway Links**
9 **Food production** - allotments, orchards etc.

Homes and Communities Agency "Carbon Challenge" zero-carbon development, Hanham Hall, Bristol. Designed by HTA Architects for Barratt Developments.

CASE STUDY: Ice Works

Developed jointly by the Urban Edge Group and Yorkshire Housing, this regeneration project occupies a prominent corner location on a brownfield site in the Exchange Quarter of Leeds City Centre.

The scheme provides 54 one and two bedroom apartments for sale and 25 apartments for rent to help meet the shortage of quality, affordable housing in Leeds. At over 30%, this project has the highest provision of affordable housing in the centre of Leeds.

The apartments for rent were developed by Yorkshire Housing and built using offsite construction to reduce the programme time and to help overcome some of the constraints of this tight city centre site. Ice Works also used modular bathroom pods to further reduce time spent on site.

Designed by Cartwright Pickard for Urban Edge Group and Yorkshire Housing Association

8.5 Building design

8.6 The design of individual buildings for sustainability requires consideration of such issues as use of materials, energy efficiency, adaptability for future uses and resilience to future climate change. In general terms, vernacular styles of architecture will tend to produce more sustainable buildings than monumental styles due to the materials used and size and form of buildings.

8.7 A general principle for sustainable buildings is that they should be designed to be long life, low maintenance, energy efficient, adaptable to meet changing needs and climate and constructed of low energy, locally produced, renewable materials. A sustainable building should also be accessible.

8.8 Flexibility is a key element of sustainability, as buildings are more likely to be reused if they can be easily adapted to meet changing needs. "Long life - loose fit" developments will be encouraged. A building height of 4 storeys is normally sufficient to allow most activities whilst remaining compact and at a human scale and avoiding a reliance on the use of lifts. A mix of uses within a building can make efficient use of space, such as living accommodation above shops.

8.9 When designing buildings, there is much guidance available on minimum standards to be achieved. In the case of structural design, for instance, this includes such items as minimum design loads, minimum levels of fire protection etc. However, there is little guidance on maximum standards. Hence, buildings can often be over specified, which will have a significant impact on sustainability (oversized foundations etc). Developers are therefore encouraged to be guided towards using maximum imposed loads as per the British Standard.

8.10 Modern methods of construction ☑

8.11 Pre-fabricated buildings are nothing new but they are experiencing a renaissance due to the high level of control they provide through the building process. Components are constructed offsite using a streamlined manufacturing process that minimises waste and complications. Various configurations can be used and once completed modules are transported from factory to site and constructed quickly and simply.

8.12 Building for Life ☑

8.13 Building for Life has become the national standard for well-designed homes and neighbourhoods and is run by CABE and the Home Builders Federation in partnership with Design for Homes. Building for Life is informed by 20 criteria that embody the partners' vision of what housing developments should be: attractive, functional and sustainable. These principles are founded on government policy and on guidance developed by CABE in partnership with Design for Homes. Over 200 local authority officers have been trained to use the 20 questions in the planning process. House builders are using Building for Life to formalise their commitment to design quality. The Government now asks all local authorities to use Building for Life to measure progress in improving design quality. The Homes and Communities Agency have now set out in their proposed core housing design and sustainability standards consultation plans to make achieving 14/20 of the Building for Life criteria mandatory.

CASE STUDY: Round Foundry

Round Foundry is a mixed-use regeneration project in Holbeck Urban Village, Leeds. Derelict industrial buildings have been conserved and new ones added which together combine residential, leisure and commercial uses in a vibrant location. Round Foundry is thought to be the oldest surviving engineering works in the world and its careful conservation has contributed to its special sense of place. Here is a project which shows all the strands of sustainable development - economic, environmental and social.

Designed by BDP Architects for CTP

CASE STUDY: Hands On

Hands On, run by Leeds Action to Create Homes (LATCH), has seen a derelict grade two listed former coachhouse in Chapeltown eco-renovated by volunteers and is now home to an innovative project teaching construction skills. The main aim of the project was to renovate the coachhouse so that it is highly energy and resource efficient but still maintains the historic character of the building. This was achieved by using reclaimed, recycled and natural materials and preserving many of the buildings original features. The building is very well insulated with timber frames constructed inside the roof and walls and filled with sheep's wool. The walls are plastered with traditional lime or clay plaster to enable the walls to be fully breathable, helping to regulate moisture levels and reduce damp problems. The building is heated by a clean-burning wood stove that provides heating and houses a kitchen work top that is made from recycled plastic from fridges. The project involved volunteers in the renovation, giving them the opportunity to develop construction skills, while people attending courses can also learn how to reduce the environmental impact of their daily lives with practical information and training on topics like energy efficiency at home. The decision was made to focus on energy conservation rather than energy generation, partly due to the unsuitability of the building for renewable energy and partly to demonstrate that on a small building reducing demand is more important than generating energy.

