South Cambridgeshire District Council

Local Development Framework

District Design Guide:

High Quality and Sustainable Development in South Cambridgeshire

Supplementary Planning Document

Adopted March 2010

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Published by South Cambridgeshire District Council

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CHAPTER 1

INTRODUCTION TO THE SUPPLEMENTARY PLANNING DOCUMENT

1.1 This South Cambridgeshire District Council (SCDC) District Design Guide Supplementary Planning Document (SPD) forms part of the South Cambridgeshire Local Development Framework (LDF).

1.2 The SPD expands on district-wide policies in the Development Control Policies Development Plan Document (DPD), adopted in July 2007, and policies in individual Area Action Plans for major developments that may vary from the district-wide policies. It provides additional details on how they will be implemented. Policies seek to ensure that design is an integral part of the development process.

1.3 The SPD builds on national policy in Planning Policy Statement (PPS) 1: Delivering Sustainable Development, and Planning and Climate Change – Supplement to PPS1. These promote sustainable, well-designed development to achieve a high quality built and natural environment. Achieving good design and sustainable development are the core principles underlying planning. At the heart of sustainable development is the simple idea of ensuring a better quality of life for everyone, now and for future generations.

1.4 "We cannot afford not to invest in good design. Good design is not just about aesthetic improvement of our environment, it is as much about improved quality of life, equality of opportunity and economic growth. If we want to be a successful and sustainable society we have to overcome our ignorance of design and depart from our culturally ingrained notion that a poor quality environment is the norm… Good design does not cost more when measured across the lifetime of the building or place." (CABE, The Value of Good Design, 2002)

PURPOSE

1.5 The purpose of this District Design Guide is to ensure delivery of sensitively and appropriately designed, sustainable developments. This document sets out important design principles based on recognised good practice and explains key requirements of the District Council that will be taken into account when considering planning proposals. It is not a 'recipe book' of design solutions.

1.6 The Guide deals with different types of development including: creating new towns, extending Cambridge and adding to villages; large scale projects and extensions to existing buildings; mixed use schemes, large business

structures and infill housing. Many of the design principles are common to all but some apply particularly to one type of development.

1.7 The Guide covers and links to a range of subjects which are integral to good quality and sustainable design such as building regulations, environmental health and renewable energy.

1.8 The Supplementary Planning Document provides additional advice and guidance on design and achieving sustainable development and expands on the policies set out in the Local Development Framework, in particular Development Control Policies DPD Policies DP/1 and DP/2.

1.9 Specific objectives of this document are to:

- Assist applicants in the achievement of an attractive, sustainable, well-designed, high quality environment that integrates housing, employment and community uses, together with infrastructure and green areas in conjunction with the surrounding landscape.

- Assist applicants' understanding of the local context, help identify features of importance, and ensure that proposals are appropriately designed to be compatible with their surroundings.

- Assist applicants gain planning permission quickly by informing them what information is required to accompany planning applications to justify their proposals and demonstrate what impact they would have.

SOUTH CAMBRIDGESHIRE LDF POLICY

1.10 Achieving sustainable development is at the heart of planning, and will be controlled by the following policy in the Development Control Policies DPD:

SUSTAINABLE DEVELOPMENT

POLICY DP/1 Sustainable Development

1. **Development will only be permitted where it is demonstrated that it is consistent with the principles of sustainable development, as appropriate to its location, scale and form. It should:**

    a. **Be consistent with the sequential approach to development, as set out in the Strategy chapter of the Core Strategy DPD;**

    b. **Minimise the need to travel and reduce car dependency;**

c. **Make efficient and effective use of land by giving priority to the use of brownfield sites and achieve adaptable, compact forms of development through the use of higher densities;**

d. **Include mixed-use development of compatible uses as appropriate to the scale and location of the development;**

e. **Where practicable, use sustainable building methods and verifiably sustainable, locally sourced materials, including recycled materials, and include a Travel Plan to address the travel needs of labour during construction;**

f. **Where practicable, minimise use of energy and resources;**

g. **Where practicable, maximise the use of renewable energy sources;**

h. **Incorporate water conservation measures;**

i. **Minimise flood risk;**

j. **Where practicable, use sustainable drainage systems (SuDS);**

k. **Mitigate against the impacts of climate change on development through the location, form and design of buildings;**

l. **Ensure no unacceptable adverse impact on land, air and water;**

m. **Contribute to the creation of mixed and socially inclusive communities and provide for the health, education, recreation, community services and facilities, and social needs of all sections of the community;**

n. **Where practicable, include infrastructure for modern telecommunications and information technology to facilitate home working;**

o. **Conserve and wherever possible enhance biodiversity of both wildlife and the natural environment;**

p. **Conserve and wherever possible enhance local landscape character;**

q. Involve community and providers of community services in the design process;

r. Conserve and wherever possible enhance cultural heritage.

2. In criteria e, f, g, j and n it will be for any applicant or developer proposing to compromise sustainability to demonstrate the impracticability of use of sustainable methods, systems, materials and energy sources and provision of sustainable infrastructure. Additional cost will not, on its own, amount to impracticability.

3. For major developments, applicants must submit a Sustainability Statement and a Health Impact Assessment, to demonstrate that principles of sustainable development have been applied.

1.11 The design of new development will be controlled by the following policy in the Development Control Policies DPD:

DESIGN OF NEW DEVELOPMENT

POLICY DP/2 Design of New Development

New Development Design

1. All new development must be of high quality design and, as appropriate to the scale and nature of the development, should:

a. Preserve or enhance the character of the local area;

b. Conserve or enhance important environmental assets of the site;

c. Include variety and interest within a coherent design, which is legible and provides a sense of place whilst also responding to the local context and respecting local distinctiveness;

d. Achieve a legible development, which includes streets, squares and other public spaces with a defined sense of enclosure and interesting vistas, skylines, focal points and landmarks, with good interrelationship between buildings, routes and spaces both within the development and with the surrounding area;

e. Achieve a permeable development for all sectors of the community and all modes of transport, including links to

existing footways, cycleways, bridleways, rights of way, green spaces and roads;

f. Be compatible with its location and appropriate in terms of scale, mass, form, siting, design, proportion, materials, texture and colour in relation to the surrounding area;

g. In the case of residential development, provide higher residential densities, and a mix of housing types including smaller homes;

h. Provide high quality public spaces;

i. Provide an inclusive environment that is created for people, that is and feels safe, and that has a strong community focus;

j. Include high quality landscaping compatible with the scale and character of the development and its surroundings.

Design and Access Statements

2. Design and Access Statements submitted to accompany planning applications and applications for listed building consent should be compatible with the scale and complexity of the proposal and, as appropriate should include:

   k. A full site analysis of existing features and designations;

   l. An accurate site survey including landscape features and site levels;

   m. The relationship of the site to its surroundings;

   n. Existing accesses for pedestrians, cyclists, equestrians and vehicles;

   o. Any known historic importance;

   p. Opportunities for maximising energy efficiency and addressing water and drainage issues.

3. The Access element of the Statement should demonstrate that the development will achieve an inclusive environment that can be used by everyone, regardless of age, gender or disability. It should also address how the development has taken account of the transport policies of the development plan.

1.12 All new development will have an impact on its surroundings. The aim must be that any development, from a major urban extension to Cambridge to an extension to an existing home, takes all proper care to respond to its surroundings, including existing buildings, open spaces and village edges, and ensure an integrated scheme that does not harm local amenity and wherever possible, brings benefits to the area.

1.13 A fully integrated and responsive design-led approach to development is therefore needed. For all development, a design-led approach will ensure that every proposal, whatever its scale, responds positively to the particular characteristics of a site and its surroundings and reinforces local distinctiveness.

1.14 The location and design of development should contribute to global sustainability by addressing the causes and potential impacts of climate change, through reducing energy use, reducing emissions, promote renewable energy resources, and take climate change impacts into account, according to Key Principle ii in PPS1.

1.15 There are a number of documents, covering sustainability and design issues, produced by the Council or its partners that form a material planning consideration when determining planning applications. These include other SPDs, for example on Conservation Areas and Listed Buildings, Village Design Statements and Conservation Area Appraisals. Many of these set out particular local characteristics that should be protected or enhanced. Appendix 2 references useful sources of further information.

1.16 The SPD is divided into three sections:

- **Part I Local Context** - describes the characteristics of South Cambridgeshire and how these should influence the design of new development.

- **Part II Design Principles and Criteria** – covers general approaches to design, appreciating and responding to context, different locations, types and scales of development, and the elements of design. It also outlines how design should deal with environmental sustainability, biodiversity and environmental health issues, and national legislation and standards.

- **Part III Procedures and Applications** – describes the documentation, such as site appraisals, concept diagrams and design and access statements, that is likely to be needed to show the design process and explain and support proposals and planning applications.

The SPD includes a number of Appendices, including useful contacts, addresses, and reference material, as well as further detail on a number of issues covered within the SPD.

PART I

LOCAL CONTEXT

CHAPTER 2

THE DESIGN CONTEXT

THE GEOLOGY OF SOUTH CAMBRIDGESHIRE

2.1 The geological deposits that underlay South Cambridgeshire predominantly date from the Cretaceous Period of geological history (65 to 140 million years ago), which, by geological standards, are therefore relatively young. In the north-west of the district are a series of slightly older clay deposits from the Upper Jurassic Period. The geology is divided into a series of strata that outcrop in bands running roughly north-east to south-west across the district (see map in Figure 2.1). These formations were laid down as successive marine deposits that have since been raised and tilted to slope south-eastwards by earth movements in Tertiary times.

2.2 The south-eastern half of the district is underlain by Chalk, a soft white limestone of great purity and composed almost entirely of calcium carbonate derived from the shells of marine animals deposited in a warm, clear sea. Chalk is a relatively soft rock that makes a poor building stone, but in this region a more resistant formation from the Lower Chalk beds was sometimes used in traditional buildings, where it is referred to as clunch. The Lower Chalk beds also include a Chalk Marl that is particularly suitable for the manufacture of cement. In the south-east parishes of the district the chalk is overlain by glacial bolder clay, deposited by the retreating glaciers at the end of the last ice age.

2.3 Nodules of flint, a few centimetres or more in diameter, are a feature of Chalk deposits. Flint is very hard and composed of silica, chemically unrelated to chalk, but with its origins also in marine organisms, albeit ones with delicate skeletons of silica. The silica forming these skeletons was not particularly stable and, after the creatures' death, it was dissolved into the chalk where it re-deposited in a more stable form as nodules of flint. The hard nature of the flint nodules makes them difficult to shape for use in walling. Because of this, the traditional form of flint walling was to lay rough nodules of flint in beds with one side crudely faced, or knapped, and to use brickwork to frame rectangular openings for windows and doors, or to turn corners. This careful, selective use of brickwork reflected the relatively high cost of importing bricks from the adjacent clay areas, and has created a distinctive appearance in the region.

2.4 North-west of the chalk is a band of dark blue / grey clay, known as the Gault Clay. In the eighteenth century this band of clay began to be worked on a large scale for brick making, producing at first a 'white' brick that weathers grey, then later in the nineteenth century, the characteristic yellow 'Cambridge stock' brick. The same beds were worked for plain clay peg-

tiles for the fifteenth century onwards with clay pan-tiles becoming widespread from the eighteenth century.

2.5 Immediately north-west of the Gault Clay is a narrow band of sandstone, referred to as the Lower Greensand. This band is relatively insignificant in the northern parts of the district, but it produces a slightly raised rib of land above the adjacent clay fens that is the site for a number of settlements, most notably Cottenham and Oakington. Further north the city of Ely is sited on an 'island' of Greensand that outcrops within the fenland. To the west of the district the band of Greensand increases in width and around Gamlingay it becomes much more prominent in the landscape.

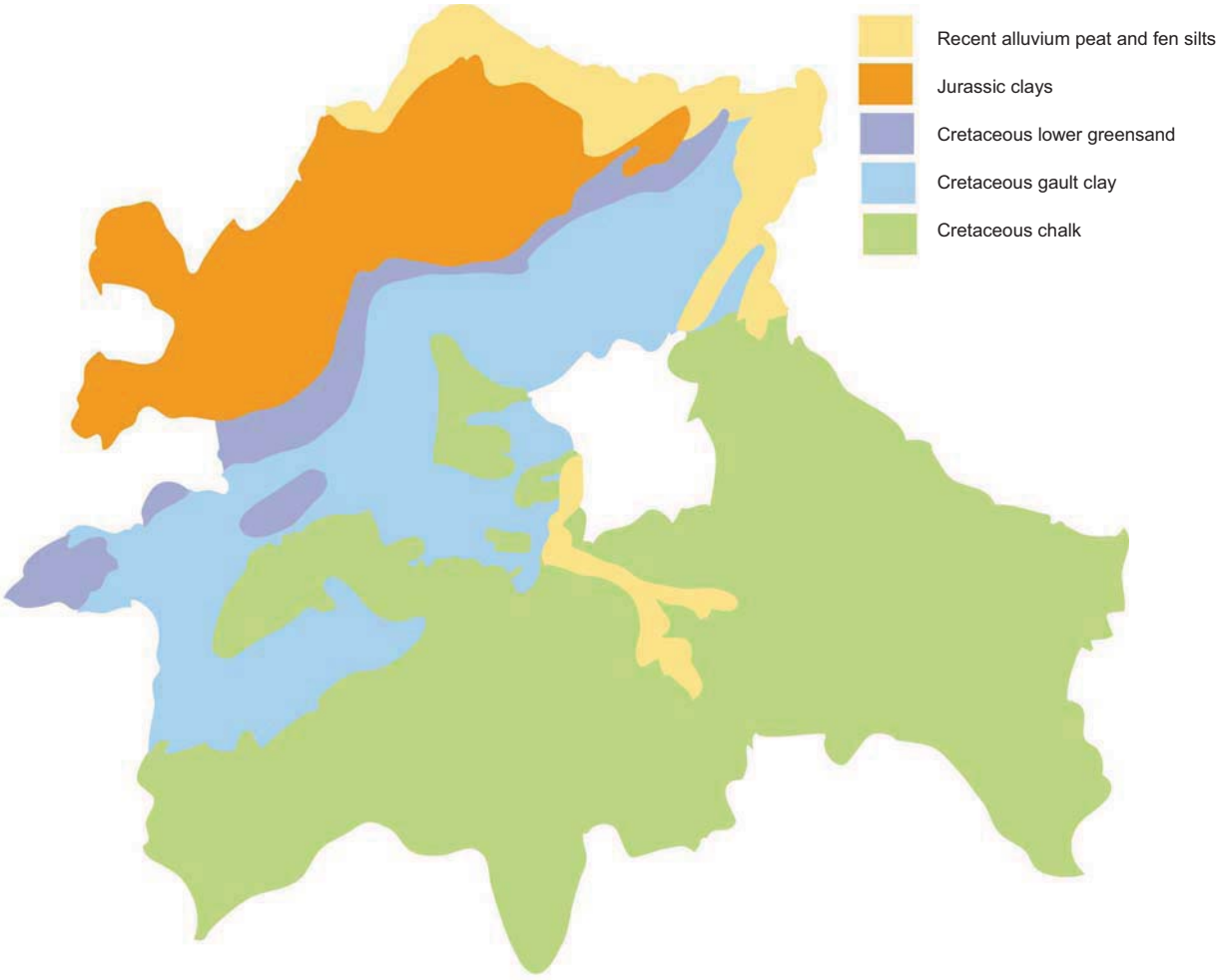


Figure 2.1 Map showing the principal geological deposits of South Cambridgeshire

THE TOPOGRAPHY OF SOUTH CAMBRIDGESHIRE

2.6 While much of South Cambridgeshire is low lying, there are some significant variations to the topography across the district, with a strong correlation to the underlying geology outlined in the previous section.

2.7 The fenland lies at, or around, sea level with the 10-metre contour defining the fen-edge, and along which line a number of villages are sited. These fens broadly correspond to the clay deposits that lie to the north of Cambridge. As one moves onto the chalklands the land quickly rises into rolling downland that is generally between 20 and 40 metres above sea level, though slightly higher in the east. Further south and east the chalklands continue to rise into a range of low lying hills, which are around 100 metres above sea level. The highest ground in the district is in the south at Great Chishill, where the hills reach a height of just under 150 metres. In the west of the district is a second range of chalk hills, which correlate to a finger of chalk that projects into the Gault Clay, though these hills are not as high and only attain a height of 70 to 80 metres above sea level.

2.8 All of the chalklands, along with the eastern fens, drain to the River Cam and its associated tributaries, which in turn feeds into the River Great Ouse. The fens that lie to the north drain direct to the Great Ouse, where it also forms the northern boundary of the district, and eventually reaches the sea at the Wash.

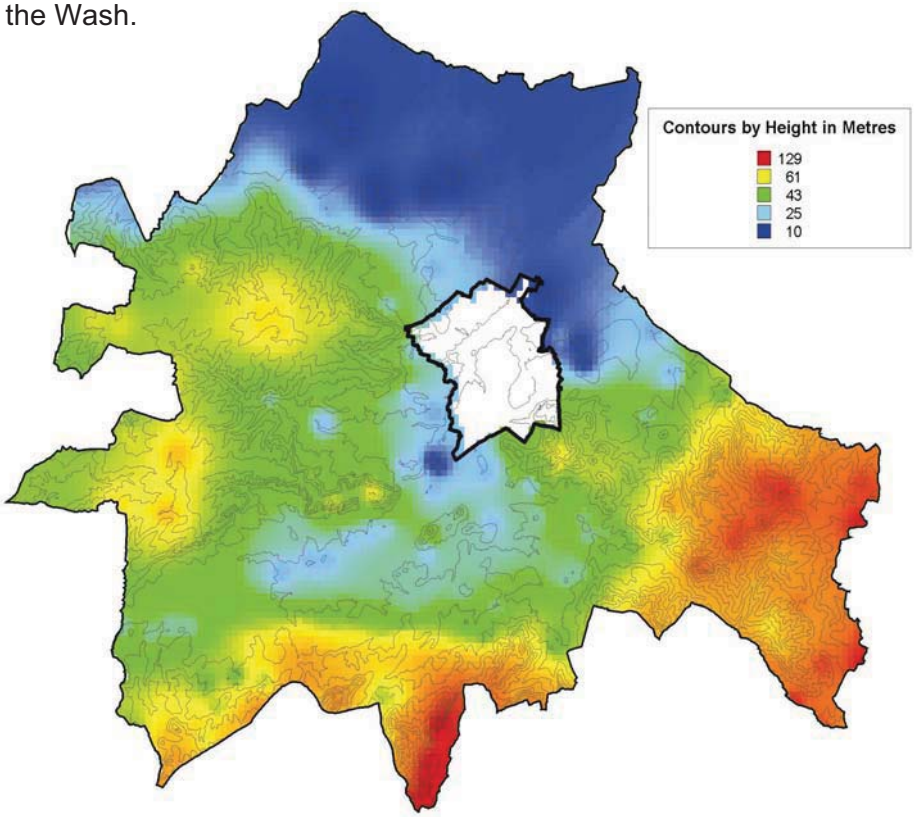


Figure 2.2 Map outlining the basic topography of South Cambridgeshire

THE HISTORICAL DEVELOPMENT OF SOUTH CAMBRIDGESHIRE

2.9 The siting and historical development of settlements within South Cambridgeshire is closely associated with the communication network (particularly at river crossings or road junctions), the avoidance of land liable to flooding and developments in agriculture. The spring-lines between the chalk and clay were favoured areas for settlement, and so, to an even greater extent, were the river valleys, with their light gravel and alluvial soils and good communications. The chalk areas to the south could only be settled where water supplies were available, but the open aspect of this countryside made it particularly suitable for trade routes from east to west across the region, using numerous parallel tracks that are collectively known as the Icknield Way.

Prehistoric

2.10 In Palaeolithic and Mesolithic times the area was occupied by hunter-gatherers, when much of the area that was later to become fen was then above sea level, so could also support the more transient societies in a heavily wooded landscape . It was the rise in sea level that accompanied the melting ice-cap at the end of the last Ice Age that led to periodic flooding and the development of the fenland areas. In Neolithic times communities became more settled as an agrarian based society started to develop. These early communities especially established themselves on the chalk grasslands around the Icknield Way, along the river valleys and fenland edge, and on the lighter soils associated with the Greensand. The development of these communities continued through the Bronze Age and into the Iron Age, by when farming had become so well developed that huge tracts of land were covered by ditched fields and enclosed homesteads, especially in areas of gravel subsoil, but also in the heavier clay areas where developments in agricultural technology produced ploughs capable of working the heavier soils.

Roman

2.11 The Roman towns of this region, Cambridge, Godmanchester, Sandy and Great Chesterford, are all located just outside the district, but their markets brought prosperity to the adjacent rural areas and the network of Roman roads have left a lasting legacy. The best preserved Roman settlement is at Bullock's Haste in Cottenham; a site so large that it appears more like a town than a village, while Romanisation of the countryside was established through a series of villas that were at the centre of agricultural estates. Those excavated at Litlington and Ickleton were particularly large and magnificent examples, while others are known at Babraham, Bartlow, Comberton, Guilden Morden, Horningsea, Horseheath, Linton, Shepreth, Teversham and Great Wilbraham. Another important feature of the Roman occupation were canals. Carr Dyke, visible today at Cottenham, Landbeach

and Waterbeach, was used to transport food-stuffs, leather goods and other products from the agricultural regions of southern Cambridgeshire to the army stationed in Northern Britain. It may also have served to drain neighbouring land.

Carr Dyke, south of Waterbeach

Anglo-Saxon

2.12 Occupation of a number of Roman sites is believed to have continued on into Saxon times, along with use of the Roman roads, since many Saxon settlements and burial sites follow these routes. The best-known sites from the early Anglo-Saxon period are a series of cemeteries and defensive Dykes, though more recent excavations have now revealed evidence of huts, halls and other signs of human occupation at Hinxton, Linton, Cottenham, Waterbeach, Pampisford and Great Wilbraham. The four great Anglo-Saxon dykes in South Cambridgeshire (Miles Ditches, Bran Ditch, Brent Ditch and Fleam Dyke), together with the larger Devil's Dyke in East Cambridgeshire, all appear to have had the same function, namely to protect land in the east by preventing easy access along the Icknield Way, and all are built to a similar pattern, with wide, flat bases and straight-sided ditches on the western side.

Middle Ages

2.13 By 1086, when the Domesday Book was written, all the current villages of South Cambridgeshire existed, with the exception of the modern communities of Bar Hill and Cambourne, though most have undergone a number of changes since their Saxon foundation. Medieval society reached

its peak in the latter years of the thirteenth century, before economic decline and a series of disastrously wet cold summers in the early years of the fourteenth century led to famines, followed in 1348 by the Black Death. Most villages in the area were not to regain the levels of their thirteenth century populations until the nineteenth century and the resulting labour shortage led to much of the land being converted to sheep pasture.

Post Medieval

2.14 In the late seventeenth century work started to drain the fens by cutting a series of canals that would take excess water straight to the sea. The process was to be fraught with problems as the peat shrank, leaving much of the land below sea level and windmills (later replaced by steam, diesel and electric pumps) were then required to lift the water back up to sea level. However, the rich farmland that was created by this process was capable of supporting a large population and the villages along the fen-edge expanded as a result.

2.15 Until the middle of the eighteenth century the majority of parishes continued to farm in common, as they had since Saxon times, with the huge medieval open fields worked in narrow strips. Then, over a period of 100 years, these fields were enclosed by successive acts of Parliament as the Enclosure movement brought about major change to the countryside. At the same time many common rights to grazing and gathering fuel were also lost, and most of the countryside became private property. This radical change in land-ownership meant the end of the traditional peasant class in England and much of the population moved to urban areas, or emigrated to America or Australia. Populations fell in all but the commuter settlements immediately adjacent to Cambridge, and this pattern continued through the first half of the twentieth century, exacerbated by the impact of the First World War and the depression of the inter-war period. It was not until after the Second World War that the pattern was to change, and the villages once again started to expand to cope with the housing needs of a growing population.

2.16 The result of this continuous occupation of South Cambridgeshire is an extensive legacy of built and natural heritage. Collectively this creates a many layered, historic landscape of great beauty and diversity that helps establish local identity at the parish level. However, the pace of change since 1945 has been intense and is, arguably, accelerating. The resultant pressures on our inherited landscape have profound implications for the social and economic well being of the district, far beyond aesthetic and academic interests.

CHAPTER 3

VILLAGE LANDSCAPE AND SETTLEMENT ANALYSIS

INTRODUCTION

3.1 This section outlines the importance of character and the crucial contribution good design can make to its conservation and enhancement. It aims to ensure that very careful consideration is given to the way new development relates to its surroundings. An overview of the landscape settlement character of South Cambridgeshire is provided. This is followed by the identification of five distinctive landscape character areas:

A – South East Claylands,
B – Chalklands,
C – Western Claylands,
D – Western Greensand, and
E – Fen Edge (see Figure 3.1).

3.2 The parishes that occur within each area are listed (note some parishes straddle the boundaries and are therefore listed under both areas). For each defined area, a brief descriptive analysis explains in simple terms the essential design relationship between:

i. **Landscape Character** - the patterns of the landscape, its geology and overall form, slope and climate, vegetation and the setting of buildings and villages within it.

ii. **Settlement Character** – the shape of settlements, their built forms and their relationship with the wider countryside.

iii. **Building Materials** – the nature of the buildings, their massing, materials, scale, colour, texture and characteristic detailing.

iv. **Trees and Hedgerows** – plant species common to the area.

3.3 Based upon an analysis of the relationship between these elements, the design implications for new buildings are highlighted in the form of a 'bullet point' list of design principles that can be used to guide the form and appearances of new development in the countryside and in the villages.

THE IMPORTANCE OF CHARACTER AND GOOD DESIGN

3.4 Character can be described as a distinct, recognisable and consistent pattern of elements that make each place different and distinctive. It is influenced by visual, ecological, historical, settlement and building elements, together with less intangible aspects such as tranquillity and

sense of place. The distinctive character of our surroundings has a fundamental impact on our quality of life and therefore identifying, protecting and enhancing those elements that contribute to character is a key aspect of our sustainability.

3.5 The Council is concerned that poorly designed new development will erode the established character of the landscape and settlements through lack of respect for local diversity and distinctiveness. Common use of standardised building designs and layouts, and the suburbanisation of rural settlements though poorly designed village extensions will have particularly significant effects on character.

LANDSCAPE CHARACTER OVERVIEW

3.6 The South Cambridgeshire landscape as a whole has several distinctive and readily identified characters. Medium to large-scale arable farmland landscapes dominate. Woodland and small copses tend to be widely dispersed or absent, and the density of hedgerows is relatively low. As a result it is predominantly open, allowing long views. Contrasting patterns of hedgerowed pastures and parkland create variety, and a greater degree of enclosure in some parts, for instance associated with settlements. Early enclosures of 'ancient countryside' give a distinctive character to some villages which are surrounded by small fields with hedgerows.

3.7 The landform reflects the broad variations in the underlying geology and continuity of settlement in the area. The geology ranges from the 'upland' undulating chalklands and clay hills in the south, to the low lying flat Fen Edge with its scattered fen 'islands' north of Cambridge. Rivers and streams cut through the higher land creating gentle shallow valleys, whilst straight dykes and ditches are a feature of the drained fen edge. Both winding and straight narrow roads link the settlements. Surviving features from different eras are part of the rich historic character of the landscape, including visible archaeological features such as the Fleam Dyke and the Bartlow Hills, ancient field boundaries and medieval narrow strip fields, as well as many moated sites, windmills, historic parklands, farmsteads, and groups of cottages.