Building renovated by LATCH and volunteers

8.14 Reusing existing buildings ☑

8.15 The extraction, processing, manufacture and transport of building materials can have a significant environmental impact. The reuse of existing buildings should therefore be a priority. Most buildings are suitable for refurbishment which, in addition to reducing the need for construction materials, can offer an opportunity to upgrade insulation standards and heating, lighting and ventilation. Conserving buildings wherever possible is encouraged for many reasons, including saving the energy embodied in the building fabric and increasing the financial returns on the initial investment. When designing a new building though, architects should think about its legacy to future generations by looking beyond the utilitarian and fashionable, and considering how to create a building that people will identify with, making it valued and reused over time.

8.16 Many historic buildings are now being reused for uses completely different from their original use. This is largely because they were not built to minimal space standards and ceiling heights; they avoided the debilitating effect of being designed too tightly to their function and having such little character that they became inflexible. They were designed under what is now termed 'long-life, loose-fit'.

8.17 They were created with materials that have a long life that may even aesthetically improve over time. Robust materials that mellow with age and weathering are encouraged and such properties are generally found in materials with a low embodied energy and from renewable sources. New developments are encouraged to follow their example and be adaptable to, yet set a framework for, change in the future.

8.18 Historic buildings are inherently sustainable by their very nature. Produced using natural materials and built to last. By 2050 a quarter of homes in Britain are expected to have employed traditional building methods. The refurbishment and reuse of historic buildings is a sustainable method of developing housing stock due to the retention of the embodied carbon in the buildings and also help preserve the character and 'sense of place' which is so important to a local environment.

CASE STUDY: Back to Backs in Leeds

As part of the 'Back to back' strategy, Leeds, in partnership with the Building Research Establishment, looked at options to improve the thermal efficiency of a pre-1919 back to back property in Beeston Hill. Testing of the property showed poor thermal efficiency and air tightness, with significant heat loss through all of the external elevation. A system of works was developed to bring the property up to the highest possible standard within a realistic budget. Works included sealing the new roof with breathable foam to improve the air tightness and insulation, installation of 'A' rated windows and a highly thermally efficient door with triple glazed fanlight. External cladding was considered initially to improve the thermal efficiency of the walls. However neither the initial thermal render or the proposed brick slips proved to be suitable for the external covering of the building. It had been hoped that this could be carried out sensitively while preserving or replicating architectural detail. Unfortunately neither could be satisfactorily developed within the time scales available for the project so internal insulation was used with new material so as to improve the U value without too much egress into the limited living space of the back to back. It is hoped that external cladding of some form will be undertaken in the near future on similar properties to allow the effectiveness of this form of treatment on the pre-1919 stock to be tested.

CASE STUDY: Solar panels on council houses

Leeds City Council is taking full advantage of the benefits of solar power and feed-in tariffs to install solar photovoltaic panels on a minimum of 5,000 council owned homes.

Tenants will be able to use the electricity generated for free, reduce their energy bills and CO_2 emissions. It is estimated that this will cumulatively save tenants around £455k a year on fuel bills and reduce CO_2 emissions by around 8,500 tonnes a year.

The feed-in tariff generated will cover the installation, plus the maintenance costs of the panels for 25 years. The remaining income from the feed-in tariff once the solar panels are paid for will be used to finance a free cavity wall and loft insulation scheme for around 13,000 private homes in Leeds, which could save residents over £2.2m in energy bills per annum.

CASE STUDY: A Zero-Carbon Victorian Semi, Manchester

This 1897 Victorian terraced house in Manchester has been transformed through retrofitting, with the following features incorporated:

- Existing windows have been retained and double glazed except stained glass panels which have received secondary glazing. New windows are tripled glazed and all windows are fully draft sealed;
- The timber is FSC approved throughout;
- Nearly Carbon Neutral Heating using a gasifying wood burner, which burns logs as well as waste timber, sucking the flames into a chamber beneath the logs which ensures a very hot clean burn with minimal ash. Heat from this and 10m^2 of solar thermal tubes is stored in thermal accumulators (water tanks);
- Gable wall has been insulated externally with wood fibre with a low U-value. Spacetherm has been used internally on the front and back but is very costly;
- Attic roof insulation uses vapour permeable construction with Thermafleece except where space was too tight when Spacetherm and glass wool was used;
- The loft has 400mm of glass wool;
- The ground floor is insulated with hemp between the joists except above the burner where glass wool is used;
- Gutters are made from recycled plastic.

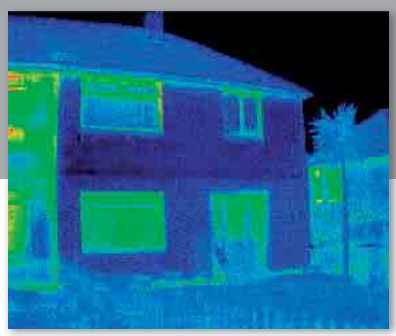
This combination of features has provided an 81% reduction on CO_2 at a cost of £39,000 for the heating, insulation and draft proofing.