SETTLEMENT CHARACTER OVERVIEW

3.8 Villages are particularly distinctive in the landscape. Small, medium and large villages occupy a variety of positions, hilltops, valley-sides and along spring lines. They often exhibit a complex mix of patterns, including linear, dispersed, nucleated, agglomerated and planned. A surprising number have been formed from amalgamation of initially separate and ancient hamlets. Villages that grow up along important communication links are often linear, with an area of green in front of buildings, as at Comberton, or at each end, as at Harston. While there are no complete planned medieval

villages in South Cambridgeshire, there are planned elements that survive in villages such as Swavesey. Development was also affected by phases in population growth or decline, visible at Bassingbourn where there are whole areas of house plots under grass. Finally, village pattern is often affected by the location and extent of open space, particularly greens and common land with settlements. Typically the villages have developed from historic cores that exhibit a varied mix of vernacular building materials, including brick, rendered plaster, weatherboarding, plain tiles, pantiles, and thatch. Some villages, particularly those closer to Cambridge, have experienced significant growth with modern estates visible at their edges. Nonetheless, most villages make a very positive contribution to local landscape character. Features such as attractive groupings of historic buildings, village greens, common land, mature trees and church towers are all important to this.

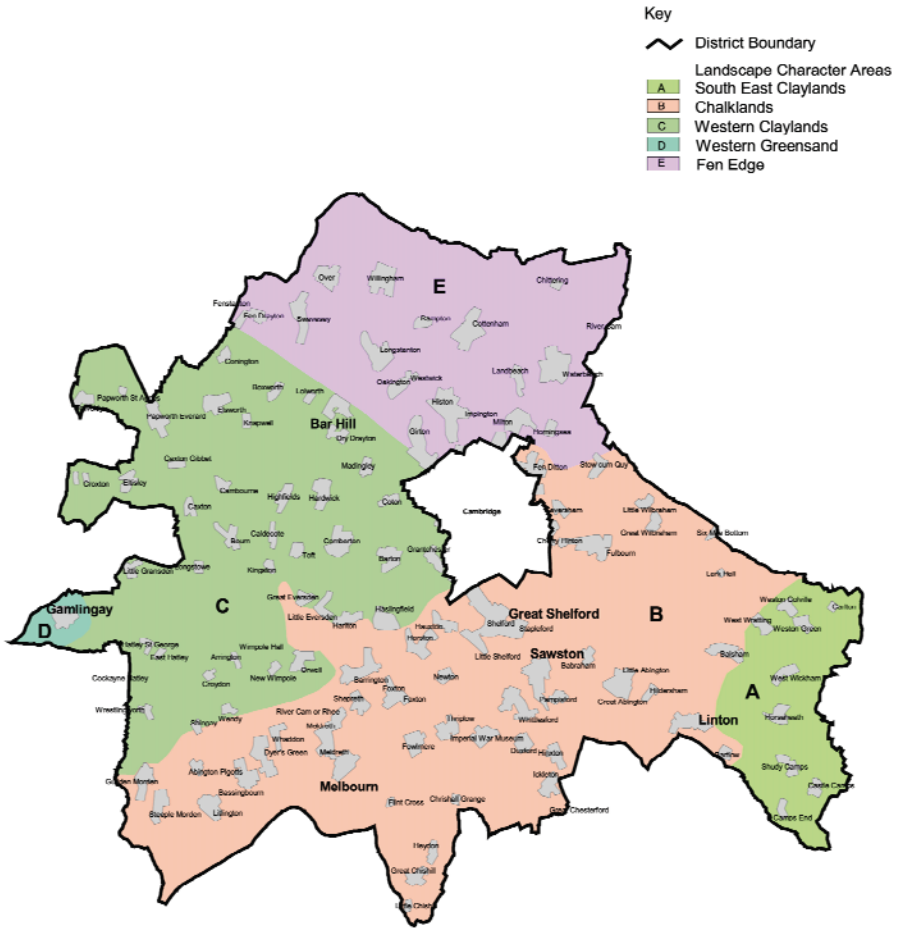


Figure 3.1 Map of South Cambridgeshire indicating broad landscape character assessment as set out in the Countryside Agency's Countryside Character for East of England

Note: the landscape character assessment (Figure 3.1) follows the Countryside Commission's assessment which was used in the 2005 Draft Design Guide. Natural England has subsequently identified new Joint

Character Areas (see the Landscape in New Developments SPD), but the Countryside Commission areas have been retained here as they better reflect settlement character, particularly that of Fen Edge villages.

A. The South-East Claylands

Parishes – Balsham (eastern sector), Carlton (western sector), Castle Camps, Horseheath, Linton (north-east sector), Shudy Camps, West Wickham, West Wratting (eastern sector), Weston Colville (eastern sector).

Landscape Character

3.9 This is an undulating area reaching 100 – 120 meters in height on the hilltops. A scattering of farmsteads and small settlements interspersed with farm woodlands, contribute to landscape character. The field sizes are mostly large, but are united by the gently rolling landform and woodland. Smaller fields, landscape and woodlands closer to edges of settlements give a more intimate scale. An historic irregular field pattern remains; Earthbanks are a distinctive feature along with some roadsides, reflecting ancient hedge and bank field boundaries; a few still retain their hedges. Long open views extend to wooded skylines, and sometimes village rooftops and church towers. The area has a surprisingly remote, rural character.

3.10 The key characteristics are:

- An undulating boulder clay landform, dissected by small stream valleys.
- Predominantly arable farmland with a wooded appearance.
- Trees and woodlands appear to join together to create a wooded skyline, with some bare ridgelines.

Settlement Character

3.11 Villages and small hamlets in this area typically have strong linear forms, often with a wooded setting and mature hedgerows and trees that contribute to rural character. Small paddocks and long back gardens also help to soften village edges. Generally they include a mix of more substantial farmhouses arranged in a loose knit pattern, interspersed with open frontages. The slightly larger village of West Wratting includes some continuous frontages that historically provided enclosure to the streets. Any areas of modern infill are generally limited. Small village greens of irregular shape, including narrow 'strip' greens, are a feature in a few villages such as West Wratting and West Wickham.

3.12 The key characteristics are:

- Mostly small villages and hamlets (locally known as 'Ends') are sited on valleysides or on ridgetops, often having a linear form.
- Buildings are arranged in a low density, loose knit pattern along narrow winding or gently curving lanes.
- Mature trees and hedgerow are important features, mainly in private curtilages, giving a strongly rural character to settlements.
- Village edges are often softened by woodlands, copses, small fields, paddocks and long back gardens.
- A few isolated farmsteads are located along lanes or at track ends.

Woodlands and small hedgerowed paddocks contribute to setting

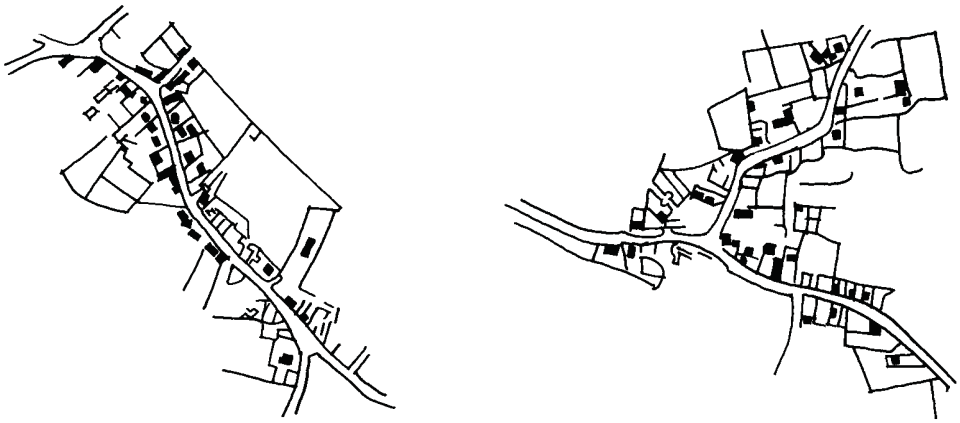
Medium to large arable field

Mature trees are a feature of the main village street

Typical settlement landscape setting

<u>*West Wratting*</u>
- mostly small cottages and houses with front gardens

<u>*Horseheath*</u>
- narrow winding lane
- loose knit settlement pattern



Street pattern arrangement of buildings

3.13 Building and Materials:

- Buildings are generally one and a half or two storeys, and predominantly detached or semi-detached, with spans of between four and six metres.

- The vernacular detailing of walls is mainly of plastered timber frame construction, often with distinctive decorative pargetting in a variety of

patterns. A few flint and weatherboarded buildings occur. Gault brick occurs in some later buildings.

- Roofs are typically of longstraw thatch and plain clay tiles.

- Details of timber-framed buildings include steep roof pitches, four or five planked doors, casement and sash windows, and chimneys located laterally on the roof ridge, or at gable ends.

(left) Typical plastered house with clay tile roofing
(right) Typical gault brick and flint cottage

3.14 Trees and Hedgerows:

- Mixed Woodland
  Oak, ash, wild cherry. Glades and near edges: field maple.

- Hedgerows, Woodland Edges and Scrub
  Hawthorn, hazel, blackthorn, dog rose, crab apple, field maple and, occasional, dogwood.

- Trees in Hedgerows
  Oak, ash, field maple.

- Avenues
  Oak, lime, horse chestnut.

- Stream Sides
  Alder, white willow, crack willow, goat willow. Occasional: Guelder rose, dogwood. Occasional where not waterlogged: hazel, ash, oak.

Rural street scene

Design Principles

3.15 Based on the above analysis of landscape settlement and built character, the following key design principles are set out:

- Maintain the distinctive, dispersed settlement pattern of small villages and hamlets and isolated farmsteads, within the context of their wooded landscape setting.

- Ensure any small extensions to villages on hilltops are located along ridgelines, and extensions to villages on valley sides are located parallel to the contours of the hillside.

- Maintain the strong linear form of villages and hamlets by limiting backland and cul-de-sac developments.

- Ensure density and pattern of new developments reflect that of existing villages and hamlets. Houses should normally be set back from the street with front gardens, except where enclosure of the street frontage is important to the historic character.

- Use a framework boundary of native woodland, tree and thick hedge planting that reflect the local mixes, to integrate new developments.

- Ensure new developments reflect the form, scale and proportions of the existing vernacular buildings of the area and pick up on the traditional building styles, materials, colours and textures of the locality.

- Enclose boundaries facing roads by hedgerow or, in appropriate locations, low flint and brick walls.

- Avoid unnecessary widening or straightening of narrow hedge banked lanes.

- Ensure large barns are sited and designed to minimise their bulk and impact on the wider landscape, normally relating them to existing groupings of farm buildings. Prominent ridgeline sites should be avoided.

- Avoid the use of standardised and intrusive urban materials, street furniture, lighting and signage as part of traffic calming measures wherever appropriate.

B. The Chalklands

Parishes – Abington Piggotts, Balsham (western sector), Babraham, Barrington, Bartlow, Bassingbourn cum Kneesworth, Carlton (eastern sector), Duxford, Fen Ditton, Fowlmere, Foxton, Fulbourn, Great Abington, Great and Little Chishill, Great Shelford, Great Wilbraham, Guilden Morden, Harston, Hauxton, Heydon, Hildersham, Hinxton, Ickleton, Linton (west and south-east sectors), Litlington, Little Abington, Little Shelford, Little Wilbraham, Melbourn, Meldreth, Newton, Pampisford, Sawston, Shepreth, Stapleford, Steeple Morden, Stow cum Quy, Teversham, Thriplow, West Wratting (western sector), Weston Colville (western sector), Whaddon, Whittlesford.

Landscape Character

3.16 This character area is a broad scale landscape of large fields, low trimmed hedgerows and few trees. Certain high points have small beech copses which form strong focal points, and there are occasional shelterbelts around settlements. By way of contrast, the eastern part of the area is cut through by the valleys of the rivers Granta and Rhee, which have an intimate

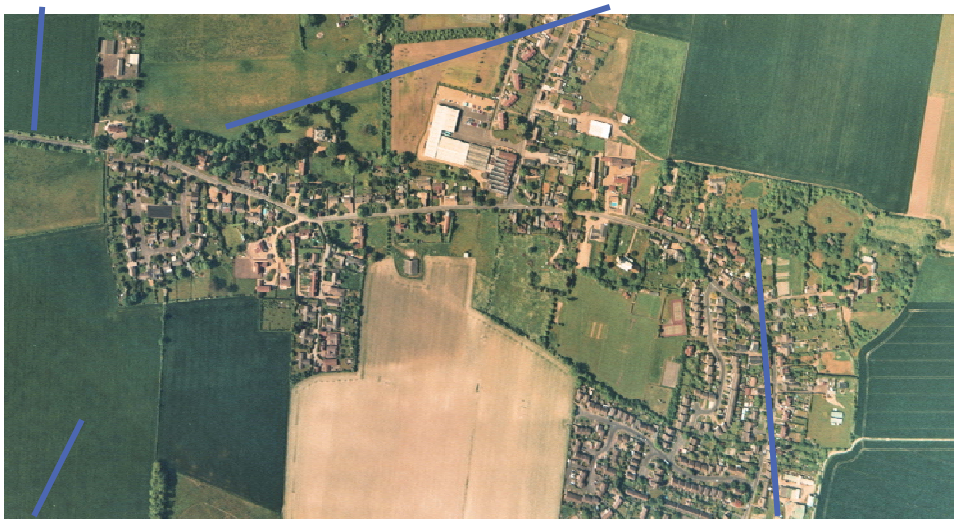
character of small grazing meadow and wet woodlands, with lines of willows along the rivers. Some historic parkland within these valleys also adds to their distinctive character.

3.17 The key characteristics are:

- A distinctive landform of smooth rolling chalk hills and gently undulating chalk plateau.
- A mostly large-scale arable landscape of arable fields, low hedges and few trees, giving it an open, spacious quality.
- Remnant of chalk grassland occurs on road verges and along tracks.
- Small beech copses on the brows of hills, and occasional shelterbelts, are important features.
- A wealth of historic and archaeological features, including; ancient trackways, earthworks, small chalk pits and pre-nineteenth century enclosures.
- Shallow valleys of the River Ganta and River Rhee have a rich mosaic of grazing meadows and parkland.
- Lanes are often straight, occasionally 'dog-legging'.
- Mostly strong rural character, though this is disrupted immediately adjacent to major roads such as the A505 and the M11.

Avenue tree approach

Village edge enclosed by mature trees



Large arable fields with occasional shelterbelts

Rough grassland & hedgerow trees provide soft edge

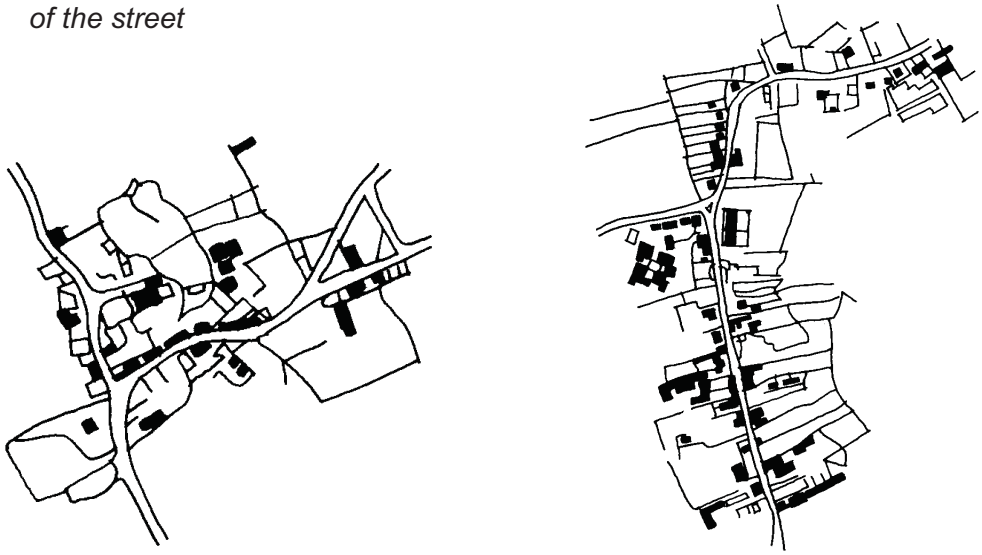
Typical settlement landscape setting

Settlement Character

3.18 Both small and large villages generally have a strong historic, linear form, though extensive modern estate developments have occurred in some villages close to Cambridge. Others, such as Bassingbourn, are the result of amalgamation of older hamlets. These linear villages widen out in places to include village greens, such as the large, oval green at Barrington and the smaller, triangular one at Heydon. A few villages, such as Little Shelford, have a rectangular form of looser structure with a number of important open spaces included. The village edges are varied, typically abutted by a mix of open fields, woodland, or smaller fields. Long back gardens also help to form a transition to the surrounding countryside.

Fowlmere
- Some continuous frontages
- Gently curving lane
- Properties located close to back edge of the street

Meldreth
- Straight lanes
- Deep plots



Street pattern arrangement of buildings

3.19 The key characteristics are:

- Small villages, such as Thriplow and Litlington, are located on gentle slopes along spring lines, or on hilltops, such as Great Chishill.

- Other villages, such as Hildersham and Little Shelford, are located within the river valleys on lower valleyside slopes, sometimes related to crossing points and fords.

- Mostly a well treed character to villages, which are often not visible in the wider landscape, despite adjoining open arable fields. Avenue

trees on wide road verges are characteristic of some approaches, such as Fowlmere.

- Enclosed meadows and parkland are important features of village setting in the river valleys.
- Village greens are frequent, both small and large.
- Mostly linear form to the settlements.
- Buildings are either arranged as continuous frontages facing streets, or have a much looser pattern with open land interspersed.
- Deep, narrow rear gardens.
- Many mature trees, both in front gardens and on the grass verges, together with streams and ponds, add to the rural character.
- A few isolated farm buildings are sited at track ends, often hidden by groups of mature trees or shelterbelts.

Typical street scene

3.20 Building and Materials:

- Buildings are traditionally two storey, simple and small in scale. A few, large, two and a half, or three storey eighteenth and nineteenth century houses occur in some villages.
- A wide variety of materials are used in walls, including; plastered timber-frame constructions (weatherboarded or rough-cast render on

laths) clunch, clay bat, knapped flint, plain gault brick, red and yellow gault brick. Farm buildings are typically black-tarred weatherboarding. Colours of buildings are generally light and warm, often pale cream, but some are painted pale pink or yellow and, occasionally, earthy red.

- Roofs of vernacular buildings are typically of longstraw, thatch and plain clay tiles and pan-tiles, with some more recent use of Welsh slate and reed thatch.

- Plastered timber-framed building details include; high-pitched roofs, drip-boards set in the gable ends and over windows, four or six panelled or planked doors, and with chimneys set laterally on the ridge to roofs.

- Eighteenth and nineteenth century house details include; low-pitched roofs, vertical sliding sash windows set in deep reveals over shallow stone sills, with gauged or segmental brick arched lintels and chimneystacks incorporated within the building at the gables.

(left) Use of plaster and thatch
(right) Nineteenth century houses with slate, brick and render

- Both low and high flint boundary walls are common, some with red brick detailing. Clipped hedges and simple picket fences also provide boundary features. Occasionally simple iron railings are associated with larger houses.

- Many of the twentieth century estates do not respond to the local vernacular.


Flint and brick walls

3.21 Trees and Hedgerows:

- Beech Hangers
  Beech, with occasional additional species from 'Mixed Woodland' below.

- Mixed Woodland
  Beech, ash. Less common: small-leaved lime, hornbeam, wild cherry, yew. Glades and near edges: field maple.

- Hedgerows, Woodland Edges and Scrub
  Hawthorn, hazel, blackthorn, field maple, dog rose, and, occasional, wild privet and wayfaring tree.

- Trees in Hedgerows
  Ash, beech, field maple.

- Avenues
  Predominately Beech or ash.

Design Principles

3.22 Based on the above analysis of landscape settlement and built character, the following key design principles are set out:

- Maintain the distinctive, settlement pattern of the area and its local context.

- Ensure any extensions to springline villages are located along the bottom of steeper slopes and along lanes.

- Ensure any extensions to river valley villages are located along the line of the river, or at right angles to it, depending on the direction of the main transport route.

- Maintain the linear, or rectilinear form of the settlements.

- Ensure density and pattern of new developments reflect that of existing villages and hamlets. Avoid backland and cul-de-sac developments where possible.

- Ensure buildings are arranged in continuous frontages within village cores and are arranged in loose knit patterns facing the street on more peripheral sites.

- Ensure new developments are integrated with sufficient space for garden and street tree planting where applicable.

- Enhance village gateways and, where appropriate, consider provision of avenue planting on village approaches.

- Take opportunities to create new village greens and/or wildlife areas within new developments.

- Ensure new developments reflect the form, scale and proportions of the existing vernacular buildings of the area and pick up on the traditional building styles, materials, colours and textures of the locality.

- Enclose boundaries facing the street in village cores by low, or high, flint walls with brick detailing, simple decorative railings, picket fencing or hedging.

- Retain hedges along roads.

- Enclose boundaries facing the street on village peripheries with hedge and tree planting.

- Avoid the use of standardised and intrusive urban materials, street furniture, lighting and signage as part of traffic calming measures wherever appropriate.

- Ensure new agricultural buildings, such as large storage sheds, are sited and designed to reduce their apparent mass, minimising their impact on the wider landscape by the appropriate use of texture, colour and planting.

C. The Western Claylands

Parishes – Arrington, Bar Hill, Barton, Bourn, Boxworth, Caldecote, Caxton, Childerley, Comberton, Conington, Coton, Croxton, Croydon, Dry Drayton, Elsworth, Eltisley, Grantchester, Graveley, Great Eversden, Hardwick, Harlton, Haslingfield, Hatley, Kingston, Knapwell, Little Eversden, Little Gransden, Lolworth, Longstowe, Madingley, Orwell, Papworth Everard, Papworth St Agnes, Shingay cum Wendy, Tadlow, Toft, Wimpole.

Landscape Character

3.23 This character area comprises gently undulating arable farmland with, mostly, large fields and low trimmed hedgerows. Occasional medium to large sized ancient woodlands provide a distinctive feature and church towers and spires are key landmarks. Despite the presence of some major roads, much of the area has a relatively tranquil, rural character.

3.24 The key characteristics are:

- The gently undulating topography is divided by broad, shallow valleys.
- It is a predominantly open and intensive arable landscape. Fields are either bounded by open ditches, or closely trimmed hedgerows, both with a variable number of hedgerow trees.
- Woodlands are scattered. Large, ancient woodlands are particularly concentrated in the north and west of the area.
- Occasional parklands and orchards add interest and variety in the landscape.

- Small pasture fields with origins in 'ancient countryside' provide a buffer between settlements and medium size fields enclosed in the nineteenth century.

- Many nineteenth century enclosure fields have been amalgamated to produce very large arable fields.

- Each village is identified by a church spire, or tower, which enliven the skyline.

Small hedgerowed pastures and medium to large arable fields

Soft village edge with many mature trees

Thick hedgerows on road approaches

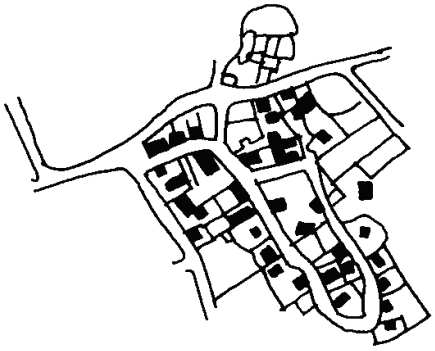
Streamside vegetation

Typical settlement landscape setting

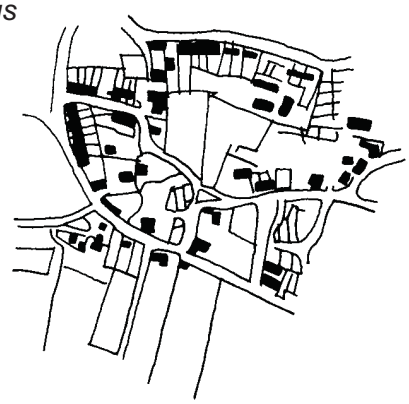
Settlement Character

3.25 The mostly small, scattered villages of this area often have well defined edges provided by mature trees, thick hedgerows, copses or parkland. Small fields and paddocks also contribute to their landscape setting, providing a transition to the surrounding countryside. Many of the villages have a strong, linear form with rows of cottages and a few, larger farmsteads facing roads and paths. Highfields Caldecote (which has a planned rectilinear street pattern) and Bar Hill (which is a C20th new community) are not typical of the area.

Elsworth
- Winding lane
- Houses at back edge or close to lanes



Haslingfield
- Fields in the heart of the village
- Loose-knit arrangement of buildings



3.26 The key characteristics are:

- Villages are either located on the sides of small valleys (such as Bourn and Little Gransden), along spring lines (such as Haslingfield) or on slightly elevated ground within broad valleys (such as Comberton and Grantchester).

- Woodlands, copses, paddocks and, occasionally, parklands contribute to the distinctive landscape setting of villages, creating a wooded character and providing a link to the surrounding countryside.

- The historic villages are mostly linear in form, despite modern infilling in some villages.

- Buildings are typically arranged in loose knit patterns, sited close to roads or paths. Frontages include open spaces which allow visual unity with surrounding fields and woodlands.

- Mature trees, hedges, picket fences and walls contribute to the informal rural character.

- Small irregularly shaped village greens are sometimes a feature, such as at Madingley.

- Outside the village core areas there are often scattered isolated farms, with some intrusive modern farm buildings.


(left) View to church tower on skyline
(right) Irregular shaped village green

3.27 Building and Materials:

- Buildings are generally one and a half or two storeys in height and domestic in scale.

- A variety of wall materials are used, including; plastered timber-frame construction (mostly cream in colour), warm red brickwork and occasional yellow brick. Farm buildings are typically of brick, weatherboarding and flint.

- Roof materials include plain clay tiles, pantiles longstraw thatch and Welsh slate.

- Details which characterise timber-frame buildings include; high pitched roofs, casement windows or horizontal sliding sashes (Yorkshire sashes) set flush with the outside face of the wall, drip boards set in the gable ends and over windows, four or six panelled or planked doors and chimneys set laterally on the roof ridge.

- Eighteenth century houses, which occur in a few villages such as Grantchester, have details that include four and six panelled front doors, gauged brick arches over windows and distinctive cornices.

- Nineteenth century houses, which occur in a few villages such as Grantchester and Comberton, have details which may include; sawtooth dentil courses under the eaves, four or twelve pane vertical sliding sash windows, four panelled doors, contrasting brick dressing or decorative polychromatic brick banding and chimneys sited at the gables flush with the gable walls.

- Many modern estates in the larger villages, such as Comberton, do not respond to the local vernacular.


(left) Typical street scene with thatch, brick and plaster
(right) Use of warm red bricks with plain clay tiles


(left) Farm building with brick banding
(right) Hitch brick boundary wall

3.28 Trees and Hedgerows:

- Ancient woodlands and later mixed Woodland
  Oak, ash. Less common: wild cherry. Glades and near edges: field maple.

- Hedgerows, Woodland Edges and Scrub
  Hawthorn, hazel, blackthorn, dog rose, crab apple, field maple and, occasional, dogwood.

- Trees in Hedgerows
  Oak, ash, field maple.

- Avenues (all one species, not mixed)
  Oak, lime, horse chestnut.

- Stream Sides
  Alder, white willow, crack willow, goat willow. Occasional: Guelder rose, dogwood. Occasional where not waterlogged: hazel, ash, oak.

Village character enriched by mature trees

Design Principles

3.29 Based on the above analysis of landscape settlement and built character, the following key design principles are set out:

- Maintain the distinctive settlement pattern of mostly small, scattered villages and isolated farmsteads.
- Ensure any extensions to valleyside villages are located parallel to contours or at right angles to them along lanes reflecting the historic settlement form.
- Ensure the linear or rectilinear form of settlements is maintained, avoiding backland and cul-de-sac development where possible.
- Ensure buildings are arranged in a loose knit form, generally facing and close to, or set a little back from, the streets.
- Ensure developments are well integrated with the local patterns of tree planting and hedgerows.
- Ensure new developments respond to the form, scale and proportions of the existing vernacular buildings in the area, for example, reflecting the traditional building styles, materials, colours and textures of the locality.

- Mark street boundaries by the use of simple picket or trellis fencing, hedges, or low brick walls as appropriate.

- Retain hedges and introduce them as boundaries alongside roads outside village cores.

- Avoid unnecessary straightening and widening of narrow country lanes and the use of standardised and intrusive urban materials, street furniture, lighting and signage as part of traffic calming measures wherever appropriate.

- Ensure new, large agricultural buildings, such as barns, are sited and designed to reduce their apparent mass, and minimise their impact on the wider landscape by the appropriate use of texture, colour and planting.

- Conserve small pre-nineteenth century paddocks.

D. The Western Greensand

Parishes – Gamlingay

Landscape Character

3.30 This is a very small character area associated with the undulating dip slope of the Lower Greensand ridge. It is drained by small streams and there are some locally steep slopes. The fairly wooded landscape is interspersed with medium sized arable fields, small areas of pasture and market gardening. There are also small areas or remnant parkland and heath. Despite the presence of some worked out gravel pits, the area retains a predominantly rural character.

3.31 The key characteristics are:

- Undulating dip slope of the Lower Greensand ridge, drained by small streams creating a relatively small scale, varied landform.
- The area has a mixed land use pattern of arable farmland, pasture and market gardening, and deciduous and coniferous woodland.
- Remnant patches of heathland and parkland tree belts add interest and variety.

Settlement Character

3.32 Within the area there is a dispersed pattern of farmsteads and cottages along lanes and one large village of Gamlingay. This has radiated out from a crossroads along five routes. The eastern half of the village is dominated by the historic core, which is of a linear development along Church Street, and the openness created by the village college playing fields. In the western half modern residential and industrial infill has occurred. The historic core comprises a wide range of buildings, many fronting directly onto the street, creating a sense of narrowness and enclosure.

Gamlingay
- Crossroads location
- Continuous building frontages mostly on back edge of pavement – found especially on Church Street and parts of Mill Street

Street pattern

3.33 The key characteristics are:

- Farmsteads, cottages and small, detached houses associated with smallholdings are dispersed along lanes.
- Historic core of Gamlingay retains a strong linear form with mostly continuous frontages radiating out along roads.
- Narrow, gently curving streets, with houses generally sited on the back edge of the pavement.
- Open fields, hedgerowed paddocks, woodland and stream valleys contribute to the distinctive landscape setting, despite a harsh urban edge in parts.

3.34 Building and Materials:

- Buildings are generally one and a half or two storeys, with spans of between four and six metres.
- The range of building styles within the village includes small vernacular cottages, medieval farmhouses and buildings, eighteenth, nineteenth and early twentieth century villas together with many nineteenth century terraces.
- Walls are constructed of timber-frame with plastered finish (coloured cream, yellow and pale pink) carstone (sandstone) and red and yellow brick. Farm buildings are of weatherboarding and brick.
- Vernacular roofs are of plain clay tiles, pantiles, longstraw thatch and Welsh slate.
- Timber-framed building details include; high pitched roofs, casement or sash windows set flush with the outside face of the walls, drip boards set in the gable ends and over windows and chimneys sited laterally on the roof ridges.


(left) Brick with plain tile roof
(right) Nineteenth century gault brick with render mouldings

3.35 Trees and Hedgerows:

- Mixed Woodland
  Oak, ash. Less common: wild cherry. Glades and near edges: field maple.

- Hedgerows, Woodland Edges and Scrub
  Hawthorn, hazel, blackthorn, dog rose, crab apple, field maple and, occasional, dogwood.

- Trees in Hedgerows
  Oak, ash, field maple.

- Avenues
  Oak, lime, horse chestnut.

- Stream Sides
  Alder, white willow, crack willow, goat willow. Occasional: Guelder rose, dogwood. Occasional where not waterlogged: hazel, ash, oak.

Design Principles

3.36 Based on the above analysis of landscape settlement and built character, the following key design principles are set out:

- Maintain the distinctive, dispersed settlement pattern of farmsteads, cottages and small, detached houses along lanes, seeking to avoid infill.

- Maintain the distinctive settlement setting of Gamlingay, including; small stream valleys, woodlands, mature hedgerows and trees. Ensure new developments improve any existing harsh edges with a

framework of new hedges, trees and woodland planting relating to local mixes.

- Maintain the traditional linear form of Gamlingay by limiting backland and cul-de-sac developments.

- Ensure buildings are positioned to reflect local patterns such as mostly continuous frontages running along the back edge of pavements, with only occasional gaps, giving glimpses of countryside beyond.

- Ensure new developments reflect the form, scale and proportions of the existing vernacular buildings of the area and pick up on the traditional building styles, materials, colours and textures of the locality.

- Enclose boundaries facing onto roads by brick walls in the village core.

- Retain hedges and introduce them as boundaries alongside roads outside village cores.

- Avoid the use of standardised and intrusive urban materials, street furniture, lighting and signage as part of traffic calming measures wherever appropriate.

- Ensure large barns are sited and designed to minimise their bulk and impact on the wider landscape, normally relating them to existing groupings of farm buildings.

E. The Fen Edge

Parishes – Cottenham, Fen Drayton, Girton, Histon, Horningsea, Impington, Landbeach, Longstanton, Milton, Oakington, Over, Willingham, Rampton, Swavesey, Waterbeach, Westwick.

Landscape Character

3.37 This character area has a mostly flat, low-lying landscape with open views. However, scatterings of clumps of trees, poplar shelterbelts and occasional hedgerows sometimes merge together to give the sense of a more densely treed horizon. Straight running 'lodes', drains and north-south droves are distinctive features. The Great Ouse river and the 'lodes' are enclosed by raised banks, which sometimes provide valuable grassland habitats, or are marked by lines of willows. Low sand and gravel fen 'islands' rise above the flat landscape and have provided an historic focus for settlements. Smallholdings for market gardens, flower growing nurseries and orchards introduce additional local variety and interest in the landscape.

Open fen landscape
Evidence of medieval long fields

Enclosed farmland and long gardens provide soft edge

Mature trees and hedgerows contribute to landscape setting

Village green

Typical settlement landscape setting

3.38 The key characteristics are:

- A low-lying, flat open landscape with extensive vistas.
- Large skies create drama.
- A hierarchy of streams, 'lodes', drains and ditches dissect the landscape.
- The rich and varied intensive agricultural land use includes a wide range of arable and horticultural crops and livestock.
- Orchards are a distinctive feature.

- Slightly elevated fen 'islands' have a higher proportion of grassland cover, trees and hedgerows.

- Small scale, irregular medieval field patterns are still visible around the edge of settlements.

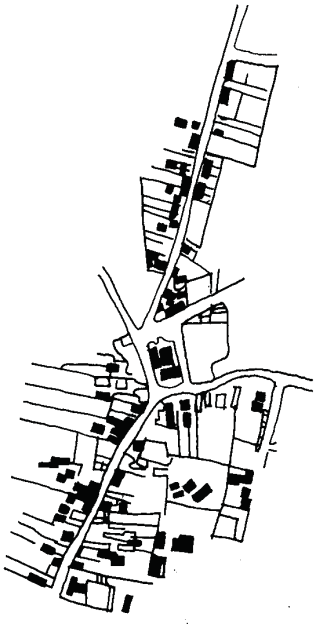
- Church towers and spires create landmarks.

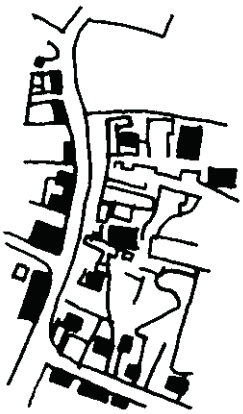
Settlement Character

3.39 The villages on the low fen islands are characterised by their strong linear form, often having developed outwards from crossroads along approach roads. The historic linear form is retained despite the modern estate developments that have occurred in many of the villages. Some village edges, such as at Cottenham, have a well wooded character, with hedgerows and mature trees concealing buildings, while others, such as Fen Drayton, have more open edges. Within the historic cores narrow lanes with continuous street frontages are typical, but on village edges buildings are more often setback with low walls and hedges fronting the streets. Long back gardens are also a common feature.

Willingham
- Groups of buildings on or close to the back of the pavement in the village core
- Discontinuous frontages on edge of settlement

Fen Drayton
- Narrow lanes
- Intimate character





3.40 The key characteristics are:

- Historic cores of villages are located on the fen islands, although some modern development has spread onto low-lying land.

- Settlements sit low in the landscape, often screened by thick hedgerows to paddocks, copses, groups of mature trees and orchards.

- Strong linear form and street pattern.

- Narrow lanes with continuous street frontages create an intimate character.

- More loose knit arrangement of buildings facing the roads on some village approaches, with open areas and mature hedges interspersed.

- Occasional central medieval village greens formed from infilled historic docks and wharves.

- Clusters of glasshouses, farms, cottages and some modern detached houses are located along lanes.

(left) Typical street scene
(right) Central village green

3.41 Building and Materials:

- Vernacular buildings are typically small scale, one and a half or two storeys in height. A few larger villas occur in some village core areas.

- Wall materials vary; yellow Gault clay brickwork predominates, but plastered timber-frame, dark stained weatherboarding and red brick are also present.

- Roofs are historically of thatch and plain clay tiles, with pantiles and Welsh slate being later introductions.

- Timber-frame building details include; steeply pitched roofs, side hung timber casements set flush to the outside face of the wall, drip boards

set on gable ends and over the windows, with four or six panelled or planked doors.

- Eighteenth and nineteenth century house details include; vertically sliding sash windows set in reveals over shallow stone cills and with gauged or segmental arched brick lintels over, four or six panelled doors in simple classical door cases incorporating fan lights and chimneys incorporated within the buildings or at gable ends.

- Some brick buildings in the village cores have Dutch gables, reflecting the eighteenth and nineteenth century's links with the Low Countries.

(left) Typical eighteenth century house details
(right) Typical nineteenth century house details

(left) Dutch gable
(right) Brick and clay pantile

3.42 Trees and Hedgerows:

- Peat and Silt Fenland
  Ash, white willow, oak, field maple, birch, white poplar, hybrid black poplar, goat willow, grey willow, hawthorn, guelder rose, dogwood, horse chestnut, sycamore.

- Fen Islands
  Ash, oak, field maple, crab apple, wild cherry, white willow, goat willow, hawthorn, hazel, dogwood, blackthorn, wild privet.

(left) Simple brick bridge
(right) Orchards on settlement edges

Design Principles

3.43 Based on the above analysis of landscape settlement and built character, the following key design principles are set out:

- Ensure any village extensions are located on the high ground of the Fen Islands, avoiding incremental development on the flat, low-lying fen.

- Ensure new developments on the edges of villages are integrated by thick hedgerows, copses and shelterbelt planting reflecting the local mixes. Ensure a transition between Fen and Fen Island by retention and creation of small hedgerowed paddocks.

- Conserve and enhance existing orchard and hedgerowed paddocks.

- Maintain linear or rectilinear form of the settlements and avoid closes and cul-de-sacs where possible.

- Ensure buildings are mostly set on the back edge of pavements, or face the street with small front gardens in the village cores.

- Ensure new developments reflect the form, scale and proportions of the existing vernacular buildings of the area and pick up on the traditional building styles, materials, colours and textures of the locality.

- Enclose boundaries facing onto roads by low brick walls and/or simple iron railings, timber picket fences and hedges as appropriate in the village cores.

- Retain hedges and introduce them as boundaries alongside roads outside village cores.

- Integrate water features, such as ditches dykes and ponds, into new developments as part of open spaces.

- Avoid the use of standardised and intrusive urban materials, street furniture, lighting and signage as part of traffic calming measures wherever appropriate.

OUTLINE OF TRADITIONAL BUILDING FORMS AND ELEMENTS OF THE AREA

3.44 The vernacular architecture of a region is heavily influenced by the building materials available in that area, which in turn are related to the geology. The geology of South Cambridgeshire is outlined in Chapter 2, and basically comprises chalk in the southern parts of the district with clay further north.

3.45 This limited palette of materials gives traditional buildings a consistency of appearance despite their many periods and designs. This helps to identify and characterise the locality and our towns and villages.

Walling materials

Timber Frame

Close studded timber frame

3.46 In South Cambridgeshire there is a distinct lack of good building stone and, therefore, the majority of early traditional buildings were constructed of timber-frame; the area once boasted a plentiful supply of good timber. The timber-frame construction in Eastern England was generally box framed in oak, with the timber studs set at close centres to produce vertical panels, as opposed to the square panels found in the Midlands. There is no tradition of cruck frames within this area.

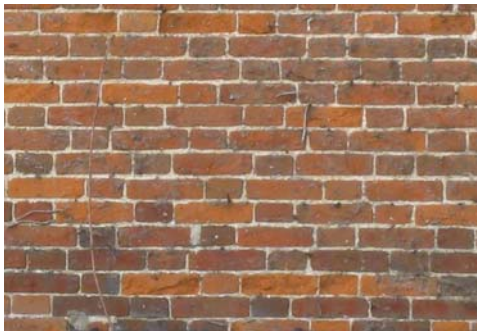
3.47 Where the oak frame was of sufficient quality to be exposed externally, the intervening panels were infilled using wattle and daub. In South Cambridgeshire, this involved wattles of hazel being woven, basket fashion, around light oak staves fitted between the frames. The whole was then daubed on both sides with a mixture of clay, dung and chopped straw, and protected from the weather by a coat of limewash.

3.48 An unbroken weather protective cladding had several potential advantages over wattle and daub infill, and this led to the widespread use of lime plaster on riven wooden laths nailed to the outside face of the studs. The render finish could be plain, decorated with a white or colour wash, or moulded into one of a number of patterns, known as pargetting. Decorative pargetting first appeared at the end of the sixteenth century, though the technique reached its height of popularity in the latter half of the seventeenth century and eventually fell out of favour in by the middle of the eighteenth century. The patterns are often distinct from modern pargetting patterns. Historically pargetting was confined to the east of Cambridgeshire, along the Suffolk/Essex borders. Colours on rendered buildings are generally light and warm, often pale cream, but some buildings are painted pale pink or yellow and, occasionally, earthy red.

3.49 Weatherboard is typical of outbuildings and minor domestic buildings and extensions. Historically it was limewashed on houses and black tarred or left as natural oak or elm on outbuildings. The hierarchy of use on new buildings would be in accordance with this local tradition.

3.50 On lesser structures, such as cottages and agricultural buildings, timber weatherboarding provided an alternative cladding material to lime plaster. Weatherboarding is known to have been in use from around 1600, when oak or elm boards were pegged to the timber-frame. The use of deal (softwood) boards nailed to the studs dates from the latter part of the eighteenth century. Deal needed protection from the elements unlike oak and elm, which could be left un-painted. More recently, imported cedar has been used and weathers to a darker colour than the silver-grey characteristic of oak or elm.

Brickwork

(left) Early gault brick in garden wall bond
(right) Red brick in Flemish bond

3.51 The Romans first introduced the art of brick making into Britain, but this knowledge was lost in the Dark Ages. Following the introduction of brick making from the continent, bricks began to be used again in Britain during the seventeenth century. Initially there were isolated examples of narrow red bricks imported to Cambridgeshire to be used on high status buildings. This was followed by the use of local Gault clay for the manufacture of bricks, originally using narrow dimensions similar to the imported bricks. From the eighteenth century onwards there is an increasing use of brickwork in the region.

3.52 The early local bricks were generally red or a 'white' brick that weathered grey. In the nineteenth century, manufacture of the characteristic yellow 'Cambridge stock' brick commenced.

3.53 Traditional brick walls were constructed using Flemish bond, English bond or, sometimes, English Garden Wall bond (all of which incorporate headers into the visible pattern). The use of stretcher bond only developed in the twentieth century, in parallel with the development of the cavity wall. Other traditional details include the use of cut arches or oak lintels over openings and a traditional flexible lime mortar avoiding the need for movement joints.

Unfired Brickwork

3.54 The glacial boulder clay that overlies the chalk in the south-east area of the district was used predominately during the eighteenth and early nineteenth centuries to produce a form of unfired brickwork used in walling, known as clay-bat or clay lump. The process involved digging out the clay, removing the flints and other large stones, mixing it with chopped straw, then compressing the mixture into wooden moulds before leaving it for several weeks to dry out. Clay bats were time-consuming but cheap to produce, and a good insulant. The 'bricks' were much larger than a fired brick, at around 450mm long, by between 125 and 225mm high and 150mm thick. The external face of a clay-bat wall needed protection from the elements; on agricultural buildings this was often by a coat of tar. Tar could also used on cottages, in which case it was generally sanded and colour-washed, but it was equally as common for cottages to be rendered in a lime plaster.

Stone

(left) Clunch wall
(right) flint wall

3.55 The chalk that underlies much of the district does not make a particularly good, or durable walling material. Chalk is a form of particularly pure limestone, it is very soft, which means it is easy to work, but is vulnerable to rapid weathering, especially in a polluted atmosphere. Within the lower chalk beds of Cambridgeshire the chalk is more compacted than that found elsewhere in south-east England and this has enabled it to be used as a building stone, known as clunch. The qualities of the stone made it possible for the chalk to be cut into squared, ashlar blocks, and it was widely used for internal walls, arcades and capitals in churches, but equally, if carefully detailed and protected by render or limewash, or under good roof overhangs, it could be used externally.

3.56 The flints which occur naturally within the local chalk are much more durable than clunch, but are extremely difficult to work. The rounded nodules of flint are also difficult to bond and to terminate at window and

door openings. Therefore, when flint is used for walling, the nodules of flint are often set in relatively thick mortar beds and combined with brickwork or ashlar stonework to frame rectangular openings for windows and doorways, and to turn corners. Where a truer face is required to the wall, one side of the flint nodule may be crudely faced or knapped. Flint is usually laid in courses, sometimes only noticeable when viewed close to along the wall. In South Cambridgeshire flint is frequently used in the construction of churches, but is not so widely used for secular buildings as in other chalk areas. It is more generally confined to boundary walls and the occasional cottage, and then often dates from the nineteenth century.

3.57 The outcrop of Greensand hardly makes an impression on South Cambridgeshire and it is only significant in the west of the district around the village of Gamlingay. Here the parish church is built of Greensand, but otherwise it is not used as a building stone.

3.58 Stones such as Bath and Ketton stone were imported to the area primarily during the eighteenth and nineteenth centuries for weathering and architectural detailing on brick-built higher status buildings, such as schools, chapels and larger houses. Combinations of stone detailing and render walls are not traditional as the render generally signifies a timber frame.

Roofing materials

Thatch

3.59 Thatch has been widely used throughout South Cambridgeshire. Long straw is the traditional material used throughout most of the district, although some water reed has always been used on the fen-edge. In more recent times there has been an increase in the use of reed over long straw, due to the greater longevity and availability of imported reed. It is important that the long straw tradition is maintained within the district since it has a distinctive character and produces a roof that is visually different to one covered in reed. One very obvious difference between the two materials is in the detailing of the ridge. Reed is stiff and brittle, and cannot be bent over a ridge. Therefore, on a reed thatch roof the ridge is formed with an additional layer of thatch, using sedge, tough grass or straw (that may incorporate decorative embellishments to its lower edge). A true long straw thatch roof on the other hand has a simple, unadorned ridge. All thatch roofs in South Cambridgeshire are steeply pitched, at 50 degrees and over.

Tile

3.60 Roofing tiles used within the region are produced in two forms; plain tile (peg tile), which are relatively small and are laid with double lap on moderately steep pitches (40 to 50 degrees), and pan-tiles, which are larger and are laid with a single lap at shallower pitches (35 to 45 degrees).

Production of roofing tiles from the Gault Clay of the district dates back to the fifteenth century for peg-tiles, with clay pan-tiles becoming widespread from the eighteenth century. Plain tile was the most expensive local roofing material and therefore used for higher status buildings. Pantile was used traditionally for outbuildings and smaller houses. Machine-made plain tiles were introduced during the mid nineteenth century and have a flatter appearance and noticeably more mechanical character than hand made tiles.

Local plain tile and pantile

Slate

3.61 The continued use of thatch perpetuated the risk from fire, especially within the densely built up village centres, and there remained a need for a readily available source of cheap, durable and non-flammable roofing material, as well as a desire to roof over shallow pitches. After the introduction of the railways in the middle of the nineteenth century, Welsh slate was able to fulfil this need and became widely used throughout the district (where it is laid at pitches as low as 25 degrees). The resulting low-pitched roofs are characteristic of Georgian and Victorian buildings. Slate used in South Cambridgeshire is therefore a distinctive Welsh mid grey or grey-pink colour rather than the dark grey and black seen on foreign imported slates.

Mid blue-grey Welsh slate

Timber

3.62 Timber shingles are used for outbuildings and garden buildings and can be used at very low pitches. Imported materials like cedar weather differently to traditional local materials such as oak and can be more vulnerable to attack by woodpeckers. Hand-cut shingles have more texture and stability and can be used at lower pitches than machine-cut.

Metal

3.63 Corrugated iron is often found as a temporary material on roofs that have failed. It is characteristically cheap but sometimes appropriate at very shallow pitches or to provide an industrial or agricultural character.

3.64 Lead was rarely used prior to the eighteenth century other than on churches. It is characteristic of high status buildings, usually laid to an almost-flat slope. Early lead was cast, but during the nineteenth century milled lead was developed which was thinner and cheaper. Terne-coated stainless steel has a similar colour, and is sometimes a modern alternative where there is a problem with theft of lead, although it is thinner and therefore care is needed to match lead details convincingly.

3.65 Copper was rarely used prior to the nineteenth century and is not characteristic of traditional buildings of the area. It was popular during the Arts and Crafts period and weathers to a distinctive bright green.

Felt and asphalt

3.66 Typical of lower status twentieth and twenty-first century flat roofs, they require much higher maintenance than traditional materials.

Glass

3.67 Glass roofs are typical of greenhouses of the late nineteenth century and later, when glass could be manufactured more reliably and in larger sizes. Less traditional glass roofs are characteristic of the late twentieth century onwards. Glass pantiles were used in the late nineteenth and early twentieth century to light outbuildings and agricultural buildings.

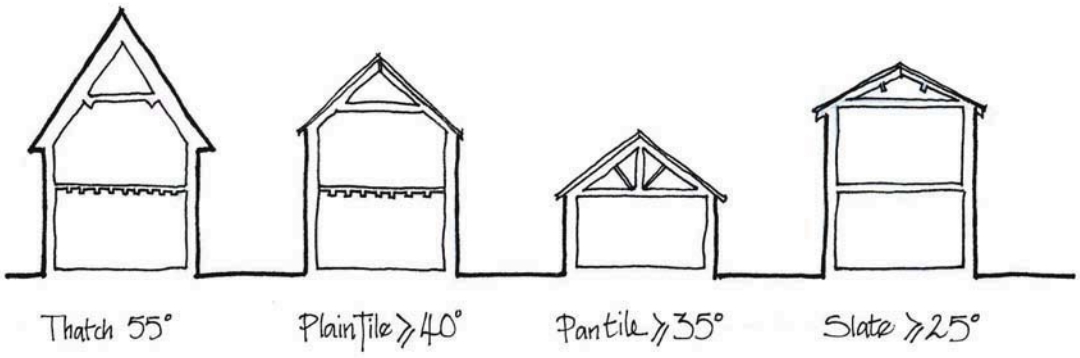


Diagram illustrating different roof pitches for different materials

Details

Windows



(left) Horizontal sliding (Yorkshire) sash window
(middle) Side opening casement window
(right) Vertical sliding sash window (with circa 1800 marginal light design)

3.68 Windows were generally of timber and their design was closely associated with developments in the techniques of glass making. Up until the end of sixteenth century glass was too expensive for use in all but the grandest of houses, so windows in smaller houses were frequently left un-glazed, with wooden shutters introduced during the latter half of the seventeenth century. Early glass could only be produced in very small panes and early windows comprised pieces of glass in lead cames set in wrought iron frames and fitted into an outer timber frame. This timber frame was in oak, elm or chestnut and was often left untreated. As the use of glass became more common, leaded lights were frequently retrofitted into older buildings.

3.69 From the mid seventeenth and early eighteenth centuries onwards, the design of windows began to reflect classical styles. Good quality softwood became the predominant material, decorated with paint or (occasionally) graining.

3.70 Square openings in vernacular buildings were generally fitted with side-hung or horizontal sliding ('Yorkshire') timber casements which had wooden glazing bars used to subdivide each casement. The casements were set level with or behind their frame, unlike the modern 'storm casement'.

3.71 Vertical sliding sash windows were first introduced at the end of the seventeenth century. The earliest sash windows were in painted oak rather than softwood with wide ovolo glazing bars and generally had their top casement fixed shut. The section of the glazing bars became more refined over time and varieties such as lamb tongue mouldings were introduced.

3.72 Throughout the eighteenth century the pattern of sash windows generally remained that of 6 panes to each sash (6 over 6). Around the middle of the nineteenth century advances in glass production enabled the pane size to be increased and the subdivision of sash windows simplified; initially to 3 over 3, then later to 2 over 2 and, finally, to a single, large pane in each sash. These larger panes were of thicker glass, and therefore heavier. In order to carry this additional weight the frames needed to be strengthened, and this led to the use of horns on the sashes from the middle of the nineteenth century onwards.

3.73 Often a mix of window types is found. This often shows the hierarchy of the building; with newer styles of windows in the main reception and higher status rooms and earlier styles of windows in ancillary and subservient lower status spaces.

3.74 During the Tudor Revival of the late nineteenth and early twentieth centuries, there was a short-lived re-introduction of iron frames in untreated oak frames, to reflect the period style of the building.

3.75 Cast iron windows in distinctive decorative patterns were also introduced in the late nineteenth century. Where found, it is important they are retained, but they are difficult to reproduce.

3.76 Steel windows and doors date from the early twentieth century onwards and are characteristic of modernist and minimalist designs.

3.77 Early glass has distinctive manufacturing marks and reflective patterns giving interest and liveliness to a façade and should be retained where found.

Doors

3.78 The entrance door evolved with two functions in mind; defence - whether it be against human invaders or the wind and rain, and display - emphasising the house owner's position in the world. Because doors have been, to

some extent, a symbol of prestige, they have also been influenced by the prevailing fashion of the time.

(left) An internal boarded (planked) door
(middle) Late eighteenth century door
(right) Nineteenth century door

3.79 Early doors were often defensive in character, constructed of heavy oak planks, smoothed with an adze, and fastened onto horizontal boards. The two faces were secured with wooden pegs or iron studs and the doors were hung on strap hinges, with iron pins seated directly in the timber surround to the door and no intervening doorframe. Security was achieved through the use of an internal draw-bar, with no handle or knob on the outside.