Designed by Urbed. http://superhome.urbed.coop

CASE STUDY: Mill Green Place, Leeds

Work at Mill Green Place focused on a combination of energy efficiency measures and aesthetic improvement to the properties:

- Brick effect insulating render to the ground floor with coloured pebble-dashed insulating render at the first floor;
- New high efficiency upvc sealed unit double-glazed windows;
- Powder coated vented aluminium eaves provide an improved design for prevention, ingress and exposure to inclement weather (the previous barge board was difficult to cloak against the weather). This has resulted in lower maintenance costs.



8.19 If carbon targets are to be met the continued use of historic buildings is vital. The upgrading of historic buildings to modern standards can be approached sympathetically to improve the energy performance of a building whilst still retaining the special character that makes a positive contribution to its locality.

8.20 There are currently a range of tax relief and capital allowances available on the refurbishment of existing commercial buildings. Consult professional advice for more information on these.

8.21 The following guidelines should be applied:

- ☑ All new development should respect unique and positive local characteristics and, where appropriate, the cultural background of the locality;
- ☑ All features of historic, cultural and aesthetic value should be retained and enhanced, wherever possible;
- ☑ Special attention should be given to development affecting the character of Listed Buildings or Conservation Areas. The aim should be to enhance the setting and safeguard the survival of historic buildings and features;
- ☑ Buildings should be designed for safety, security and comfort;
- ☑ All buildings/developments should embrace the principle of being accessible and inclusive to all users and dwellings should enable someone to stay in their home should individual circumstances change;
- ☑ Over-specification for the building's intended purpose should be avoided;
- ☑ Wherever possible, existing buildings should be retained and refurbished;

CASE STUDY: Broad Gate, The Headrow, Leeds

Originally built in 1932, the redevelopment of Broad Gate has been carefully undertaken to consider sustainability principles throughout all stages of the design and construction. Key sustainability highlights of the project include the refurbishment of an existing building, reuse and recycling of materials and energy and water efficient fittings.

Over 80% of the existing building structure has been retained and two thirds of the existing building façade. As a result, fewer materials have had to be imported to the site resulting in a reduced resource and energy usage.

Designed by Fairhursts Architects for Highcross

- ☑ Think before you demolish. Can the building be adapted to meet present day needs? Is there an opportunity to improve the energy efficiency of an existing building? Thermal imaging will help to show where a building's thermal insulation can be improved;
- ☑ External insulation does often require planning permission and must comply with building regulations. Guidance in this area is developing and Leeds is leading a Yorkshire and Humber project that will result in further advice and good practice in this area. In general terms, internal insulation treatments are preferred. However external insulation may be acceptable in less sensitive properties or in treating areas such as rear elevations and gables;
- ☑ All conversions and refurbishments should be designed to reduce energy use in proportion to the embodied energy of new materials used;
- ☑ Many existing buildings are suitable for retrofitting of renewable energy technology, such as solar hot water panels. Care must be taken on listed buildings and in conservation areas and further advice is provided in section 9.57;

Horsforth Town Street

Pudsey Town Centre

8.22

- New buildings should be designed to be durable, easily adaptable to change, resilient to future climate change and use low amounts of energy, both embodied and in use (ie, be designed for 'long life - loose fit' and low energy). This generally means that they should not be too closely tailored to individual needs.
- The foundation design used for new properties will have to allow for the increased risk of subsidence caused by the potential for shrinkage of clay soils.
- The effect of climate change on wind speeds is uncertain. Speeds may be higher in the future, and thus structures, especially tall ones may need to be stronger or able to be strengthened.
- As rainfall becomes more seasonal, certain types of soil will experience more extreme cycles of wetting and drying. Trees, which are valuable for shade, windbreaks and heat and water absorption, may aggravate this in certain soils.
- The thermal massing of a building is important in how it responds to heat losses and gains. Heavy construction can help to regulate temperatures, but lightweight (eg pre-fabricated) construction can heat and cool quicker. Materials such as concrete, stone and tiled floors will soak up unwanted heat during the day. The choice of appropriate thermal mass will depend to some extent upon expected use and occupancy.

8.23

Further information

- For more information on Leeds City Council's approach to design, landscape and heritage issues including guidance on distances to trees, the 10 Urban Design Principles as well as the City Centre Urban Design Strategy and Neighbourhoods for Living: A Guide for Residential Design in Leeds see www.leeds.gov.uk.
- Building for Life: http://www.buildingforlife.org
- Sustainability checklist for development: http://southeast.sustainabilitychecklist.co.uk
- English Heritage: www.english-heritage.gov.uk
- The UK Green Building Council has been established to *"dramatically improve the sustainability of the built environment by radically transforming the way it is planned, designed, constructed, maintained and operated"* www.ukgbc.org
- 'Adapting to climate change: A checklist for developments', South East Climate Change Partnership November 2005: www.climatesoutheast.org.uk/images/uploads/Adaptation_Checklist_for_Development_Nov_2005.pdf
- Existing buildings survival strategies. A guide for re-energising tired assets and reducing operating costs: http://www.ukgbc.org/site/document/download/?document_id=626
- English Heritage has published a series of guidance documents which look at a range of improvements that can be made to improve the energy performance of existing buildings and how renewable energy technologies might be used on historic properties. These documents can be downloaded from www.helm.org.uk.