3.80 In the seventeenth century the basic construction did not change, but the number of vertical planks to each door increased and the edges were sometimes moulded as the planks themselves became narrower and defence gave way to decoration. External fastenings were introduced, normally a heavy iron ring-pull. Whilst in some buildings there was still no separate doorframe, in others the door closed flush against a heavy timber frame.

3.81 Towards the end of the seventeenth century, these boarded doors evolved into ledged doors where, instead of a double layer of timber, the vertical boards were supported by three horizontal ledges on the internal face. The earliest ledges were relatively thin. Later doors had thicker ledges and became the ledged and braced door that remained in widespread use right up to the middle of the twentieth century, especially for subservient rooms and rural and less fashionable buildings. The diagonal braces provided additional strength and rigidity. Simple strap hinges connected the flush face to a rebated timber doorframe with metal 'Suffolk' type latches as the most common type of fastening. Strap hinge details varied over the centuries and their position moved from outside to the inside of the door. Likewise the planks were originally butt-jointed, often with a small bead

moulding on the joint. This gradually evolved during the twentieth century to tongue and groove.

3.82 In the eighteenth century the revival of interest in the architecture of Greece and Rome resulted in a sophisticated and elegant architectural style within which the panelled doors became the norm. Details of the panels varied widely, but the six-panelled version became the most common. Some panels were flush with the stiles and rails others were raised and fielded. Hinges had to be unobtrusive, so as not to spoil the effect, and often H or L type hinges were used. Internally, the door no longer opened into a main room but into a smaller hallway and fanlights over the door allowed light to reach this internal space. The classical doorcase, with pilaster and pediment (triangular or segmental), emphasised the social significance of the door. Door 'furniture' became more elaborate with knockers, door knobs and eventually letter-boxes, all normally made of brass. Boot scrapers outside the door protected the polished floors and rugs inside. In the nineteenth century the number of panels gradually diminished until four-panelled doors became the most usual type. One large raised and fielded panel at the bottom was not, however, uncommon, particularly in the latter part of the century. Overall the effect was chunkier and more 'solid' than the elegance of the eighteenth century. Fanlights too became simpler, with plain rectangles or arches replacing the delicate tracery of the earlier doors. A greater variety of door furniture was used, with iron and, on occasion, glass or porcelain, added to the familiar brass. The door was hung from butt hinges, familiar to those still used today.

Lintels and Cills

3.83 The detailing of the lintels and cills was an integral part of window and door design. On the more humble vernacular buildings lintels were generally formed from timber, though on brick structures a simple, segmental ('curved') brick arch was also frequently used externally, in combination with a timber internal lintel. On grander brick buildings rubbed bricks (specially shaped soft bricks with very fined joints) were sometimes used to form flat arches over the window heads. Alternatively in the late nineteenth and early twentieth centuries, imported dressed stone could be used for both the lintels and cills of masonry buildings. In brick or stone walls, windows and doors are set back from the outer face of the wall for protection against weather, with the exception of the late seventeenth century and earlier when doors and windows were set level with the outer face of brickwork. In rendered and weatherboarded walls, windows and doors were set level with the outside face, using a timber pentice board over the head to shed water and occasionally also with an architrave. The main door sometimes had a hoodmould or canopy instead of a simpler pentice board.

Dormers and Rooflights

3.84 Dormers are traditionally modest, forming only minor incidents in the roof slope. The exceptions are classically designed grand houses of the early eighteenth century where they were used to emphasise the verticality, proportions and height of the building, and late nineteenth century 'Arts and Crafts' buildings where they emphasise the designed articulation of a roof.

3.85 A number of traditional buildings in the district are either 1½ or 2½ storeys, with gable end windows and a limited number of dormer windows used to light the rooms that extend into the roof space. Most dormers are relatively narrow (i.e. two casements wide) and have simple gabled roofs, though on steeply pitched roofs (and particularly on the fen margins) catslide dormers are also not uncommon. Dormers introduced into thatched roofs are generally 'eyebrow' type, though sometimes they may be gabled and roofed in plain tile or slate.

3.86 On grander houses the dormers may have flat, or gently arched, roofs covered in lead, which on later 'Arts and Crafts' houses could also have a significant horizontal emphasis.



(left) Eyebrow dormer in thatch
(middle) Nineteenth century decorative dormer
(right) Catslide dormer

3.87 Rooflights were generally not used to light habitable rooms, but could be used to light roof spaces used for storage. These rooflights are traditionally relatively small, made of wrought iron or cast iron, with a central vertical iron glazing bar, and are unobtrusively located on the rear slopes, or behind parapets.

Eaves and Verges

3.88 Traditionally, eaves and verges in South Cambridgeshire are kept very simple and are cut back tight to the building without fascias, soffits or

bargeboards. Where the eaves extend beyond the line of the wall (more commonly found on timber-framed structures), this is normally detailed as an 'open eaves' with exposed sprockets to the rafter feet. Brick buildings often incorporate decorative dentil courses under the eaves and, sometimes, 'tumbled' brickwork to the verges or chimneystacks. Later Victorian structures may also incorporate verges that project beyond the line of the wall below and these often include decoratively shaped bargeboards.

Chimneys

3.89 The introduction of chimneys dates from the medieval period, when flues and chimneystacks were first used to funnel smoke from fires. They only became widely used during the late sixteenth and seventeenth centuries when the stack was substantial and often surmounted by freestanding shafts, usually circular in plan or set diagonally. During the eighteenth and nineteenth centuries, the number of rooms with fireplaces increased resulting in more and larger combined stacks; classical details such as cornices, stringcourses and plinths were also widely used. Chimney pots were introduced on top of the stack in the eighteenth century. These early pots were plain and of modest proportions. In the nineteenth century pots became taller, with more elaborate profiles and decorative features.

3.90 Chimneystacks were generally located on gable ends or centrally on the ridge, especially on more modest dwellings. Where stacks were located on gables, it was normal for them to again be placed centrally, such that the flue terminated inline with the ridge, and with the stack flush to the outside face of the gable. Subservient stacks such as for ancillary spaces and service areas such as wash rooms were smaller and less decorative.

Rainwater Goods

3.91 Rainwater goods include; gutters, downpipes, rainwater heads, spouts, and gulleys. They not only protect walls from water penetration, but also contribute to a building's design, giving vertical emphasis, horizontal definition and decoration. The earliest surviving examples of rainwater goods are stone gargoyles and spouts found on medieval buildings, especially churches. Gutters and downpipes were not generally applied to secular buildings until the mid eighteenth century. Before then, wide overhanging eaves of thatched and clay tile roofs provided protection by shedding water away from walls. During the eighteenth century it became fashionable to incorporate gutters either in classical cornices, or concealed behind a parapet wall. These gutters were then connected to lead downpipes via lead rainwater heads, which were often elaborately decorated with mouldings, heraldic devices, initials and dates.

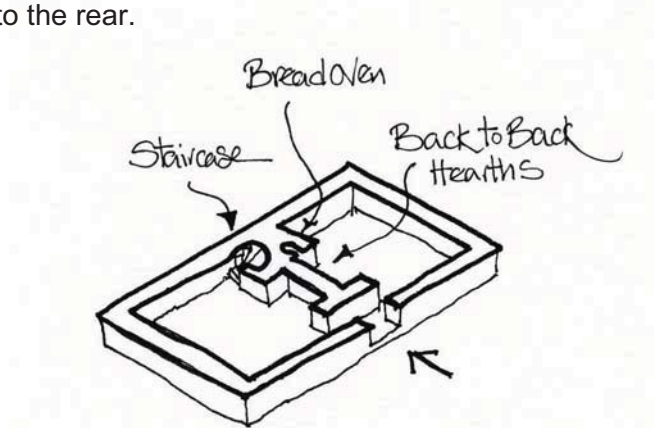
3.92 Early guttering was generally made from wood, of simple, square, or ogee box section with minimal decoration and attached to walls beneath the eaves, supported by either wrought iron or steel brackets, or set on brick or stone corbels, or occasionally partly recessed into the wall. Cast iron became available from about 1750, from when cast iron rainwater heads similar to decorative lead goods bearing dates and initials, can be found. The mass production of cast iron gutters and downpipes dates from the early years of the nineteenth century and it became the most common material for rainwater goods from the mid nineteenth century until the 1950s. More recently cast aluminium has been available as a lighter alternative with a similar appearance to cast iron.

Plan Form

3.93 The traditional plan form of the area was for wide frontage cottages of shallow depth (i.e. single room deep and a maximum of 6 metres). These spans are limited historically by the sizes of timber. A span of 5 to 6 metres is common and larger buildings are made from multiples of this. These multiples of the traditional span are clearly identifiable in the external appearance of the building, such as by using a double pile roof or aisled form.

3.94 The earliest buildings have simple rectangular forms with single room depth plans. A few high status buildings have aisles to increase the internal volume and later more commonly cross-wings are incorporated. The simple rectangular single storey to one-and-a-half storey form continues as the most common form of building in later centuries.

3.95 Many traditional cottages follow a 'baffle entry' form, in which there is central chimney stack (usually with two fireplaces back to back) and the main entry door sited on the side of the stack, creating a lobby between the two rooms. Access to first floor was generally via a staircase sited on the opposite side of the stack, but the stairs could also be contained within an outshut to the rear.



Baffle entry house

3.96 Larger houses from the eighteenth century onwards frequently made use of the ‘double pile’ plan form, in which there are two parallel ranges, resulting in four rooms being provided on each floor, together with a centrally placed front door and a staircase located between the two rooms on the rear elevation. These double pile arrangements are characteristic of higher and mid-status buildings such as manor houses, vicarages, farmhouses and villas.

3.97 This house type was later to be used as the model for the narrow fronted, Victorian terraced cottages that are also two rooms deep but only one room wide, with further accommodation contained in outshuts to the rear. Examples of these are generally to be found within the larger villages, especially those that experienced rapid growth during the nineteenth century.

3.98 Extensions to buildings follow simple traditional additive forms; as attached cross-wings, lower parallel ranges, gables and lean-tos. Double pile roofs to reduce the apparent depth of a deep-span building are too complex for simple vernacular buildings and domestic outbuildings. The additions are clearly identifiable on the elevations and have subservient forms, being lower and narrower than the original building.

PART II

DESIGN PRINCIPLES

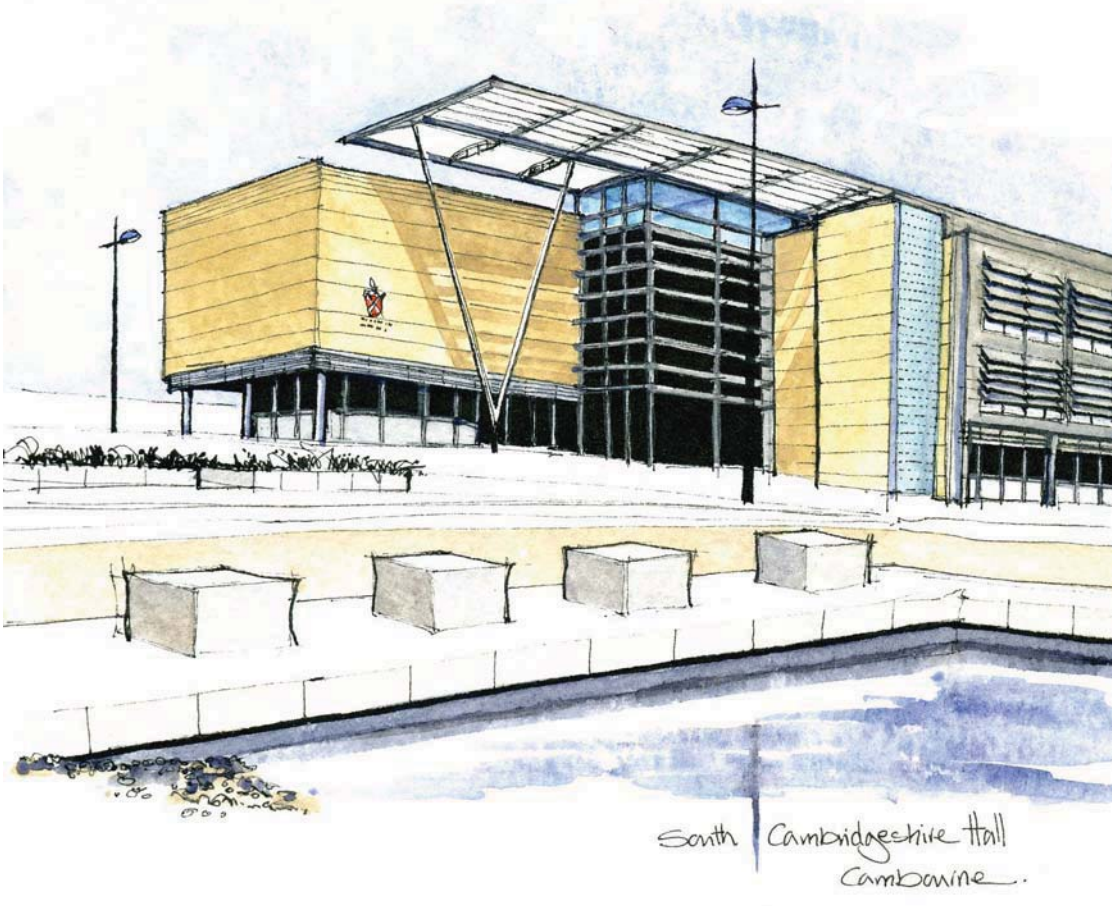
South Cambridgeshire consists of villages within open countryside, rather than towns and large urban contexts. This modest scale and rural setting is the basis of the local distinctiveness, which shows in the type, scale, density, details, materials and spaces characteristic of the existing settlements.

The district has a demand for major new development. Much of this is focused on extensions to Cambridge and a new town at Northstowe, but development will also take place, to different degrees, in villages set out open countryside.

The design of new development needs to create viable and vibrant spaces and buildings that also respect, preserve and enhance the special character of South Cambridgeshire.

The aim of this section is therefore to identify important design criteria for this new development in urban and rural contexts.

Many of the principles will apply to all types of development but some will apply to just one, for example creating a new town or adding to villages. The guide therefore should be used with discretion.



CHAPTER 4

URBAN DESIGN

INTRODUCTION

4.1 Good urban design addresses the interface between all the issues that influence the form and use of urban settlements, in order to create successful places where people want to live, work and visit, and which supports their needs. The purpose of urban design is to create good quality places, rather than just the provision of developments.

4.2 Urban design principles apply to all forms and sizes of development. For even one single house to be provided in an existing street, it will be best designed to integrate into its surroundings if urban design principles are followed. This chapter focuses on the full range of urban design principles that apply, in full or part, to all development proposals and addresses larger development proposals. Chapter 7 focuses specifically on the issues that are encountered with smaller scale developments.

4.3 Prior to any design work being undertaken, it is essential that the site is fully understood in its context. It must be fully understood how the proposed development will be integrated with the existing communities and their supporting facilities and services, from the sub-regional level down to the neighbourhood and block level; dependant upon the location of the site and the intended scale and nature of the proposed development. The residents and workers of, and visitors to, the new development must have ready and convenient access to existing facilities and services; with any new facilities and services, provided as part of the development supporting and integrating with those already existing. Provision for the community must go beyond a consideration of the provision of housing and facilities and must address how the whole and its component parts are designed to promote the integration of a healthy community, who will live, work and play there for at least one hundred years. This will require the integration of new developments into the existing social structure, movement patterns and public transport services and the wider landscape and/or townscape as appropriate. (Townscape is a generic term relating to the urban scene i.e. the appearance of a built environment, whether a hamlet or a city.)

4.4 Society and its requirements are constantly changing, therefore, development proposals should be designed in a manner that will allow future adaptation and alteration, to prevent developments becoming potentially unused or undesirable if they cannot accommodate future needs. The known changes that are likely to be encountered are, in household size and composition, lifestyle, work patterns, transportation patterns and climate.

4.5 The purpose for developers of properly understanding context is to enable them to promote development, which will integrate with its surroundings. Development proposals that are an imposition on a location and do not address the social, sustainable, economic, transport and ecological structure of the context will not be accepted.

QUALITY

4.6 Quality is not a matter of luxury, i.e. of expensive design details and construction materials. Quality is concerned with the whole approach to the planning and design of new developments, not just by the developer and the Local Planning Authority, but by all the partners involved, to ensure that new developments conveniently and efficiently provide the facilities, services and conditions that the people living and working in, or visiting them, require, within the capacity of the environment to sustain them and protect local distinctiveness.

4.7 "Bad planning and design and careless maintenance encourages crime, contributes to poor health, undermines community cohesion, deters investment, spoils the environment and, over the long term, incurs significant costs." (p6)

"The places where people live have a profound effect on their quality of life and life chances. Places exercise this effect in a range of ways – through, for instance, crime levels, pollution levels, employment opportunities, social ties and opportunities for community engagement, and the range and quality of local services, transport links and green space. Quality of place can then be understood as that subset of factors that affect people's quality of life and life chances through the way the environment is planned, designed, developed and maintained." (p11)

(World Class Places – the Government's strategy for improving quality of place, Department for Communities and Local Government, 2009)

4.8 It is important that new developments are designed and constructed in a manner that minimises the demand on natural resources:

- By minimising travelling, through the provision of mixed use developments and the provision of good and efficient public transport facilities, footpath and cycle networks;

- By designing developments that respect the existing landscape and existing biodiversity and enhances them through the implementation of the proposals;

- By designing to avoid putting development at risk from flooding and ensuring the discharge of surface and rain water is by means of sustainable drainage systems to prevent creating flood risk for others;

- By constructing with robust materials, to ensure the long term durability of the development;

- By designing buildings in a manner that readily allows for their future conversion or adaptation;

- Designing and constructing buildings in a manner that minimises their energy consumption for heating, cooling and lighting; minimises the demand for potable water; and does not result in air, noise and light pollution; and designing developments that are not only valid today but remain so, in the face of changing climatic conditions, for at least 60 years for commercial buildings and 100 years for all other buildings.

4.9 Achieving high quality development requires the co-operation of all partners involved in the planning, design and ongoing maintenance of new development. This requires all parties to adopt a flexible approach in securing their interests to ensure that the development, as built, is fully integrated. With such an approach high quality development should remain the goal and be achievable irrespective of the fluctuations of the economic cycle.

4.10 Quality is dependent upon design rigour, the quality and durability of the materials selected and the quality of the workmanship during construction, to ensure robust high quality designs appropriate to the intended uses are attained.

4.11 The following is a list of considerations that impact on design quality and should be considered in the design process:

- Develop a clear design concept.

- Set a realistic budget for design, implementation and management of the works.

- Select design components and apply the principles of design theory and composition in a manner appropriate to the concept.

- Select materials that are long lasting, good looking and durable.

- Portray the scheme in clear and comprehensive plans.

- Choose contractors carefully, give them clear instructions and ensure thorough supervision of them on site.

- Devise conveyance and management regimes at an early stage.

- Designs should be appropriate and affordable for Parish Councils or others to manage.

GREEN INFRASTRUCTURE

4.12 Green Infrastructure describes a network of public open spaces, routes, wildlife habitats, landscapes and historic sites. It includes a wide range of different types of element such as rivers and watercourses, country parks, historic landscapes, archaeological sites and rights of way, and combines a range of functions.

4.13 Green Infrastructure provides an essential environmental foundation and support system and is set within and contributes to a high quality natural, historic and built environment. It is key to creating places that are attractive, healthy and give a good quality of life, and delivers a range of other social, economic and environmental benefits. Green infrastructure is needed to meet the needs of existing and new communities and is a crucial part of successful new development.

4.14 The aim is to plan, deliver and manage green infrastructure at county, district and community or neighbourhood scales. Green infrastructure should be an integral part of new development and its surroundings and link with the wider network. Existing green infrastructure should be protected and well managed.

4.15 The Green Infrastructure approach is supported at national, regional and local levels. It is included in PPS12: *Creating strong, safe and prosperous new communities through spatial planning* and is promoted in Natural England's *Green Infrastructure Guidance* (2009) and CABE's *Grey to Green* (2009). Green infrastructure is also included in the *East of England Plan* (May 2008).

4.16 Green infrastructure elements and approaches are supported and described in Local Development Documents such as Area Action Plans, the Development Control Policies DPD and Site Specific Policies DPD, as well as a number of Supplementary Planning Documents e.g., Landscape, Biodiversity.

4.17 In 2006 Cambridgeshire Horizons and partners (including South Cambridgeshire District Council) produced the first Green Infrastructure Strategy for the Cambridge Sub-Region. This Strategy and its results have been reviewed and a new strategy is currently being prepared which will cover the whole of Cambridgeshire. Other planned work will identify the costs of green infrastructure and mechanisms for funding including through development.

4.18 Cambourne and Trumpington Meadows are examples of the successful provision of green infrastructure as part of new developments and their settings. They show how it can deliver a number of specific objectives including sustainable drainage and flood management as well as creating attractive places and encouraging people to walk, cycle and enjoy their surroundings.

4.19 The District Council strongly supports the planning, delivery and management of green infrastructure as an essential part of new development and crucial to its success. Green infrastructure should be fully integrated with development and its setting, and link to wider green infrastructure networks. It should also contribute to existing communities and environmental and other resources. Green infrastructure should be a fundamental part of development, design and planning processes from the start.

CREATING A SENSE OF PLACE

4.20 Everywhere is somewhere, irrespective of it having a strong, a weak, a unique, or a pattern-book identity and irrespective of it having desirable or undesirable associations.

4.21 The starting point for development proposals should be what is “the spirit of the place” (the genius loci); what is good, strong and desirable to harness and what is poor, weak and undesirable that presents the opportunity for change and improvement. In relation to new development the aim should be to create somewhere that is recognisably distinct, whilst simultaneously strengthening the larger local identity.

4.22 The development must create and enhance an effective network of streets and buildings that achieve a permeable network and encourage cycling and walking. A permeable network is one that is easy to navigate and easily accessible by means of interconnected routes. It will not contain cul-de-sac or no-through routes as these result in poor integration and tortuous routes between places. A key structuring principle should be the provision of a direct, safe and convenient movement pattern on foot, bicycle or public transport. Movement patterns for private motorcars may be less direct to discourage their use; therefore some routes may not allow a through movement for motorcars. It should be noted that not all villages have a form and structure that is conducive to the application of this principle.

4.23 Any new development designed as one and constructed in a short period of time, compared to the lifetime of the settlement, runs the risk of appearing uniform. The design of large new developments should be undertaken in a manner that reflects the incremental growth of the settlement the development, lies within, is attached to, or is nearby, in the case of a new settlement. To assist this the design of new developments should be split

into smaller parcels, with each parcel designed by a different architect; appropriate parcel sizes are relative to the location of the development, with parcels for separate architects not exceeding 70 homes in Northstowe or urban extensions, reducing to less than 5 homes in some villages. House sizes and tenures create a more effective community character when they are intermixed throughout the development.

4.24 Any new large-scale development should be designed around a pattern of connected streets and public spaces that can be easily understood, so that people know where they are. The street network should focus on busy pedestrian places which have an identifiable and accessible heart, the location of which is marked by a concentration of facilities (e.g. shops, offices, small-scale workspaces, civic functions, schools, clinic, a public square or park) and by an increasing building height, providing greater enclosure. The heart of the development, and other important spaces, should also include features and landmarks that define them as special places.

CHAPTER 5

APPRECIATING CONTEXT

LANDSCAPE SETTING

5.1 The landform in the Cambridge Sub-Region is not highly pronounced. Therefore wherever possible variations in landform within development areas should be harnessed to accentuate the local landscape character, and care must be taken not to obscure distinctive landform characteristics with development. Road alignments and drainage corridors should also respect local landscape character. Generally development should be aligned parallel to the contours not up and down slopes, accentuating slope profiles and preventing their loss beneath staggered or irregular development. See Chapter 3 for further details of Landscape Character.

5.2 Any new development must sit comfortably in its landscape, taking account of the topography and natural or man-made features. New development should not intrude upon the skyline, with the exception of specifically agreed features selected as landmarks, in the tradition of church spires or towers. If, for the general development, this is unavoidable, careful consideration must be given to the height and form of buildings, with the built form broken down to appear as a composition of forms, rather than one large form and utilising trees and other planting to soften the impact on long distance views. In some specific cases there may be an argument in favour of retaining a hard built edge to a development.

5.3 Developers are required to undertake a design-led approach that demonstrates and justifies its appropriateness for the development and its location.

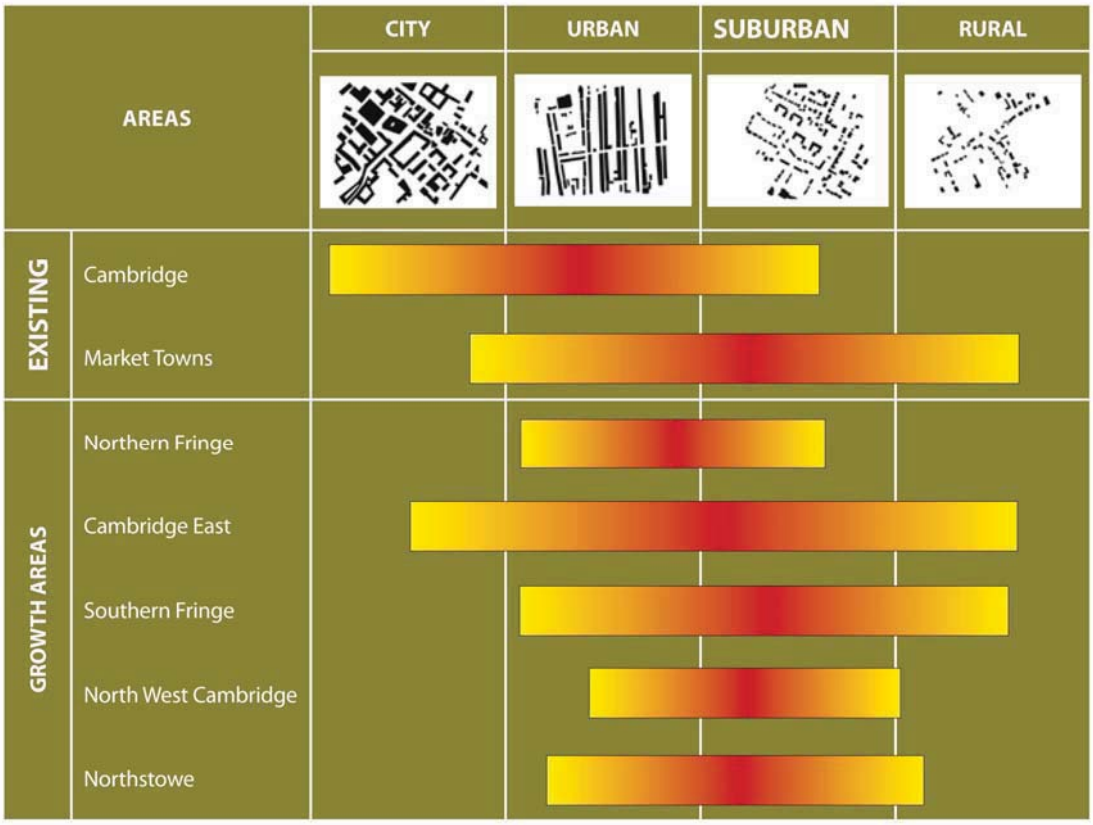


Table identifying how new development areas fit into the varied character of Cambridgeshire, from the Cambridgeshire Design Guide.

THE LANGUAGE OF BUILDINGS

5.4 Chapter 3 described the particular characteristics of settlements, buildings and materials found in different areas of South Cambridgeshire; and described materials and details that are traditional and distinctive to the district.

5.5 The Listed Buildings SPD (Chapter 15, pages 123-130) highlights specific types of buildings and structures within South Cambridgeshire. These include farm buildings including barns, granaries, stables, dovecotes, and cart and stock sheds. The importance of food processing, as well as agriculture, to the district is reflected by mills and maltings. Traditional crafts and industries are represented by smithies and tanneries. Bake houses and wash houses, schools and war memorials are also included.

5.6 Alongside the details and building types that are typical of an area, buildings reflect the relationship between their type, form, function, status and other aspects. The pattern or arrangement of buildings also helps create the character of places.

The Relationship Between a Building's Form, Function, Date, Status and Other Aspects

5.7 In this section relationships between different aspects are considered separately. In reality, all the aspects work together in the design of buildings and contribute to the meanings they convey.

5.8 Schools are examples of how buildings' functions and details are reflected in their forms. Parts of Victorian and Edwardian schools are often divided equally between girls and boys. Tall windows and high ceilings give good light for reading and writing.

5.9 Industrial buildings can have limited numbers of small windows or, where illumination is important, long runs or areas of glazing.

5.10 Other examples of the relationship between function and details are: the louvred panels of drying sheds which encourage the passage of air; granaries lifted up on staddle stones to keep the rats at bay; and the snout and trotter resistant brick walls of pig sties. Some farm building types including barns and stores have no windows. When work is carried out, barn doors could be opened to give ventilation and light. Vents or slats in a farm building indicate that it housed animals or stored produce.

(left) Granary on staddle stones
(right) Slatted vent for livestock

5.11 Details also reflect the properties of the materials used to keep a building weathertight and relatively warm and light. For example, thatch roofs have wide eaves to throw rain water away from the building. Clay bat walls need a 'good hat and boots' to protect the bats from the weather and keep them above the ground.

5.12 The different use and status of buildings is reflected in their construction and materials. For example, a house built with tiles and bricks may have outbuildings with humbler and cheaper pantile roofs and timber-framed walls.

5.13 Differences in wealth and status are reflected in the houses of the district. (What we have inherited gives just part of the story of the past as poorer cottages and workshops are less likely to have survived.)




Mid / late nineteenth century Cottenham houses reflecting differences in social status.

5.14 Parish churches were centres of the village and historically the building and churchyard could be used for a range of community and other activities. They could be well supported by the local landowner and receive other donations and funds. The status of churches is reflected in their positions in the village and the settings they enjoy, their ambition and impact, and the quality of materials and craftsmanship. In many cases, the church is the focus of the settlement – other buildings are grouped around it; its tower is the tallest structure in the group; and it is prominent in views.

5.15 Chapels, by contrast, are normally less prominent and tended to be built amongst the houses of the working class. Their often modest designs and materials reflected nonconformist beliefs as well the limited resources of chapel communities.

5.16 Ownership and influence is reflected in the design of buildings. Landowner controlled villages were generally smaller and neater than the more haphazard 'open villages' and often feature characteristic estate cottages. Landowners sometimes demolished villages to make way for new landscaped parks and planned villages could be built to replace them. Wimpole is an example of a planned village.

5.17 Different types of shared purpose and community action are reflected in almshouses, buildings associated with land settlement movements, and the village halls built as part of the self-help movement in the 1930s. Public and private ownership and influence are reflected in the designs of council and social housing, and those built by builders and private developers.

5.18 Finally, buildings reflect the period they were built, and architectural fashion, developments in design, the materials available locally and from further afield, prosperity and depression, and changing needs and solutions.

Patterns of Buildings

5.19 This section looks at how buildings relate to each other and to the layouts of our villages.

5.20 Much of the character of villages is given by the patterns of streets, plots and buildings. The streets and open spaces create the 'skeleton' of a village and can remain little changed for centuries. The division of the land next to historic streets into plots is often long lived but is likely to change more frequently than the streets. At a smaller level of scale are the buildings that occupy the plots. These are more likely to be replaced or changed than the plots though some buildings outlive them. Extensive redevelopment can sweep away this historic pattern.

5.21 Villages can be dispersed (for example, made up or a number of 'ends' or small collections of buildings) or focused on one or more centres. Two of the standard models are buildings grouped around a village green and buildings running along a main street. Most settlements do not follow a simple pattern, however, and can combine features from different models in a complex whole. Villages reflect centuries of dynamic change in response to wide range of factors. As each settlement has its own set of circumstances, so each village is unique and special.

5.22 Different sizes and shapes of plots give places a very different feel. Medieval plots were typically long and relatively thin, and could lead on to a back lane and common fields beyond. The social hierarchy of a village was reflected in land divisions, with manor houses and vicarages sitting in larger plots.

5.23 Plot divisions in at least the same street were often reasonably regular. In many places more variety is given by the buildings which fill them. Unlike modern estates, it was unusual in rural villages for whole streets or areas to be built by the same people and at the same time. Individual houses or short terraces were constructed by different people at different times. The variety of building forms, types and uses found in most traditional villages is a key part of their character and appeal.

5.24 The way buildings are positioned on plots makes a significant difference to their settings and the way they are perceived and to sense of space and character of streets and villages. Many historic buildings were on or close to the street. Detached houses often had generous space either side. Where plots were less wide, then houses would be more likely to be joined together. This contrasts with modern suburban developments where houses are set back and individual or semi-detached houses can have relatively small gaps between them. Whether traditional houses form terraces or are individual buildings obviously affects their design and ability to change and extend over time.

5.25 In many village centres, buildings or substantial walls characteristically define the boundary of the public realm, usually the edge of a road or green. Typically, the front elevation and line of the main roof follow the direction of the street. Within some villages, such as Cottenham, occasional buildings are located perpendicular to the road with a prominent gable in the streetscape. Historically, the most important buildings were usually on the frontage, though farmhouses were often set back beyond a courtyard of farm buildings.

5.26 Beyond the main frontage buildings, the outbuildings are subservient and often orientated to follow the site boundaries at 90 degrees to the main building, becoming smaller as they become further from the main building. Farmsteads within villages often extend further to the rear of the street frontage than other development and this distinction should be retained rather than used as a general building line.

5.27 Towards the edges of villages, development is generally more open and the building line of development is often set back further from the road edge. It usually still follows the direction of the street but provides less enclosure. The front garden and the front boundary are more prominent and important in the streetscape. The front boundary changes character, often from walls and picket fences typically closer to the village centre to hedges leading towards the open countryside.

5.28 The size, shape, position and orientation of buildings in the streetscape will define the 'weave' of the built fabric. For example, detached buildings which are placed in the centre of larger width plots define a looser-knit settlement pattern than lines of terraced houses. Also, buildings that directly front on to the pavement generally define a narrower street and more enclosure than buildings set back with front gardens and garden walls.

5.29 Along with the variety of buildings already mentioned, their grouping, for example along a street or around a green, creates distinctive and attractive places. Farmsteads are an example of buildings and structures of different but related functions found on the same large plot. A variety of different

forms come together with buildings arranged to reflect the hierarchy of uses and the way the buildings and the whole farmstead works. This included the relative importance of easy access to the fields.

5.30 The relationship of the farmstead and its buildings to the countryside can be that of enclosure with a courtyard, or of openness to the fields, or its relationship can be within a larger settlement.

5.31 Individual and groups of buildings in the countryside or close to the edge of villages have specific characters and landscape qualities in which fields and trees predominate. Views can be more open and far-reaching with softer and less solid boundaries such as traditional hedges and simple open fencing such as post and rail.

5.32 Villages should always be seen within their wider landscape setting with its pattern of fields, woodlands, boundaries and routes. Dividing villages from the countryside that surrounds them ignores history and context. Rural communities were supported by agriculture with most people working on the land or in related trades. The countryside needed to be easily accessible from the village and the fields, common land, meadows and woods all supplied different needs. Villages should always be seen as part of and indivisible from the countryside.

VILLAGES

Character, Significance and Models

5.33 South Cambridgeshire is a particularly rural area. Agriculture was the main employer well into the last century and despite significant growth its population density is currently little more than a third that of the country as a whole.

5.34 The district almost entirely consists of villages (over 100) and countryside, and it is the rural settlements and landscapes, and their relationships, which gives it its special character.

5.35 Historically, each village was supported by an area containing agriculture and other natural resources. The boundaries of many of these areas were set by prehistoric times. Most of our rural settlements existed in some form by Domesday and the pattern of villages was more or less fixed by the fourteenth century. Our settlements and landscapes are a rich mix of survivals from the past, continuity, loss and change.

5.36 The relationship between villages and the surrounding countryside is crucial. For example, routes through and to the countryside often helped shape the forms of settlements. Some villages, for example in the Bourn valley, were laid out over earlier medieval field systems and their origins are

reflected in grid plans and the shape and size of fields and tofts. Tofts were generally developed as individual plots with a detached house in each. Medieval boundaries and long fields can be still identified in parts of the district such as the fen edge.

5.37 Medieval villages provided shelter and sustenance, but also reflected people's ideas of what a village should look like, including those of the community. Many villages were entirely planned and evidence of the earliest medieval planning still shows in the street patterns and narrow burgage plots of many of the district's villages.

5.38 The historic development of villages and landscape is complex but it can often be interpreted with sufficient attention and expertise. Such an understanding is an essential starting point for the design of new development.

5.39 The district's villages give historic models which should influence modern development. For example, these aspects of historic layouts could usefully be repeated:

- Grid plans and structures of roads and lanes and single and double rows.

- Development along interconnected routes (including tracks and paths leading into the countryside).

5.40 Small fields surrounding and within villages (usually early enclosures) which give have an appropriate scale and provide screening trees and hedgerows. Villages and landscapes are therefore important and interesting because of their long and complex histories and relationships. They are valuable culturally as well as physically and visually, and the survival of villages shows that they have been a successful and flexible type of settlement. Villages need to be understood to inform the design process. Finally, their historic development provides useful models for future development.

5.41 Villages need to be given the attention and importance they deserve. This will help generate imaginative designs which come out of individual places and avoid standard village pastiches.

Challenges for Modern Development in Villages

5.42 Development of any site must be understood and planned in terms of the history and future of the entire village. Developing individual sites in a piecemeal way is likely to detract from the village as a whole and its sense of place. The widespread use of culs-de-sac encouraged by such a piecemeal approach, often but not in all village locations, conflicts with historic structures and character and urban design principles. Piecemeal

development in villages should also be careful to retain existing visual links through to the countryside.

Glimpses of the surrounding rural area between buildings in Cottenham.

Views of the surrounding rural area down side streets in Oakington.

5.43 Many villages include areas of countryside and open spaces. The more built-up parts generally had low densities, for example, a row of detached historic houses could have a density of ten dwellings per hectare. Making successful responses to the historic patterns and densities of villages, which are important parts of their character, is a key challenge.

A paddock in the heart of Little Shelford provides views of the church across open space within the heart of the village.

5.44 The context of any new design will be informed by the established character of the area. This will include views, roads and paths, trees and landscapes and the scale, proportions, orientation, positions, building lines, styles, and materials of existing buildings.

5.45 The uniformity of much modern development – such as much criticized 'anywhere housing' – often contrasts with local character. Some accommodation for home and shared work use, and for local services, could increase the variety of building types.

5.46 Responding to existing variety in building design is a key challenge for new development as is the need to reflect the distinctive character and identity of each village.

5.47 Proposals should identify the focus of the context, whether countryside or settlement. Within the countryside it may be the long views and clumps of trees, and within the village it may be more intimate views or glimpses of countryside, and of the church, that is generally the focus of the settlement. The character of each part of the settlement or context is distinctive and careful consideration should be taken to preserve or enhance it.

Cottenham approaching from the east; the village development is subservient to the church and the village tree line.

5.48 The layout of each settlement also defines the positions, forms and footprints of new urban structure. The development within a nucleated settlement is contained within a roughly rounded perimeter, and in rolling landscapes such as the west, south and east of the district the settlement is often located on higher or lower ground than the land around it. In nucleated settlements new development is often limited to small or infill sites as it would risk being in competition with the original settlement if it extended significantly from one edge of the original group or overflowed onto the next ridgeline. A linear settlement follows the line of a road and does not extend significantly beyond the roadside buildings. Small lanes may extend outwards but they are characteristically short, often leading to a church, manor house group, farmstead or small farm cottages. New development therefore is generally restricted to the road edge.

5.49 Each village has a defined village framework shown on the Local Development Framework Proposals Map, outside of which there is a presumption against development. Certain villages have also prepared their own Village Design Statements and, where available, these should always be consulted. The Local Development Framework also outlines Conservation Areas, and a number of these are described in full detail in Conservation Area Appraisals. These Appraisals also contain summaries of Listed Buildings. The Council keeps a register of Listed Buildings and lists and descriptions are available at English Heritage's Images of England website (www.imagesofengland.org.uk). The grade of listing defines the special attributes of the building and setting, and a full analysis of the special characteristics of the Listed Building and its setting will inform the extent and type of new development possible.

5.50 Villages need to respond to the implications of climate change and scarce resources by reducing vulnerability and increasing the opportunities for sustainable action. Traditionally houses in the countryside had plots that allowed people to grow fruit and vegetables, and large gardens should be encouraged. (Many modern developments have small gardens.) Local food production, community orchards and community farms should also be supported and preserved. Existing and new small fields next to settlements provide opportunities for these along with accessible wildlife and other beneficial uses.

5.51 The movement of people living in villages can be severely restricted by the lack of safe, and suitably surfaced and connected, routes within and between settlements, and into and across the countryside. New development should allow and support these rather than act as barriers.

5.52 It is a challenge to combine some sustainable forms of construction and other approaches with local character, but this could provide a spur to imaginative design.

5.53 New development in villages should reflect the settlement's position in the spatial, historical and physical hierarchy of villages. Such an approach will help ensure the development's design is appropriate to its context and reflects the differences between villages.

URBAN EXTENSIONS

5.54 Urban extensions are the addition to the outer edge of an existing settlement, of a new neighbourhood, district or township. All major urban extensions identified are for extensions to Cambridge.

5.55 Urban extensions will be of sufficient size to be able to establish their own identity and character and provide a focus for the building group. The extensions should, however, relate to the existing urban areas with which

they share a common boundary. It is also essential that urban extensions present an urban edge that is sympathetic to the character of Cambridge, or any other settlement extensions they are proposed for, as well as relating to the rural context they abut.

5.56 Urban extensions will often be of sufficient scale to enable the incorporation, from the outset, of high levels of sustainable technology to minimise the environmental impact of the development. Such considerations should include local heat and power generation, sustainable drainage systems, direct and convenient footpath and cycle routes to access the settlements primary facilities, direct and frequent public transport routes to access other facilities.

NEW SETTLEMENTS

5.57 The focus of new development is on brownfield sites within existing urban areas; however in the Cambridge Sub-Region it is recognised that there is a need for a new settlement, at Northstowe, to provide the number of new homes required, without damaging the character and integrity of Cambridge, its surrounding settlements and their rural and Green Belt setting. New settlements require careful integration into the community structure of the Cambridge Sub-Region and should not undermine or compete with the existing settlements and their facilities, but rather be complementary to them to support both the existing and proposed population. They should form settlements that are connected to Cambridge and other local settlements via efficient public transport links.

5.58 South Cambridgeshire is a rural area with Cambridge being the only large urban area and the other settlements being mainly villages. New settlements should harness the characteristics of the setting and form of the existing settlements in the sub-regional landscape, see Chapter 3 for information on the varied local characteristics. Innovative design solutions that sympathetically address the requirements of modern development in historical contexts are encouraged, whilst pastiche design solutions that inappropriately attempt to mimic historical design styles on modern buildings are discouraged.

5.59 New settlements should be designed from the outset to incorporate high levels of sustainable technology to minimise the environmental impact of the development. Such considerations should include local heat and power generation, sustainable drainage systems, direct and convenient footpath and cycle routes to access the settlement's primary facilities, direct and frequent public transport routes to access other facilities, both within and outside the new settlement. Further detail is contained in Chapter 8.

INFILL DEVELOPMENT

5.60 Infill plots are small-scale plots within existing developed areas and will always have a significant impact on the character of the established streetscape and on neighbouring properties, therefore good design is essential to ensure a positive impact is achieved. Infill sites will be expected to complement the street pattern by continuity of form and design, or by an appropriate contemporary contrast. They will be expected to make best use of the site while enhancing the rhythm of the established street pattern. To retain the character of villages it is appropriate to retain some vacant plots.

Infill development in Madingley designed to be sympathetic to the scale and form of its village setting.

5.61 A detailed analysis of the adjacent built environment should form the foundation of any design, in order to understand how the proposal will relate to its surroundings. Considerations include: the distance of building fronts from the pavement edge; heights, positions and types of boundary treatment; storey-heights of buildings compared to their widths; depths and character of surrounding gardens; and typical building types: whether detached, semi-detached, terraced or courtyard developments.

Large scale mixed use infill development, Papworth Everard. Buildings include townhouses and flats around a new public open green space and a new public library with retail development.

DEVELOPMENT TYPES

Mixed Use

5.62 Traditionally many villages and towns in the Cambridge Sub-Region developed at the intersection of roads, or close to bridging points. Service facilities usually became established at or close to the intersections, with incremental growth spreading out from the historic core along the roads, with infill development following between the roads in the larger villages and towns.

5.63 Mixed-use areas maintain more even levels of activity throughout the day, preventing residential areas becoming inactive during the working day and preventing non-residential areas becoming inactive outside the working day.

5.64 Mixed-use development mat not be acceptable in some villages. Proposals therefore must conform to what is acceptable in accordance with the Local Development Framework.

5.65 The benefits of mixed-use development include:

- More socially diverse communities.
- Greater safety arising from more people being around at most times of the day.
- Increased vitality and street life.
- Potential for increased viability of urban facilities, arising from increased support for small businesses such as corner shops.
- More convenient access to facilities.
- Greater opportunities for social interaction.
- Increased stimulation arising from an increase of different buildings within close proximity.
- Some travel to work journeys are reduced, reducing traffic movements and congestion.

5.66 A successful and sustainable local neighbourhood is a product of:

- The distances people have to walk to access daily facilities.
- The presence of a sufficient range of such facilities to support their needs.

- Places and spaces where a variety of activities are encouraged to take place.

Providing Mixed-Use Centres

5.67 Mixed-use centres are not self sufficient therefore they need to be part of an integrated larger urban structure that has the population to support the facilities and services provided. They are best located therefore at the intersection of the main movement routes through both the neighbourhood and the larger urban structure. The mixed-use centre is the core of a neighbourhood within which the local shops, commercial uses and amenities will be located. Llewelyn-Davies (2000) states "to create a strong community focus, a shop, bus stop and primary school will usually be considered a bare minimum". Other facilities that could be located there are nurseries, libraries, community centres, police stations, other business premises and other retail premises.

5.68 A diversity of uses can result in conflict if they are incompatible, but this is not an argument for avoiding the provision of mixed use. Careful consideration is required as to what is an acceptable mix of uses, both within the development and with its neighbours, supported by strong site planning to acceptably separate any potentially conflicting uses.

Great Shelford library with residential development above.

5.69 Opportunities should be taken to incorporate in the main urban areas, uses such as office and retail premises and industrial units that have become located in out-of-town locations. As such uses often have large building footprints out of scale with residential properties, they should not be located in the urban fabric as islands, but rather surrounded by other smaller development to help integrate the larger unit into the locality.

Papworth Everard local centre, containing shops, café, library, Parish Council offices and business premises.

5.70 The location of such premises in urban areas should not result in unacceptable traffic levels from people accessing and leaving the facility, nor create other unacceptable nuisance for residents, nor should it undermine the primary town and village centres. Travel Plans and Transport Assessments will be required to justify the development proposals.

CHAPTER 6

THE ELEMENTS OF DESIGN

URBAN STRUCTURE

6.1 The urban structure, of hamlet, village, urban extension or town, is formed by the interrelationship between the components of built-up areas, the blocks of development and buildings, the streets and open spaces. The urban structure creates an integrated framework that forms the foundation for any new development within it. The urban structure of new developments should ensure that the components work together to form an efficient and integrated whole.

6.2 The urban structure should seek to maximize opportunities for vistas towards landmarks, distinctive buildings, trees, open spaces or fields, or views to the rural setting. Building form, materials and details are informed by the immediate and wider surroundings (see Chapter 3) and in general, natural colours are used that relate to the landscape and traditional materials of the locality. However, cues should not be taken from poor quality examples.

6.3 Many South Cambridgeshire villages present important frontages to the surrounding landscape, contain Conservation Areas or an historic street framework and contain or frame numerous strategic views (both within the settlement and out to the landscape). This contextual development should be used as the basis for analysis to determine the character of new building structure appropriate for the area.

Table 6.1: Getting the layout right

To achieve this:	Do this (these may not all be appropriate in some villages):	Examples / Notes
A choice of interesting routes	• Create routes to link up broken routes on either side of the site. • Align routes along desire lines to provide direct links to schools, shops and other destinations. • Base movement on a loose grid, with new routes every 50-120m. • Avoid culs-de-sac.	

Well defined street-spaces	• Join buildings to create well defined frontages. • Use smooth building alignments for continuity. • Use building fronts to define the street-edge. • Turn corners with buildings to prevent blank elevations presented to streets. • Incorporate focal spaces for human interaction at key nodes.	Unless set-backs are characteristic.
Clearly defined public and private space.	• Use perimeter blocks with public fronts and private backs. • Incorporate flexible communal or private garden space in the core of blocks. • Avoid spaces where ownership and the opportunity to use it is unclear.	Give all space a purpose.
Lively and safe street space	• Place building entrances on the front of buildings to ensure ground level interaction between buildings and the street. Individual entrances provide more activity than communal stairs. • Incorporate non-residential uses in the ground floor at key nodes for activity. • Ensure public spaces are overlooked by windows/buildings.	

6.4 The following table identifies a categorisation of urban sites, based on shared physical characteristics and/or common issues. This results in shared urban design issues and the potential for similar urban design solutions.

Table 6.2: Layout guidance for different types of site

Type of site	Specific layout considerations (these may not all be appropriate in some villages)
Infill to road frontage	• Building alignments to define the road frontage are important. • Complete perimeter blocks. • Building scale, form and alignment should be determined primarily by the immediate townscape context.
Sites with more than one frontage	• Turn the corner with a double fronted building. • Where the junction is a node can justify an increase in scale over immediate surroundings to emphasise the node. • Trading amenity and parking standards against townscape benefits can achieve a perimeter block fronting more than one space.
Edge of open space	• The extent to which the size and type of space being addressed justifies an increase in building scale. • Using a good outlook and useable balconies to justify a reduction in garden sizes, subject to not losing privacy for properties and the character of the area.
Backland with no frontage	• Whether the proposal would fit with the grain and spatial character of the area. • Whether the site is big enough to enable a new inward looking enclosed courtyard space to be formed (typical minimum site dimensions 30m x 35m). • Ensuring the new space has a satisfactory relationship with an existing place e.g. a vista stop within 65m of a main street, or a maximum access length between side walls of 40m – measured from highway boundary to the first new frontage. • Whether the access can be designed to appear as an approach to a new area; ensure at least one of the units at the front incorporates an active frontage to the new access way wherever possible.

	• Whether satisfactory access can be formed from a functional point of view; 2.4m min for shared drive off a lower category road, this may need to be wider to attain the desired visual impression; 3.7m minimum where fire appliance access is required; 4.1m minimum access width where access taken of higher category road. • Securing quality of life for new and existing residents (see privacy/garden size criteria).
Limited road frontage and space in depth	• Carefully address the corner turnings at the access. • Is the site big enough to enable frontage and in-depth development • Securing a good quality of life for new and existing residents.
Public road and space network required	• Get the interface between the new and existing development right. • Create routes that take people where they want to go. • Front buildings onto routes and spaces to provide natural surveillance. • Create workable blocks between active roads or routes that enable permeability; the spacing between roads can be as low as 60m in areas of high movement, near town and local centres; a spacing between roads of 80m and 100m is ideal for most circumstances; and a spacing between routes of up to 120m can be appropriate in areas of low movement; generally the spacing between roads should not exceed 120m as this is a barrier to permeability. • Create areas of strong character.

6.5 These typologies cover the majority of typical development sites with groups of buildings but are not necessarily exhaustive. Sites that are unique or special will always warrant careful appreciation of context, assessment of potential and an appropriately responsive design solution.

DISTRICTS / NEIGHBOURHOODS / COMMUNITIES

6.6 Successful communities require a range of local services and facilities, including retail, educational, health, civic and spiritual. These need to be conveniently located and accessible by safe and comfortable routes.

6.7 From the mid twentieth century different uses in development became segregated. This segregation of uses reduces the overall activity in areas restricting the periods of activity, making them less attractive locations for the establishment of supporting services.

6.8 Local facilities bring residents together, reinforce community and discourage car use, by reducing the need to travel by car. Including mixed-use in larger housing developments can help to foster a more vibrant and cohesive community. It also introduces a variety of building scales and forms, creating diversity and interest in the streetscape. The needs of non-residential uses should be identified at the outset and incorporated into the masterplan, with sites reserved for future provision where necessary.

Sawston village centre illustrating the vitality arising from mixed uses.

6.9 Mixing tenures promotes social diversity; it is important therefore to spread different building types and tenures throughout a neighbourhood, rather than group them into single areas, which divisively subdivides the neighbourhood, instead of supporting the integration of the neighbourhoods differing components. Accordingly mixed-use areas are preferable locations for the establishment of supporting services and facilities.

6.10 Higher density developments are better located close to the local centres to maximise the numbers of people able to support those facilities within the 400 and 800 metre walking distances. The scale and density of a potential neighbourhood centre is dependant upon where the development is located within the urban hierarchy. High-density development may not be acceptable in some villages. Proposals therefore must conform to what is acceptable in accordance with the Local Development Framework.

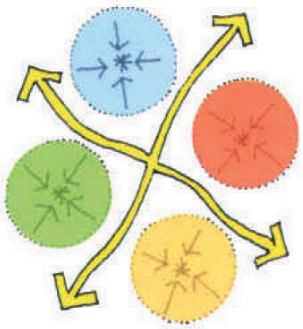
6.11 Local facilities provide a natural focus to towns, districts and neighbourhoods, drawing people together at informal meeting places. Facilities should be provided at convenient locations and distances from homes. Convenient local facilities are within an average 5 minute walking time, which equates to a 400m walking distance. Developments should be designed so that all residential properties are within 400m of a bus stop to encourage people to use public transport in preference to private cars. Local shops, a primary school and a doctor's surgery should ideally be located within an average walking time of 10 minutes, which equates to a 800m walking distance. If such facilities are provided further away than 800m from residential properties residents will be discouraged from walking and be more inclined to use private cars to access those facilities, and once people have opted to use a car to access facilities, they may not automatically use the local facilities. To support sustainable communities facilities should be provided within 800m to ensure they are easily accessible and supported by the local community.

6.12 The Urban Task Force report, Towards an Urban Renaissance, illustrates preferred walking distances to facilities from homes, see diagram. Barton et al. develop this work in, Shaping Neighbourhoods A Guide for Health, Sustainability and Vitality, where they identify illustrative catchment populations for various facilities, together with the catchment radius required to support those facilities at different residential densities, see table.

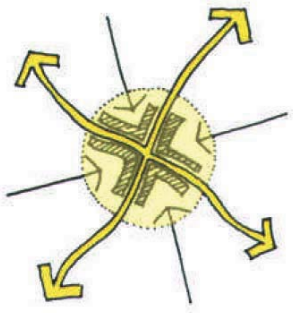
6.13 Local facilities to efficiently support the new communities should be within easy walking distances and the routes to these should be of high quality for both pedestrians and cyclists. The walking distances to facilities are the keystone of any movement framework. The Urban Task Force recommends that residents should have to walk no more than 2 to 3 minutes to a post box, or local open green space; 5 minutes to the newsagents and there should be local shops, a health centre and a primary school within 800 metres, or about 10 minutes walk. This is based on an environment that does not present obstacles to walking, such as busy roads.

Facility / Service	Population required to support facility or service	Maximum walking distances from service
Local Shop	1:1,500	Within 400m
Nursery	1:2,000	Within 600m
Primary school	1:4,000	Within 600m
Pub	1:6,000	Within 800m
Local Centre Cluster (consisting of 4 or more shops)	1:6,000	Within 800m
Post Office	1:5000	Within 800m
Proximity to Bus Stops	-	Within 400m
Proximity to Cycle Routes	-	-
Proximity to Public open space	Park Allotments Playing field	800-1000m Within 400m 800-1000m

Population required to support local facilities and desirable distances for them from homes.

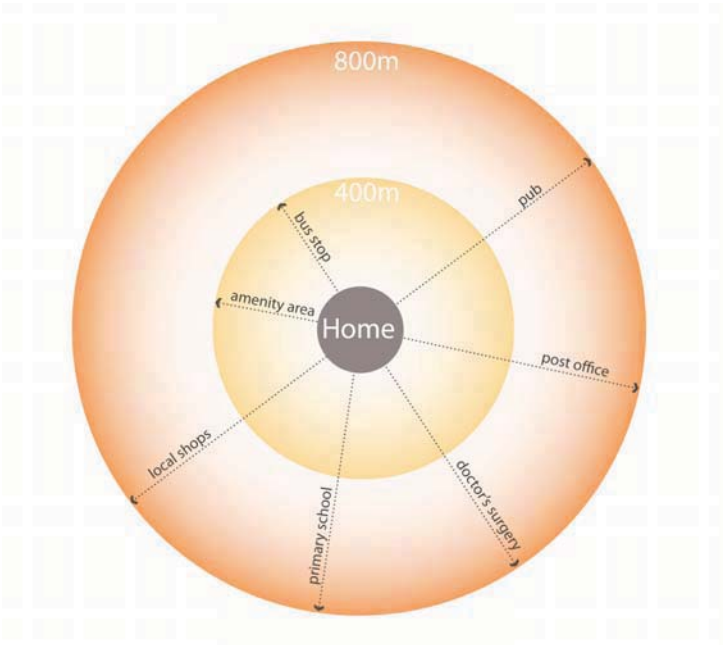


Positioning local centres away from main routes deprives them of life and passing trade

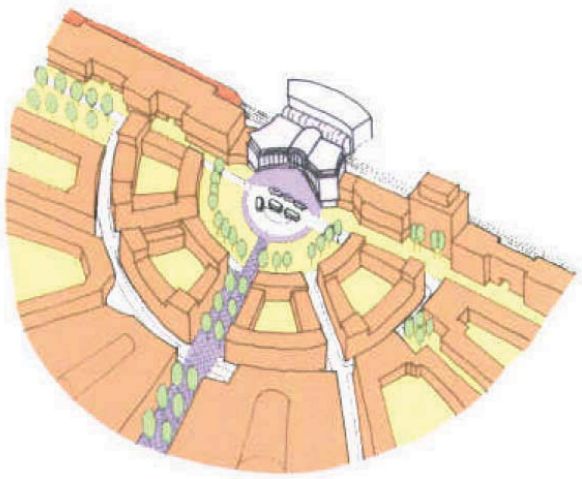


The answer is to create pedestrian and public transport–orientated centres at key focal points

Locating local centres. (Urban Design Compendium, Homes and Communities Agency)

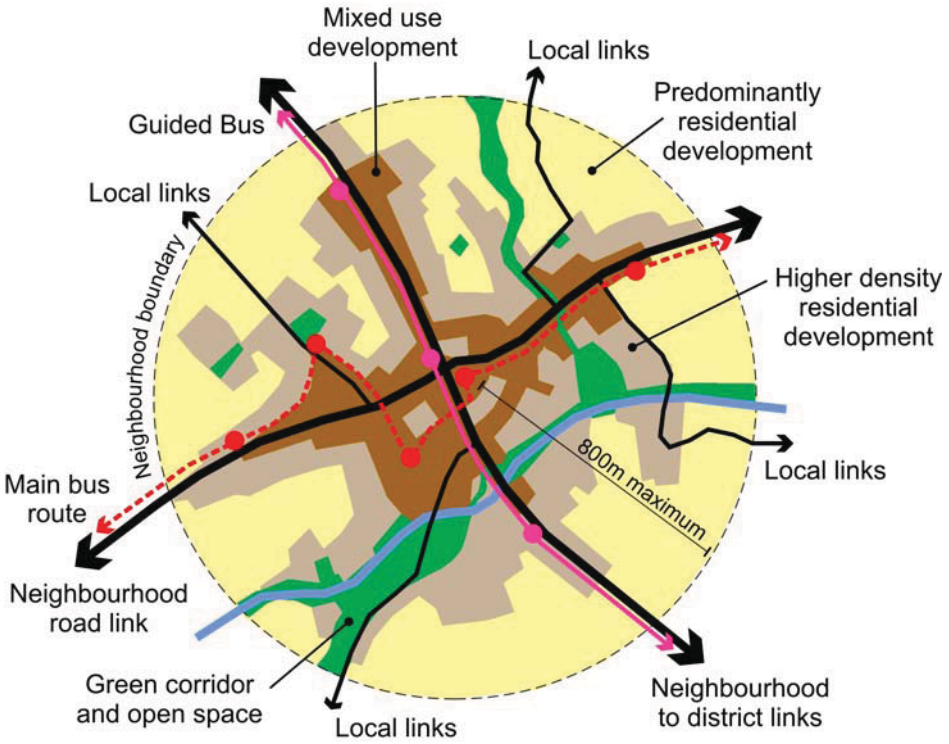


Desirable walking distances to facilities from the home.



Public transport orientated development ensures that a mixed use community has a railway station or bus stop within walking distance at its heart

Facilities and transport focused development. (Urban Design Compendium, Homes and Communities Agency)



The components of a sustainable 'walkable' neighbourhood. Source Adapted from Urban Task Force 1999

EDGES

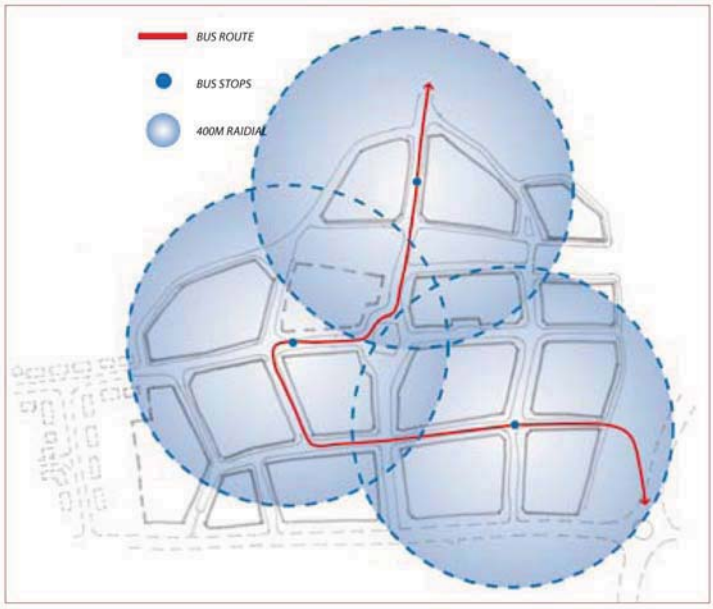
6.14 Places are often defined by linear objects e.g. rivers, railways, busy roads, etc. that often form physical barriers to movement and therefore define the edges of places. Less obvious are psychological barriers that can be physically crossed but which people may prefer not to cross e.g. open spaces which no one overlooks, major roads, areas of different tenure of housing or use, etc. New developments adjacent to such features must be carefully considered so that they do not create a barrier to movement within the development. Sometimes it may help strengthen identity to retain such edges, whilst on other occasions it may create new opportunities to create new identities or break down actual or perceptual barriers to create routes that cross these barriers.

6.15 The edges of new development should blend into the landscape by means of lower density towards the perimeter, with increased planting predominately of native species. The use of close-boarded fencing along development edges is not appropriate within a rural context, which is generally local hedging species or a post and rail fence.

ROUTES

6.16 A key to successful development is good access and connections between the site and its surroundings, whatever the size of the development and, the opportunities presented by the context should be harnessed. The structuring of routes in the new development should effectively address the following issues: How will the routes from the new development integrate with those existing in the surroundings? What are the existing movement routes around and possibly across the site? Who is moving from where to where and when? How will this influence the movement into, out of and around the site?

6.17 Movement affects uses, activities, density, security and the impact on neighbouring developments. A successful movement framework takes full account of the movement requirements the development will generate, provides maximum choice for how people will make their journeys and makes clear connections between the new and existing routes and facilities. The movement framework should make it as easy and attractive to walk, cycle or take a bus, as it is to travel by car. Direct attractive routes should be established to connect residential areas with facilities, maximising the number of properties, especially residential properties, that can access bus stops within a 400m walk and a local centre within a 800m walk. The maximum number of direct connections to the main streets should be provided. The greater the number of links to the main access roads, round or through developments, the greater choice people have as to which route to take and the greater are the opportunities for successfully establishing mixed use developments and, the greater is the discouragement of crime and antisocial behaviour as the greater the uncertainty for perpetrators that they may be disturbed. These aspects of the design rationale should be clarified in the developer's Design and Access Statement.



Bus routes and stops (Cambridgeshire Design Guide)

6.18 Linear spaces facilitate movement, which may be formal or informal in character. The movement network includes all the routes and all types of travel, and should allow easy access. The cycle and pedestrian routes will require a finer grid than those for cars and public transport. Lower order roads should be used wherever possible, while tortuous routes and culs-de-sac, i.e. a street closed at one end, should be avoided. The development should also take into account the type of movement it will generate and promote movement on foot, cycle or public transport.

6.19 The better connected a development is, the stronger is the case for a higher density of development and a lower car parking provision. However, the provision of good public transport connections may only result in the reduced usage of private cars rather than in reduced car ownership and provision is always required for visitor car parking spaces.

6.20 A hierarchy of routes should be established to aid legibility for those moving through an area, so it is clear if people are on a main route through an area, a secondary route providing access into development areas, or are within development areas on tertiary routes.

6.21 All routes should have buildings and windows facing onto them to provide natural surveillance of the routes to deter crime and antisocial behaviour. At the same time, buildings and how they address the routes should be designed to provide privacy for residential properties and any others requiring privacy such a health centres.

6.22 Public realm spaces should be well contained by the buildings that edge them. The fewer breaks there are in the built frontage and the narrower any breaks are the stronger will be the containment of those spaces. The character and built form of a village will determine the level of containment.

6.23 Routes should not be the divide between development parcels. Routes should run through development parcels to ensure continuity of development for those travelling along the route.

6.24 The management of pedestrian, cycle and vehicle movement, together with vehicular parking should be integrated into the design of the routes, streets and public spaces, and not dealt with as an afterthought through the use of painted lines and bollards.

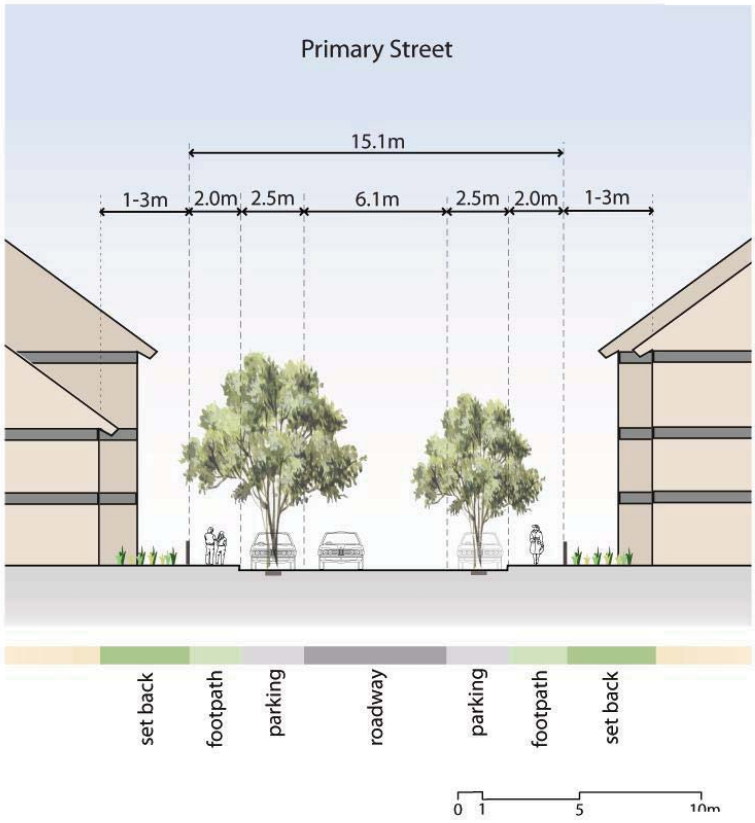
6.25 In order that residents make the best use of the more sustainable travel options presented by the integrated route network, a residential travel plan should be included for new large developments.

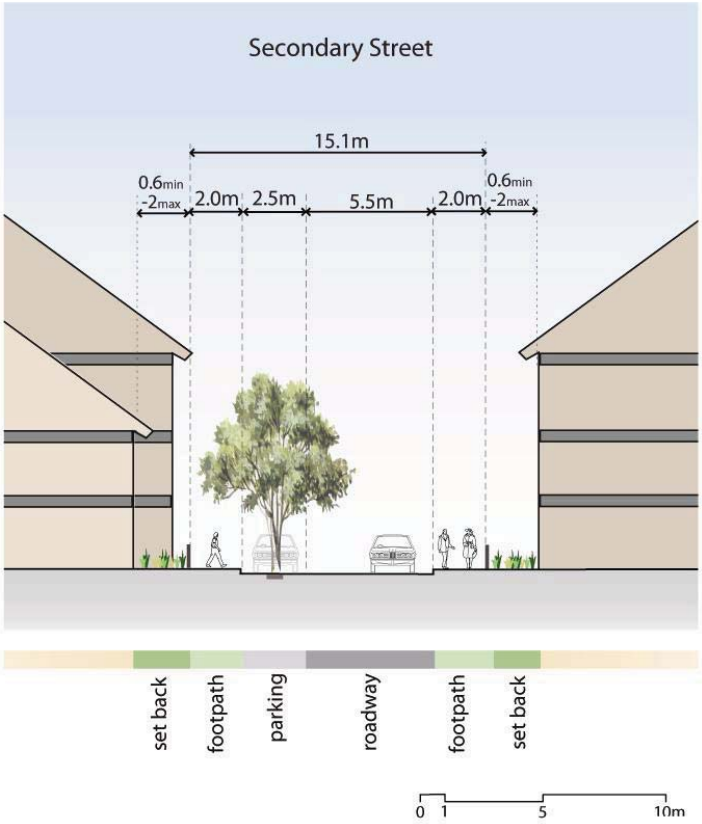
STREETS AND SQUARES

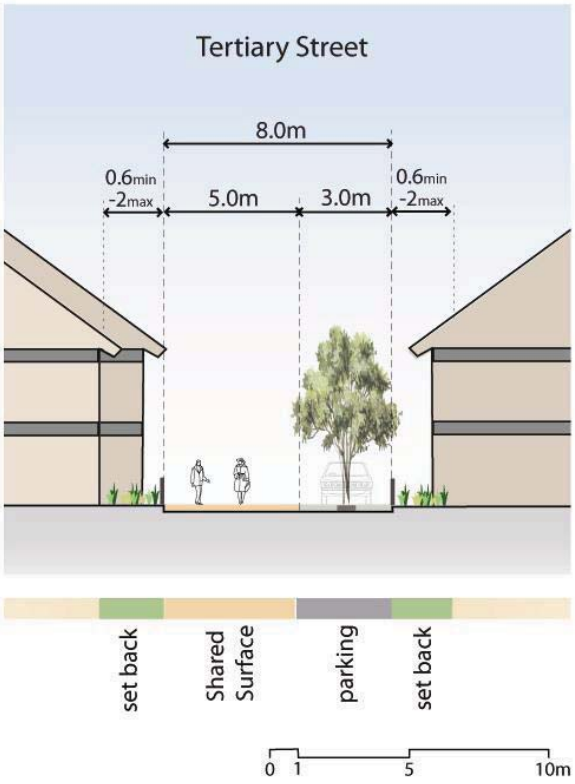
6.26 Street design should aim, wherever possible, to reduce the dominance of vehicles, and thus create an accessible and friendly environment. There should be spaces to encourage people to meet, spaces for social and 'spill out' activities, and places with seats on routes to local facilities.

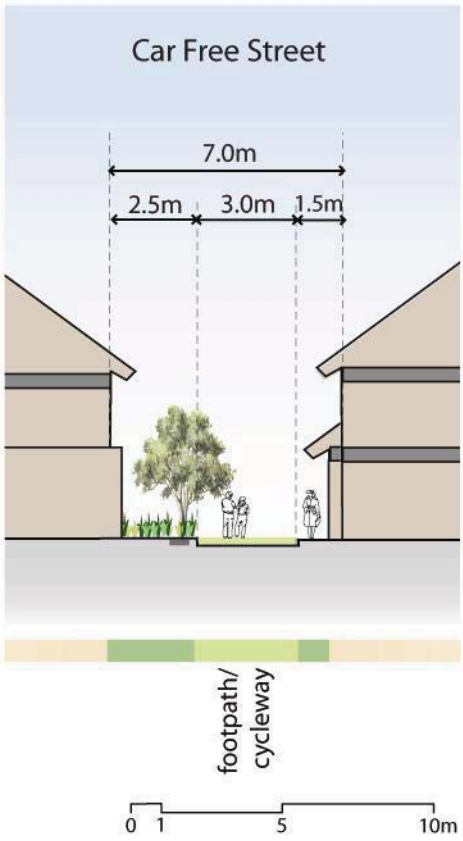
6.27 Development should be designed to accommodate and reflect a hierarchy of street types:

- Primary distributor road for movement through the larger urban area.
- District distributor routes for movement through an area.
- Secondary routes for movement into and out of an area.
- Tertiary routes for movement within development areas.
- Mews courts for access to small numbers of residential units creating an intimate semi-private place.




Secondary Street
15.1m
0.6min -2max
2.0m
2.5m
5.5m
2.0m
0.6min -2max
set back
footpath
parking
roadway
footpath
set back
0 1 5 10m


Tertiary Street
8.0m
0.6min -2max
5.0m
3.0m
0.6min -2max
set back
Shared Surface
parking
set back
0 1 5 10m



6.28 A focus on highway design specifications has in the past led to many residential developments having a poor appearance, becoming car dominated and lacking local distinctiveness. In conjunction with Cambridgeshire County Council, the District Council has collated examples of good practice from other areas and the following points should inform highway design in new developments:

- Engineering standards should be used imaginatively and interpreted alongside other design considerations.
- Highway design should not be the leading factor in determining settlement form; there should be a hierarchy of spaces rather than a hierarchy of road types.
- Buildings should be arranged to fit the local context and to create interesting urban forms.
- Roads should fit within the spaces created; with adjustments as necessary to ensure that minimum road widths and other essential clearances are accommodated.

Reference should be made to the Cambridgeshire Design Guide for Streets and Public Realm (2007): http://www.cambridgeshire.gov.uk/transport/trafficmanagement/networkmanagement/Cambridgeshire+Design+Guide.htm

6.29 As outlined in Places Streets and Movement (DETR 1998) the use of vehicular tracking models can help in laying out buildings to suit the intended character of the street. The following design issues should be considered:

- All forms of movement need to be considered, but pedestrian, cyclist and access to public transport should take priority in the design process.
- Where possible streets should encourage social interaction with shared spaces rather than segregated areas and routes.
- Where segregated routes cannot be avoided they should be convenient, attractive and safe to use.
- The aim should be to achieve traffic calming by passive means through the arrangement of buildings and spaces coupled with surface materials. This may include smaller corner radii rather than sweeping curves, the use of frequent junctions and fewer straight lengths of road, buildings, walls, hedges and trees close to the road and allow for some on street parking.
- Traffic speeds within neighbourhoods should not exceed 20 mph.
- Bus routes may require suitable adjustments to roads. A permeable grid-based layout assists access and obviates the need for turning areas.
- Bus stops should be sited to achieve convenient access for as many people as possible and designed to allow for level boarding.

A 'homezone' that has been retrofitted to an existing development, Groningen, Holland.

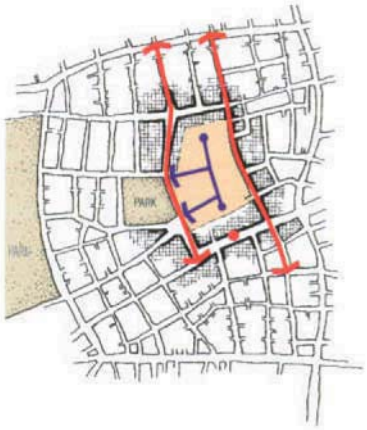
GRIDS AND BLOCKS

6.30 Grids are widely used ways to achieve convenient connections through developments. Such grids can be of rigid geometry or may be less rigid and more fluid. Route spacing in a grid of 80 to 100 metres provides an optimum network for pedestrian, cycle and vehicular movement, although it may not be necessary for all routes to be open to vehicular traffic. In town centres route spacing in grids for pedestrians and cyclists can be reduced to 65 metres where high volumes of pedestrian activity will be experienced. Conversely in suburban locations where pedestrian and cycle movement levels will be lower route spacing on grids can increase to 120 metres; spacings greater than this can impede permeability and discourage pedestrians and cyclists. Neighbourhood centres will not all have all facilities present, therefore a network of mutually supportive neighbourhood centres that share certain facilities should be established. To allow neighbourhood centres to be mutually supportive and easily accessible for pedestrians, cyclists, buses and motorcars, a larger grid at 800 metre centres should be established to link the neighbourhood centres.

6.31 Many historic settlements comprise an informal, grid of interconnected roads, streets alleyways and space. This is in marked contrast to the visually and socially less successful twentieth century 'tree hierarchy' type layouts that contain culs-de-sac, dead ends and unnecessarily tenuous through routes.

Consider how best the site can be connected with nearby main routes and public transport facilities

A more pedestrian-friendly aproach that integrates with the surrounding community links existing and proposed streets, and provides direct links to bus stops



The typical cul-de-sac response creates an introverted layout, which fails to integrate with the surroundings

This street pattern then forms the basis for perimeter blocks, which ensure that buildings contribute positively to the public realm

Key

Principal routes

Internal streets

Bus stop

(Llewelyn-Davies 2000)

6.32 It is desirable to create an informal, permeable grid for new developments that connects into the existing street pattern. The layout of grids and blocks should be determined by the grain and visual character of the surrounding area, and the atmosphere that is sought for the new development, coupled with the need to control the degree of permeability (to ensure adequate security), which will focus through routes on 'desire lines' and destinations. The specific location within the South Cambridgeshire district will also affect the type of layout appropriate to a new development (see Chapter 3 on Village Landscape and Settlement Character).

6.33 The orientation of blocks within the grid should, where possible, be arranged to enable the principal living rooms in the dwellings to face south and thereby maximise passive solar gain. Opportunities should also be taken to provide shading when the sun is higher in the sky, such as overhangs, louvres or tree planting. Further detail on passive solar gain is contained in Chapter 8.

6.34 Perimeter blocks that are secure in their core should be provided.

6.35 Developments should not be designed in isolation without due regard to their collective appearance, particularly as a skyline. The collection of buildings within a block should create a varied and interesting skyline; and a collection of blocks should create an interesting wider skyline.

HOUSING TYPES AND MIX

6.36 All large residential areas should include a mix of sizes, types and tenures of property, within neighbourhoods, to cater for all stages in the life of households, from single young people through to residential care facilities, so that whatever their needs, residential opportunities exist for people without having to leave the neighbourhood, if they so wish, in accordance with the principles of 'Lifetime Homes'. Residential development will provide a range of types, sizes and affordability, including Affordable Housing, to meet the identified local needs. Certain types of development mat not be acceptable in some villages. Proposals therefore must conform to what is acceptable in accordance with the Local Development Framework.

DENSITY

6.37 High-density residential development is often misconstrued as being synonymous with poor quality and high-rise urban housing. In comparison medium rise high-density buildings of 3 – 4 storeys maximises density whilst minimising perceived intensity or overcrowding. Density is a product of the design and should not be used as a determining factor in the design approach adopted. Therefore, a design led approach to residential areas should be adopted, that is appropriate to the site, its location, surrounding density and context. High-density development may not be acceptable in some villages. Proposals therefore must conform to what is acceptable in accordance with the Local Development Framework.

6.38 Higher density residential developments can locate greater numbers of people within the 400 and 800 metre walking distances of local centres improving the viability of the services located there.

6.39 Higher density developments can provide economies of scale in relation to the provision of infrastructure, making such things as district heating or undercroft or basement car parking more viable.

6.40 Higher density developments can make public transport services more viable. The Local Government Management Board's rule of thumb that densities of 100 persons per hectare are often regarded as necessary to sustain a good bus service. Within a walking distance of 800 metres, generating a walkable neighbourhood covering an area of 97.5 hectares, equates to 45 dwellings per hectare, assuming an average household size of 2.2 persons.

6.41 Policy HG/1 in the Development Control Policies DPD seeks average net densities of at least 30 dwellings per hectare, except in exceptional justified circumstances; and net densities of at least 40 dwellings per hectare in more sustainable locations close to a good range of existing or potential services and facilities, or the potential for good public transport services.

6.42 To assist in place making the density of development should be varied and not uniform in order to create variety of built forms. The higher density development should be provided at or close to the heart of the development, with density decreasing with distance from the heart.

6.43 Special circumstances may exist within a Conservation Area, within widely spaced buildings, or on the rural edge of a settlement. This is considered on a case by case basis and guidance is contained in Chapter 7, Part III and the Council's Conservation Areas SPD.

PUBLIC REALM AND LANDSCAPE FRAMEWORK

6.44 Everything in the public realm, from the design perspective, can be considered as landscape; all hard and soft landscape, relationship to the countryside, streets, and squares, open space, parks and water movement corridors. The landscape framework applies at two levels; the broader level is the structural landscape at the overall development scale; and the detailed level is landscape as setting for spaces and buildings.

6.45 The best development relates well to the topography and geography of a site and acknowledges the pattern of historical use of that site.

6.46 When setting out to design the landscape framework to a new development, the existing landscape character in its broadest sense should be respected, taking in issues of geology, topography, vegetation, hydrology, landmark features and local building character, as well as how to fully integrate the proposed development into landscape.

Table 6.3: Working With Site Features DC46

Achieve this:	By doing these things:
Use existing positive features to create character	• Work retained buildings into new blocks. • Use ponds and watercourses for outlook. • Use specimen trees and shrubs as the focus of new development. • Use existing hedgerows to create structure for new development. • Front established routes. • Formalise informal routes.
Work with the topography of the site	• Allow existing levels to suggest layout options. • Allow hedges and ditches to influence layout and add structure for new development. • Retain all trees and hedges where practical.
Retain uses that are important to the function of an area	• Work important existing uses into a layout in new or retained buildings.
Accommodate below ground constraints in a workable layout	• Avoid disruption to below ground archaeology where possible. • Where block structure permits align streets and spaces along utility easements for ease of access. • Explore the practicalities of rerouting services which preclude efficient layout options.
Ensure protected species are safeguarded	• Protect habitat. • Avoid conflict with the built form. • Build in appropriate protection/relocation or other mitigation measures.

6.47 Maximising the use of existing landscape features on the site will add instant maturity to any development. Existing views and vistas can be harnessed for the benefit of those who will live, work or visit the development. Care should be taken to ensure the development proposals do not obstruct such views and vistas spoiling people's enjoyment of them.

6.48 The landscape needs to be considered early in the design process. It is not something that can be successfully added after the event. The landscape proposals must therefore be included as an integral part of the design process and the Council will expect landscape proposals to be submitted concurrently with applications for full planning permission, rather than be left as a reserved matter to be sorted out later. A Landscape Design Statement will be required illustrating: how the design will integrate with the local character, how design will relate to the needs of the development and its future occupants, and that the design includes sufficient space (made up of practical areas) for the planting.

6.49 Developers should ensure sites are designed to integrate the built forms with their encompassing spaces to create a unified whole, with no spaces left over that are not properly incorporated into the design of any building plot or public realm area.

6.50 Attention should be paid to the retention, integration and future maintenance of important landscape elements such as trees, hedgerows and ground-slopes. Consideration should be given to the use of products such as the Deep Root Silva Cell to direct tree root growth.

6.51 Landscape is an integral part of any development. It applies equally to housing, business and industrial developments and can fulfil one, some or all of the following functions:

- Complement and/or enhance the proposed built form, providing both a setting and an outlook.
- Assist in integrating development into the existing landscape – with consideration to both visual and landscape characteristic aspects.
- Screen the development.
- Be an entity in its own right.
- Create a sense of place.
- Provide shelter and ameliorate noise and/or air pollution.
- Provide environmental benefits through carbon fixing, i.e. taking in carbon dioxide and emitting oxygen.
- Provide wildlife habitats – assisting in meeting biodiversity requirements.
- Create enclosure and define boundaries.
- Soften and frame views.
- Food production, either on plots, allotments, or smallholdings.

6.52 Spaces around buildings should be designed to integrate with the buildings to enable them to provide clean cool air for natural ventilation and to cool exhaust air from buildings; to provide shade in the summer to reduce the demand for artificial cooling; to reduce the heat island effect by cooling the urban areas.

6.53 The public realm should be designed and managed to enrich people's experience, it should allow for movement and interaction, it should delight the senses, make people feel comfortable and be easy to maintain. Reference should be made to the Cambridgeshire Design Guide.

Table 6.4: Public Realm Design

Achieve this:	By doing this:	Notes:
Safe space	• Ensure public open space is overlooked. • Provide lighting that is appropriate for its setting. • Make routes direct. • Relate spaces to routes. Plan focal space where footfall is greatest. • Create comfortable spaces where people enjoy spending time. • Predict misuse and design it out.	People help to police space. Create pride in civic space
Accessible space	• Relate spaces to the movement network to ensure they are easy to get to. • Think about all users. • Make public space easy to use. • Avoid clutter. • Smooth the public/private transition. • Consider access for emergency vehicles and refuse freighters.	Ramp integrated into steps. Refer to 'Streets for All'
Useful space	• Ensure all space has a clear purpose; avoid 'space left over'. • Design with the purpose of the space in mind to ensure space is fit for purpose. • Avoid unnecessary objects that clutter space. • Consider microclimate at site planning / layout stage and in determining the relationship to adjoining buildings.	Awkward shapes can be difficult to maintain.
Attractive space	• Make use of natural assets; water, trees, hedges or slope. • Design space with the same care as the buildings that enclose the space. • Use good quality surfacing. • Be imaginative and make the most of small spaces. Create simple geometric patterns or informal designs that flow with and reinforce	All new shared surfaces in setts e.g. tegular. Avoid complicated patterns that are

	space. • Use material changes to identify intentional changes in use or character. • Mark parking spaces out subtly, or by changes in material. • Play down arbitrary changes in surfacing in overly complex designs or at public/private boundaries. • Co-ordinate and combine street furniture. • Reduce visual clutter. • Place street lighting on buildings where practical. • Integrate public art into the design of spaces. • Incorporate appropriate tree, shrub and other planting. • Ensure boundary treatments work with the space. • Get the detailing right.	unintelligible to the user. See guidance on public art and Public Art SPD. Manhole covers etc Workmanship
Space that lasts	• Consider future maintenance – keep landscape design simple where ease of maintenance is important. • Get clear management responsibilities put in place from the outset. Draw up maintenance regimes at the design/planning stage. • Use durable products; natural materials weather better than artificial ones. • Remember trees grow; think about both their immediate and eventual impact on buildings and space. • Use indigenous planting species where possible and foster biodiversity. Greater consideration of ecological principles at design stage can improve biodiversity in new open space. • Select species that do not require irrigation once established and will survive in predicted changes to climatic conditions. Get the right plant for the right place to ensure planting thrives.	Avoid the use of materials that will result in visible patches of reinstatement. Liaise with landscape managers to see what is practical. Avoid the use of materials that discolour or fade, or become brittle in sunlight. Brownfield sites can have surprising nature conservation potential. Open space is often too simplistic in design and too intensively /uniformly managed to have much nature conservation value, but this need not be the case.

PUBLIC ART

6.54 Public art should be designed in parallel with the design of buildings and spaces, as an integral part of them and should not be seen as isolated features to be bolted-on to buildings or placed in spaces at a later time. South Cambridgeshire District Council has adopted a public art policy and published an SPD on Public Art. The term Public Art refers to works of art in any media, which contributes to the identity, understanding, appreciation and enhancement of public places. Public Art can promote a sense of place and pleasure for example by evoking local history, be inspiring and/or thought provoking. In South Cambridgeshire Public Art has a role to play in neighbourhood and community development.

6.55 Public art is described as; any work by a recognised artist in a public place, and this policy applies to:

- Residential developments comprising ten or more dwellings.
- Other developments where the gross floor space created is 1,000 m^2 or greater, including offices, manufacturing, warehousing and retail developments.

6.56 The artwork may be large or small, mobile or static, integral to a building or freestanding, fine art or functional. For example, public art may be produced in the following forms:

External Public Space – Sculpture; Mural; Relief; Feature Window; Canopy / Entrance Feature; Paving; Landscape Art; Bespoke Street Furniture; Bespoke Signage.

Internal Public Space – Sculpture; Mural; Painting; Textile; Glass; Flooring; Crafts; Exhibition space for changing exhibitions.

Non-Site Specific – A contribution may be considered though the general public art strategy for off-site works that may be more easily accessed by the public.

6.57 The Council's policy encourages developers to dedicate between 1% and 5% of the associated construction costs of the capital project to Public Art. The council will initially negotiate the principle of an agreement with developers and their agents to commission art within the development, which will then be secured through a Section 106 agreement that will be attached to the planning permission for the development.

6.58 The Council encourages the use of local artists from within South Cambridgeshire, but developers are free to choose and appoint any recognised artist and work by nationally notable artists is also encouraged.

The developer's architect or landscape architect/designer should be able to assess possible types and most appropriate locations of art in relation to the project design and context. Ideally the appointed artist will work alongside the architect. It is important that at the outset an artist's brief is prepared. This will clarify what kind of artist is required for the particular development and establish: a theme and character, location(s), budget, programme, identity of the client and any requirements for community involvement (including contacts).

6.59 Developers are advised to ensure that technical consultations and approval for the artwork are carried out in advance of the installation. These may include:

- Statutory utility companies (for underground services in the location of the installation).
- The Highway Authority (for traffic safety and works within public highway land).
- Parish Councils (for works on public open spaces).
- Health and safety issues and Environmental Health issues.
- Whether the art installation requires planning permission in its own right.

6.60 Any resulting art installation will require maintenance during its life. The maintenance will vary depending on the nature of the intervention, but may include running costs for lighting etc, and responsibility for maintenance of the artwork will need to be carefully considered when the artist's brief is prepared. It is anticipated that the investment in the artwork includes a sum for maintenance. Provision for future maintenance should be included within the Section 106 agreement.

6.61 More detailed advice on the public art policy and the procurement process is available in the Public Art SPD or from the Council's Arts Development Officer.

LANDMARKS AND WAY MARKERS

6.62 A variety of built forms and public realm spaces provide identity and interest that enables people moving through an area to navigate by. This can be greatly enhanced through the provision of key landmarks that people can identify. Such landmarks could be distinctive places at the intersection of routes, distinctive buildings at key locations such as intersections and at the end of vistas, or the provision of towers to provide landmarks in a wider context. Existing buildings of special note, or individual mature trees,

should be considered to create landmarks. Similarly visual stops need to be carefully considered and achieved using buildings or other focal points.

6.63 Small-scale points of reference that aid orientation and the creation of a local sense of place, such as war memorials, village notice boards, post boxes and distinctive, architectural features. These way markers give the sense of an unfolding journey when travelling through the development.

A feature corner building acting as a way marker, Orchard Park.

A corner turning building acting as a way marker, Great Shelford.

6.64 Using a particular house type as a landmark or way marker is acceptable, but if the same house type is repeated it loses its effectiveness and becomes commonplace and confusing.

DAYLIGHT AND SUNLIGHT

6.65 Daylight and sunlight are primary considerations in any proposal, both for the new accommodation, and for that of the neighbouring development and gardens. This depends on orientation and the built form, but buildings must

not significantly overshadow a neighbouring property's windows or garden, or where possible block their views, and evidence will need to be shown that this is the case. Buildings will not normally be allowed to protrude beyond a 45-degree line drawn horizontally from the nearest window of a neighbouring property.

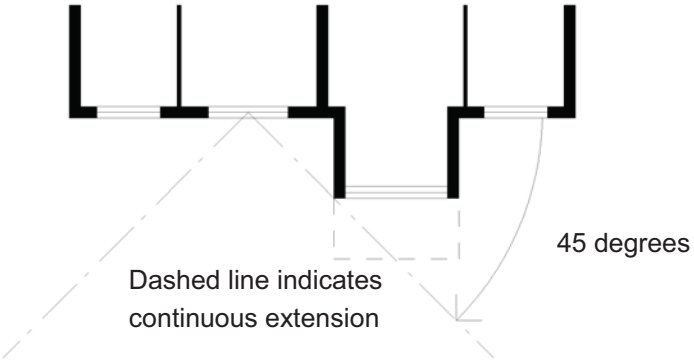


Diagram of 45-degree "rule of thumb" concerning daylighting. The dot/dash line indicates the 45 degree line drawn sideways from the centre of the nearest adjacent window. This also applies upwards from the top of a window.

6.66 Consideration should be given to orienting buildings to the south or within 30 degrees of south to maximising the potential for harnessing solar gain to reduce the demand for space heating and solar power for energy production.

PRIVACY AND OVERLOOKING

6.67 Protecting privacy and avoiding overlooking of neighbouring houses should be given high priority in any residential context and the Council is required to consider any relevant objections received from neighbours.

6.68 To prevent the overlooking of habitable rooms to the rear of residential properties and rear private gardens, it is preferable that a minimum distance of 15m is provided between the windows and the property boundary. For two storey residential properties, a minimum distance of 25m should be provided between rear or side building faces containing habitable rooms; which should be increased to 30m, for 3 storey residential properties. Where the opposing alignment of facing windows is significantly offset, these distances may be slightly reduced. Where blank walls are proposed opposite the windows to habitable rooms, this distance can be reduced further, with a minimum of 12m between the wall and any neighbouring windows that are directly opposite.

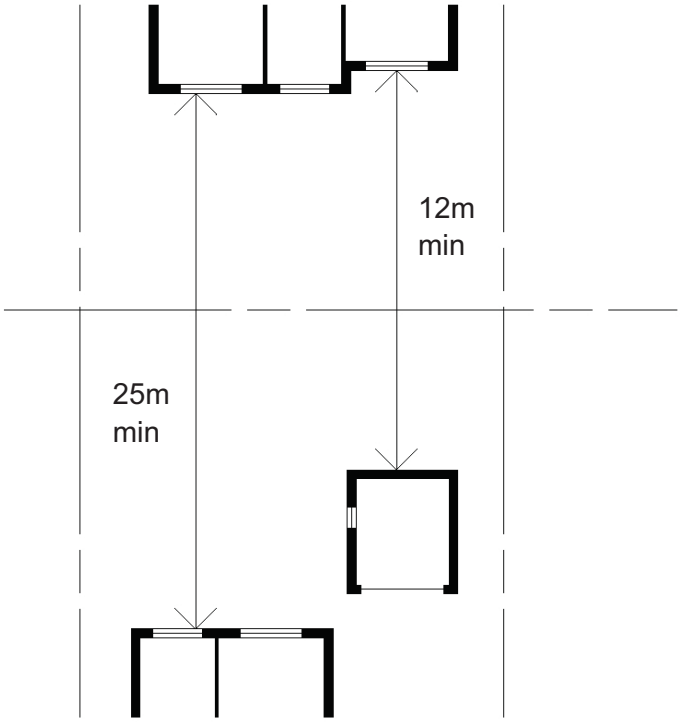
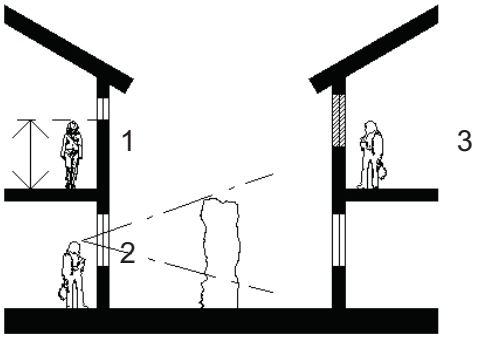


Diagram of 12m and 25m "rules of thumb" concerning daylighting and over-looking. The plan shows two residences with back-to-back gardens. The 25m rule of thumb refers to primary habitable rooms that face each other. The 12m rule of thumb refers to a blank wall that faces a neighbouring room.

6.69 Careful consideration must also be given to minimise the impact of direct overlooking from a new dwelling into a neighbouring garden, particularly from upper floor windows. Where a potential problem is evident, the careful internal planning of rooms will assist, if necessary windows could be of obscured glass and fixed shut (apart from any top vent), or could be at high level. Protective boundary treatments, garden walls and planting, can assist in obscuring views, but as these cannot be relied upon to remain in perpetuity they should not be utilised as the primary means of creating privacy.



Diagrammatic section illustrating acceptable types of windows in walls parallel to a boundary to minimise overlooking of neighbouring gardens.
1. Cill of window higher than 1.7m from floor level.
2. View blocked by hedge/wall/fence, etc.
3. Use of obscured glass in fixed window.

PRIVATE GARDENS AND AMENITY SPACE

6.70 The design of the grounds surrounding buildings are as important as the design of the buildings themselves and the two should be designed as an integrated whole.

6.71 Every home should have the benefit of some private or communal outside amenity space. This can take the form of private gardens, communal gardens, roof terraces or balconies. Within denser development of new settlements and urban extensions, the careful design of outside amenity spaces is required to optimise the benefits of good locations and ensure these spaces offer maximum benefit to new residents. In such compact developments within appropriate urban contexts there will be an emphasis on private balconies and communal gardens / terraces. Relatively modest balconies, roof terraces and communal decks can offer significant benefit to residents of urban developments where they are properly integrated into new development, respect local character, are secure, quiet, attractive and have good microclimate.

6.72 Private gardens should:

- Be of a size and shape to allow effective use for the number of people the property is designed for, for growing plants or vegetables, for general amenity, for play in family housing, etc. and where possible be oriented to allow sunlight into each garden.

- Incorporate a private sitting out area positioned close to internal living accommodation.

- Incorporate means of enclosure that do not undermine the quality of adjoining, especially communal, spaces; whilst avoiding excessive wall or fence heights, which could overshadow small gardens and discourage interaction between neighbours.
- Be placed away from public areas within the development.
- Feel safe and secure.
- Enable flexibility of use and personalization.
- Provide accessible yet discreet locations for clothes lines.

6.73 Communal gardens including roof terraces should:

- Be convenient to use.
- Be clearly distinguished from the public realm.
- Not be bisected by vehicular routes to parking courts.
- Feel safe and secure.
- Not unduly affect the privacy of residents' internal accommodation, particularly those at the same level as the communal space, or below in the case of roof terraces.
- Incorporate a variety of semi private sub spaces to permit flexibility of use.
- Provide accessible yet discreet locations for clothes lines.
- Be designed with interesting planting, hard surfacing and places for sitting and socializing.
- Be properly managed and maintained.

6.74 Balconies should:

- Benefit from sunshine and good microclimate (including air quality).
- Be well related to internal accommodation.
- Be of sufficient size as to permit outside sitting / dining.
- Have good outlook.

- Be secure and relatively private.
- Be placed on the quiet side of the building where possible.
- Relate well to the architecture of the building on which they are placed.

Usable sized balconies, Orchard Park.

6.75 Ideally residential units should be provided with access to the following sizes of private amenity space. Each one or two bedroom house should have private garden space of 40m^2 in urban settings and 50m^2 in rural settings; whilst each house with 3 bedrooms or more should have private garden space of 50m^2 in urban settings and 80m^2 in rural settings. Ground floor apartments should have a minimum of 10m^2 private amenity space immediately outside their living accommodation, or use of a communal garden, where 25m^2 is allowed for each apartment. Upper floor apartments should have use of a private balcony, of a minimum of 3m^2, plus use of a communal garden, where 25m^2 is allowed for each apartment. This provision is in addition to the stated requirements for car parking and bin storage. Residential properties in some villages, historically, have small private gardens, in the context of which it may not be appropriate to provide private amenity space in accordance with the above guidelines.

PLOTS

6.76 A settlement may contain numerous different sizes and shapes of plot, but usually an overall pattern can be identified and, when subdividing larger plots, this pattern and scale should be respected, as it adds to the unique character of a cumulative settlement. The pattern will need to be varied to suit the individual location, be it along a straight street, a curving street or at a corner junction. The proportion of width to depth of a plot often distinguishes the density and character of the built environment.

6.77 All plots should promote a human scale with a frontage to the street that reflects the local characteristics. Larger buildings may sometimes be disguised using a smaller building in front to suggest a more human scale where viewed from the public realm.

6.78 Corner plots present special challenges, as the building must relate to more than one frontage. Building position, garden layout and boundary walls can all define their success in the structure of the built environment. Attention should be paid to the layout and orientation of similar corner plots in the same settlement. Access into the plot and the locations of openings within the defining boundary should be carefully considered in relation to the adjacent plots and those on the opposite side of the street.

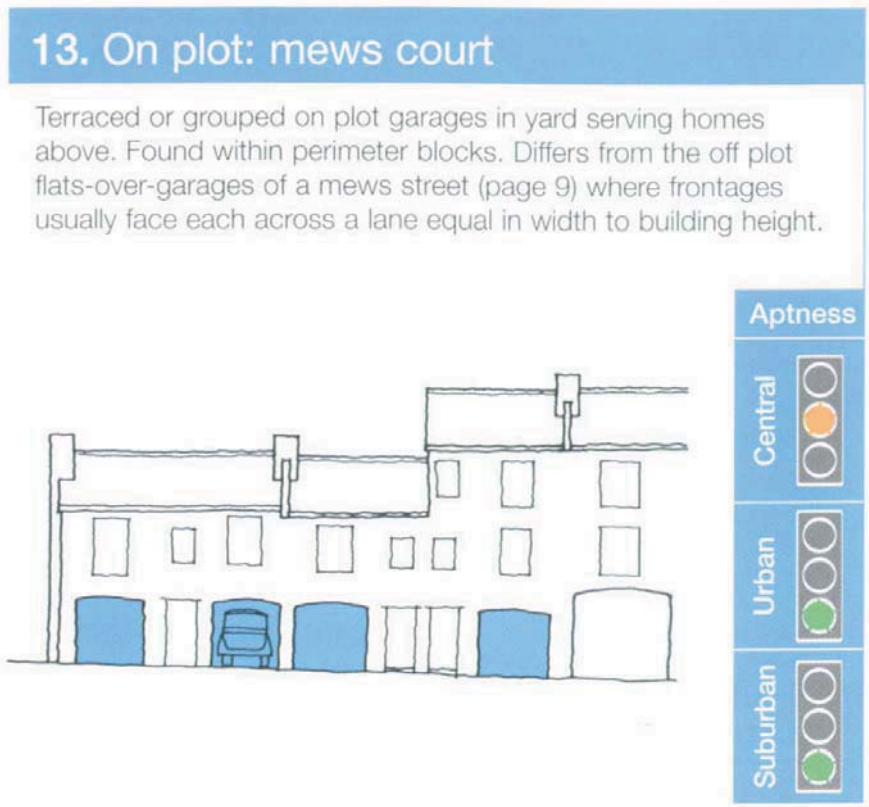
6.79 Neighbourliness will be an important consideration; therefore privacy and the avoidance of overlooking, particularly from window to window, but also from window to private garden space, should be given high priority in any residential context, as should any effect on day lighting and a sense of 'overbearing' of adjacent properties.

6.80 Developers should always generate innovative design solutions that exhibit architectural excellence. However, where a site is in a landmark location within a settlement, or may be difficult to develop, such innovation and excellence are essential.

PARKING

6.81 One of the major challenges in the design of new residential developments is to accommodate the car in ways that are visually unobtrusive, convenient and safe to use. The number of parking space to be provided should be assessed using the Council's adopted Parking Standards as set out in the Development Control policies DPD. These are a maximum level of provision and it may be possible to provide fewer spaces where there is good access to facilities and public transport. Where appropriate and viable, consideration should also be given to the provision of car clubs and dedicated shared parking bays. Reference should also be made to the need to consider design implications of providing adequate cycle parking as part of new developments.

6.82 Parked cars should not be allowed to dominate the street scene; they should preferably be accommodated within, beneath, or at the side or rear of buildings. If parking is not on-plot it should be as close to the house as possible for convenience and to prevent people parking on the roads. In most cases parking spaces and garages located within the dwelling plot should be recessed from the building frontage so as to lessen their visual impact. Within villages the urban form will dictate the manner of parking and to retain the village character parking may need to be provided in a similar manner.



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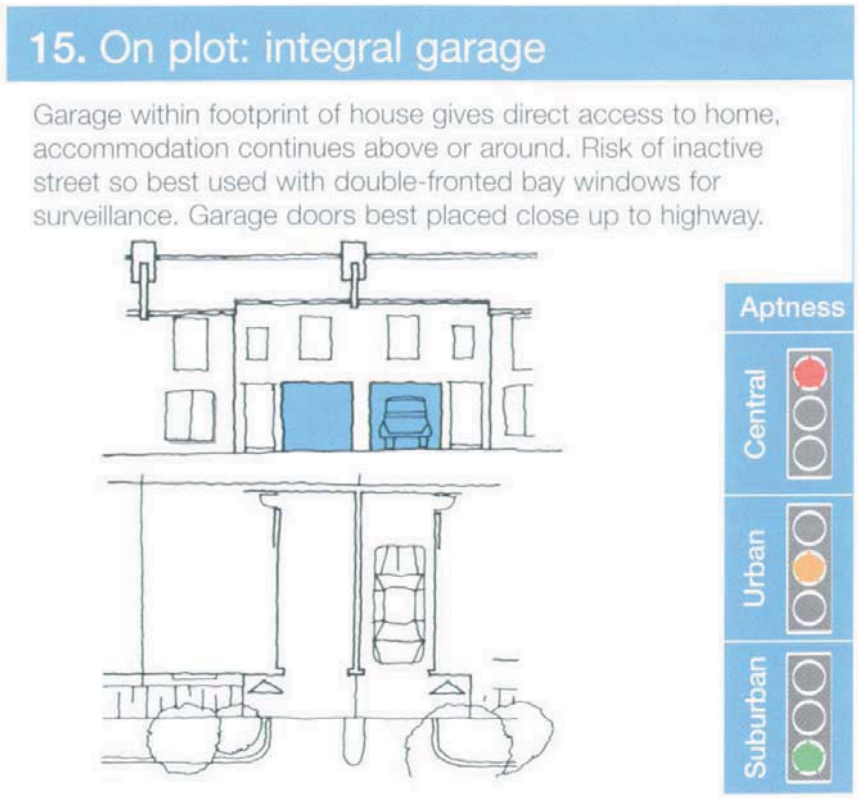

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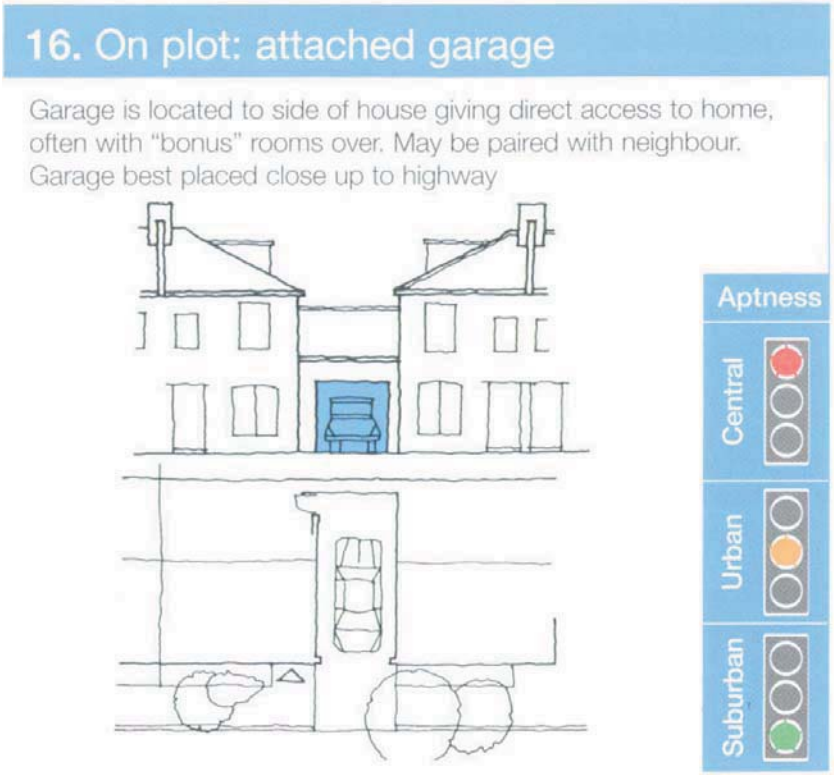
On plot integral garages, Sawston.



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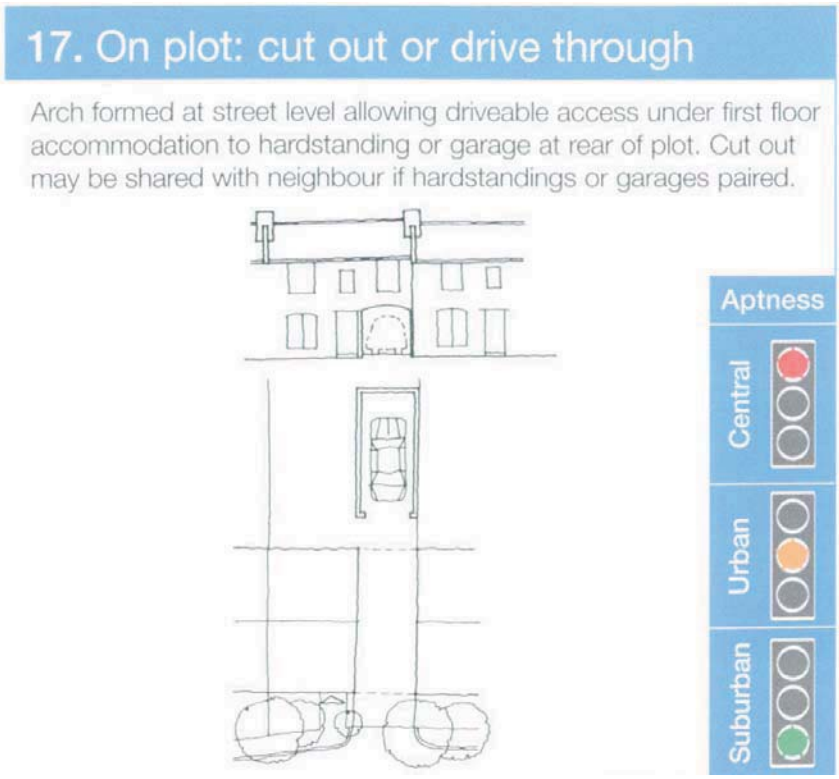
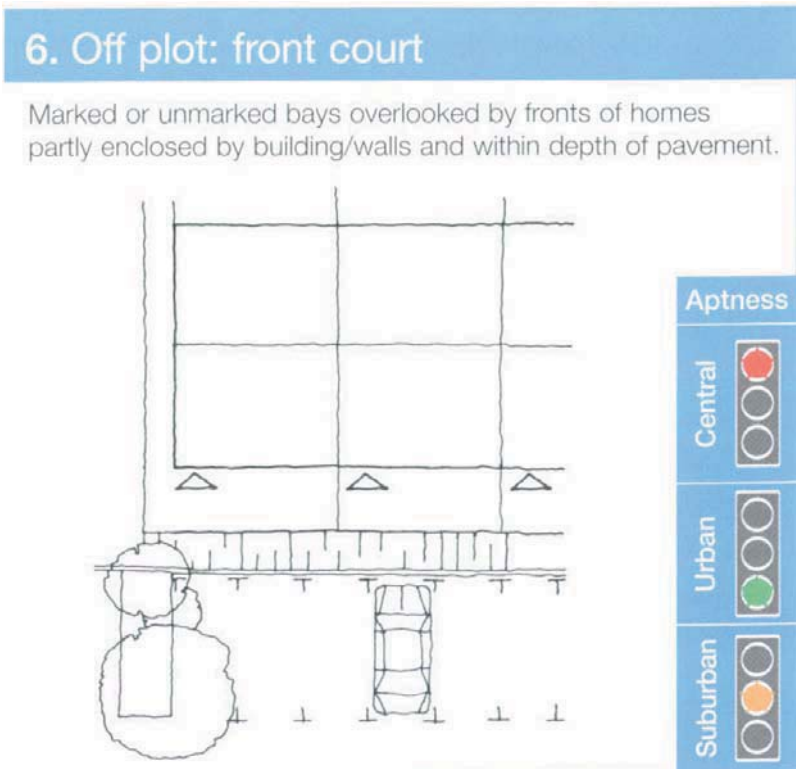


(Car parking what works where. Homes and Communities Agency)

Drive through car parking with garages to the rear of the parking space, Highfields.

6.83 To avoid cars being displaced from garages into the street, it is important that garages are of sufficient size to accommodate a large car together with cycle storage, some degree of other storage and room to pass garaged cars with wheeled bins, if the primary route for taking them to the back-of-footpath is through the garage. To provide garages of adequate size, a minimum of 3.3m X 6.0m should be allowed for car parking and circulation, with an additional allowance of 1.0m at the end or 650mm – 750mm at the side to allow for cycle or other storage.

6.84 Parking facilities should be viewed as public spaces that have cars in them at certain times, and should be created as attractive functional spaces, with planting used to avoid the street scene becoming dominated by the view of cars. The retention of existing trees, in combination with appropriate landscape materials and detailing, can create low key and attractive parking areas.



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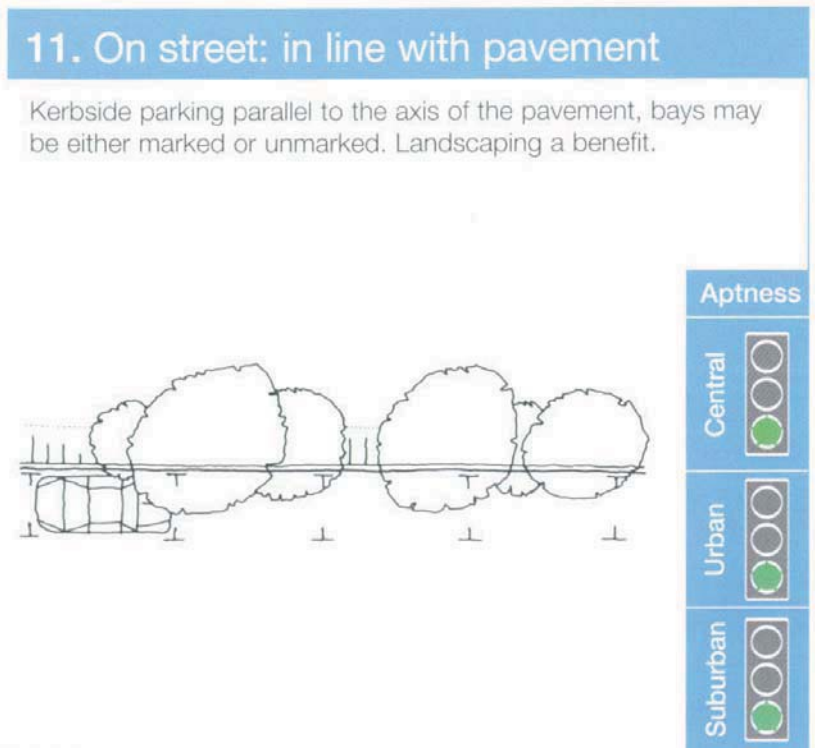

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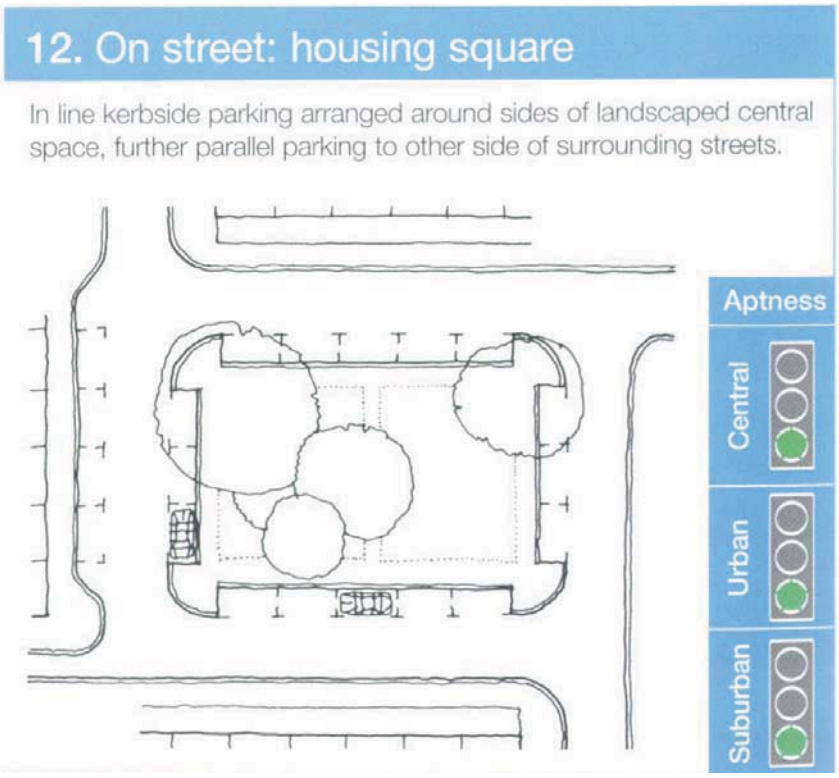

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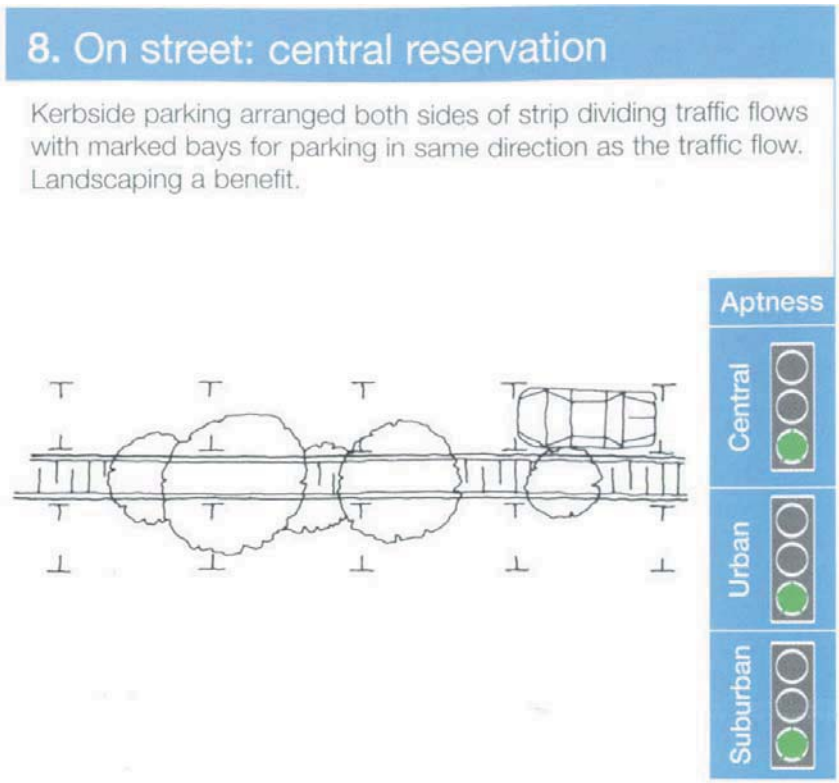
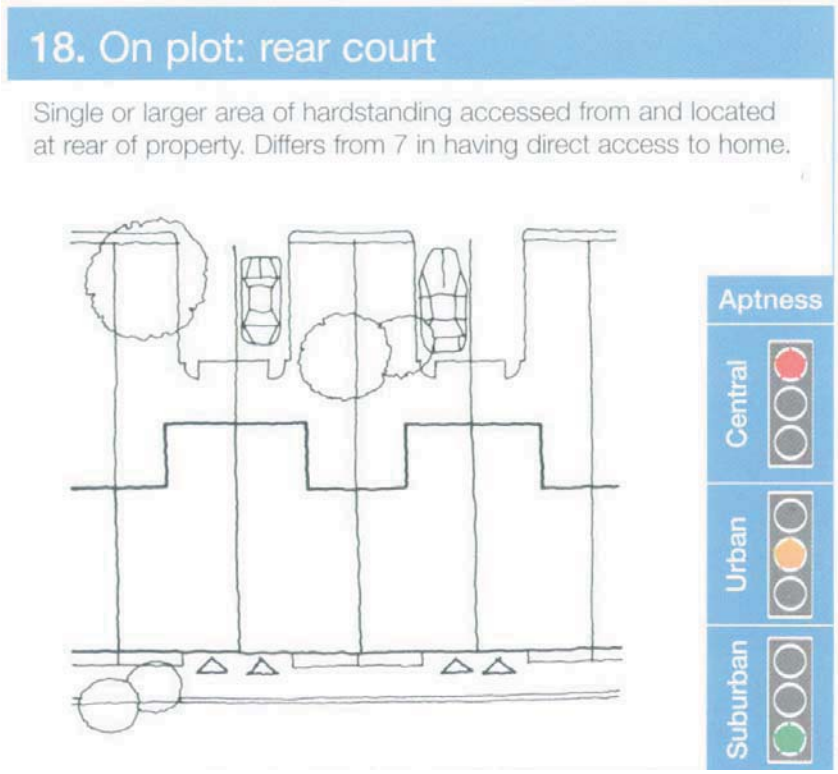


(Car parking what works where. Homes and Communities Agency)

6.85 Any off-plot provision of communal parking courts must be in small, well lit, and overlooked by neighbouring properties, for security, otherwise they may become underused, problem areas. Larger unsupervised parking courts, especially in the heart of blocks that remove the security of the rear of properties are not acceptable as they will be little used, resulting in cars being parked on the streets. One of the benefits of higher density development is that it makes undercroft or basement parking economically viable; this is an option that minimises the visual impact of parking while maximising the land for development. However it is important that it does result in awkward or unbalanced elevations. Reference should be made to English Partnerships' Car Parking What Works Where, especially to the golden rules on p18.



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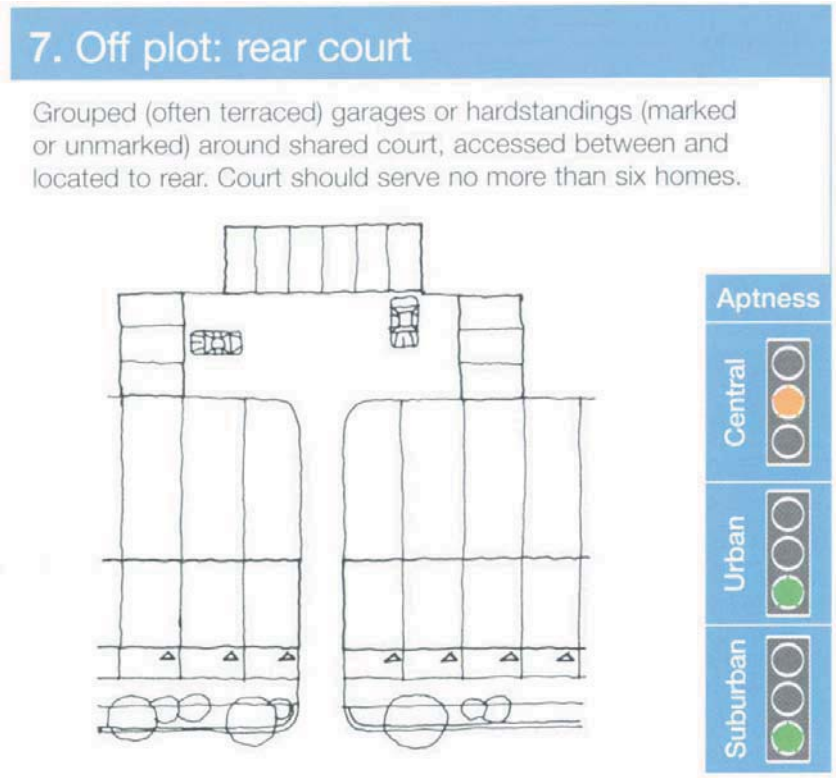

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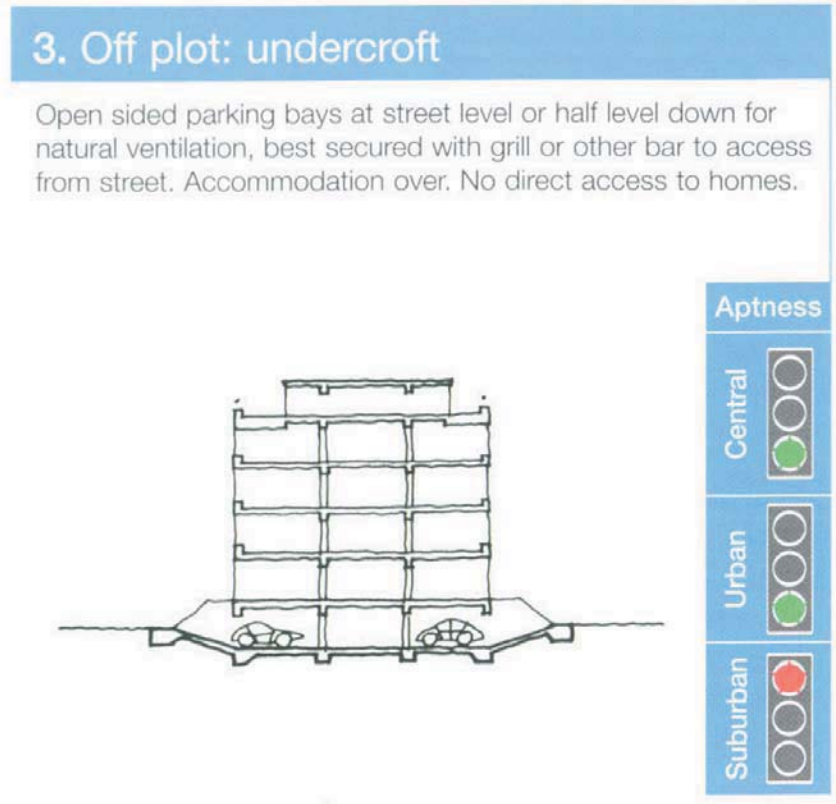


(Car parking what works where. Homes and Communities Agency)

6.86 Adequate provision must be made in all cases for visitor parking and service vehicles.

UTILITIES

6.87 Developers are strongly encouraged to locate all services underground to minimise visual clutter. Common service trenches should be employed to maximise the areas available for planting of trees and shrubs for the visual enhancement of the public realm spaces and the improvement of the setting of the buildings themselves.

6.88 Building Regulation B5 requires access for fire tenders to 15% of a dwelling's perimeter or to within 45m of every point of the building's footprint.

6.89 The location of external meter boxes needs to be considered as part of the detailed design process to ensure they are not unduly prominent in the street scene, with carful attention paid to their position and colour.

SOLAR PANELS

6.90 The Council encourages the design of all new buildings to minimise their environmental impact and be robust in changing climatic conditions.

6.91 Solar panels should be incorporated into the design of the roof rather than be add-on units above the roofline, this will retain the visual integrity of the built form.

6.92 Where solar panels are not incorporated into a building from the outset, the roofs should be designed to enable their easy later addition with minimal visual disruption of the roof form. See Chapter 8 for further details on building integrated renewable energy technologies.

6.93 Where the proposals affect a Conservation Area or Listed Building, the siting of the solar panels should be carefully considered and unobtrusive. Further guidance is contained in the Council's Listed Building and Conservation Areas SPDs.

SATELLITE DISHES AND OTHER PARAPHERNALIA

6.94 Satellite dishes need careful consideration, especially when they are to be located in proximity to a Conservation Area or Listed Building. As a general rule satellite dishes should be located on secondary elevations and rear elevations. Where this is not technically feasible or affects a Listed Building or Conservation Area, alternative options should be considered, such as siting the satellite dish on a pole in the rear garden, or on an outbuilding, subject to not being visually intrusive into public areas or the setting, or detrimentally affecting the amenity of neighbours.

DESIGN THEORY AND AESTHETICS

6.95 In this section the following terms are used in the manner indicated by the following definitions:

- Design theory is the deliberate application of the design elements and the principles of composition to formulate high quality design solutions.
- The design elements are the basic building-blocks of design theory; point, line, shape, form or mass, texture, tone and colour.
- The principles of composition is the aspect of design theory that addresses the combination of the design elements into an integrated design; pattern, rhythm, repetition, variety, contrast, emphasis, dominance, simplicity, unity, harmony, balance, scale and proportion and sequence.

6.96 Good design complements and enhances new development, but poor quality design detracts from the development. Architects, urban designers, landscape architects / designers and engineers should pay careful attention to the application of design theory in their designs, to ensure visually strong design compositions in which all the viewer / user observes / experiences is intentional and not undermined by ill-considered accident. Good architects and designers who posses a strong and controlled command of the use of design elements, may, intentionally break the following 'rules of grammar' to create strong individualistic design solutions.

6.97 Design can be subjective with different people having different preferences of the things they like and dislike. However, a meaningful discussion can be had about designs, free from personal preference, through focusing on design theory, i.e. how the design elements and the principles of composition are used. The following is a guide to how design theory will be assessed in designs submitted to the Council and how design language will be used when providing comments on design considerations will be referred back to designers.

DESIGN ELEMENTS

Point

6.98 These are the aspects of a design intended to act as points of emphasis to catch the observer's eye and direct vision to a particular place or feature. They may be singular, such as a tower on the corner of a building or a statue in a square, or they may be repeated throughout the design, such as a particular feature window, or a particular species of plant. However, too many points of emphasis cause distraction and visual confusion.

The column in Paternoster Square, London, is the focal point of the square. The column is not located at the physical centre of the square, but the paving pattern radiates out from the column leading the observer's eye to it as the focal point.

Line

6.99 Line is the joining up of two or more points, to lead the eye. This is often intentional, such as with a stringcourse, or eaves line, or a path linking two spaces. A line may also be implied by the intentional or accidental repetition of points of emphasis, such as the use of a particular colour, or feature such as trees, resulting in the observer's eye following a line that was not intended by the designer and thus distracting the eye away from the features intended to act as the primary visual attractions.

A gulley used to form a visual line in the paving at Broadgate, London, to draw the eye into the space between the buildings.

The size, shape and alignment of windows on a plain background of the building elevation, creates a primarily horizontal emphasis, giving the impression of a long low terrace. Orchard Park.

Vertical bays on similar terrace to the one above, creates a primarily vertical emphasis, giving the impression of a shorter and taller terrace than the one above.

A change of level results in the deflection of an intended strong straight line.

Shape

6.100 Shape is a two dimensional area on a surface, such as on the floor or a wall, etc. Such intentionally created physical shapes are referred to as 'positive shapes' e.g. areas of panels or windows in a building wall, a building or boundary wall, fence, hedge, paving, grass, plants, water, etc. However, a shape can be implied by the things that surround it, acting as its boundaries, referred to as 'negative shape', e.g. the wall space between door and window openings. Shapes should be co-ordinated to form a harmonious composition to attain the design intention.

The use of colour emphasises the shapes created in the design of the building elevation. Orchard Park.

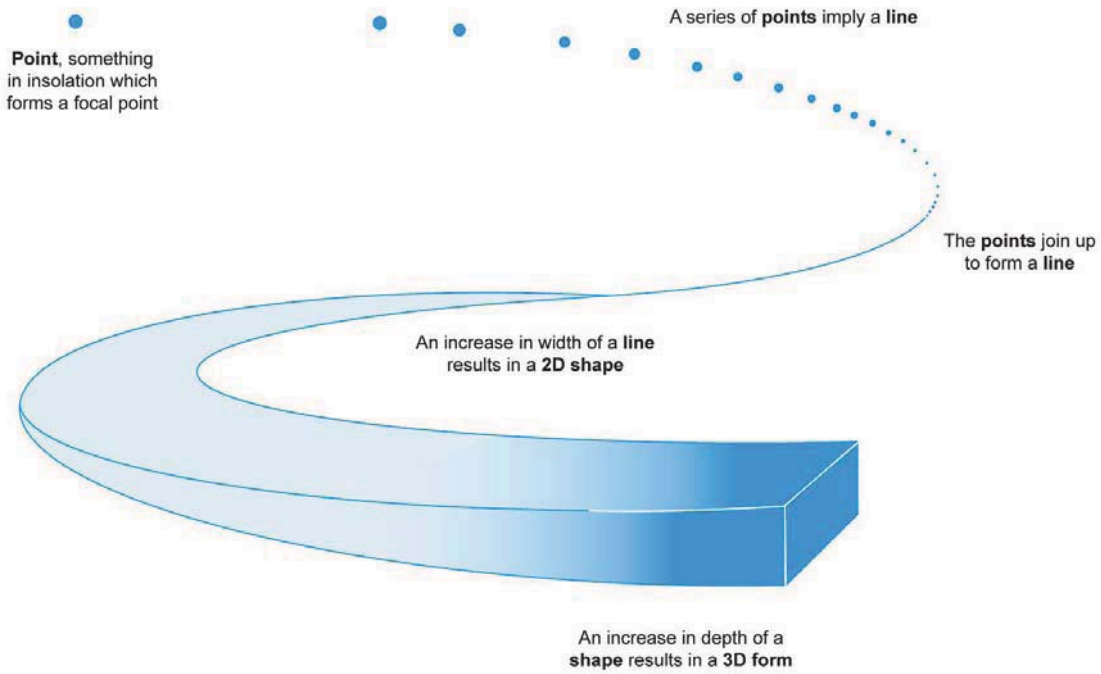
Form or mass

6.101 These are three-dimensional objects, buildings or features in the landscape used to divide space or to provide points of visual emphasis e.g. pavilions, buildings, plant groups. Such physical objects are referred to as 'positive form or mass'. However a space can be defined by the boundaries that contain it, which is referred to as 'negative form or mass', e.g. a 'public square' is defined by the buildings that edge it.

An innovative approach to the form of a building creates the visual impression of 3 separate forms stacked one on top of the other. The CHIPS building New Islington, Manchester.

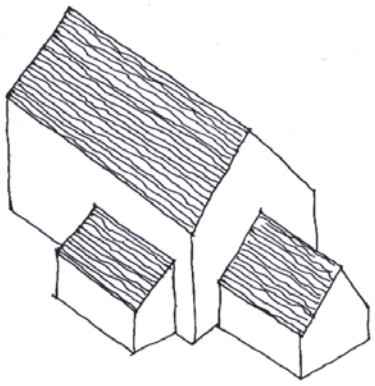
A building with an unconventional form creates interest in the urban fabric, Piccadilly Basin, Manchester.

Two rows of trees suggest edges and imply enclosure of a space.



The general relationship between point, line, shape and form. How points, lines, shapes and forms are perceived is dependent upon the context in which they are seen; for example a road is a shape as it has width, but from a distance it may be seen as a line running through a landscape.

6.102 Additive forms comprise the composition of a number of building structures joined together to give a balanced whole. They are derived from traditional buildings where the original structure is added to and extended over time. Subtractive forms involve the cutting away of shapes from the original to leave it truncated or with hollows and, though sometimes they may be architecturally interesting, are not typical of local buildings.



Additive forms

Texture

6.103 Texture is determined by the size and arrangement of the constituent parts of an object and is seen by the pattern they create and intensity of shadows cast. Texture is not an absolute aspect of an object but is relative to the size and shape of the object and the texture of the things around it. The observer's perception of an object is influenced by the texture perceived e.g. coarse, medium or fine.

Tone

6.104 Tone is the observer's perception of how dark or light an object is. Tone is not an absolute aspect of an object but is relative to the tone of the things around it. The observer's perception of an object is influenced by the tone perceived e.g. light, medium or dark.

Colour

6.105 Colour is identified in relation to the positioning of the colour in relation to the colour spectrum and modified by the tone, from white to black, to produce shades. The perception of an object's colour varies according to the colours of other objects it is seen in association with. Some colours make objects appear larger or nearer, whilst other colours make objects appear smaller or further away. Great care therefore needs to be taken in their selection.

PRINCIPLES OF COMPOSITION

Pattern

6.106 This is the use of the design elements, point, line, shape, texture, tone and colour, to create the visual design, to create an integrated whole. Too much use of the same element can become monotonous, but the use of too much variety can confuse the unity of the design.

Rhythm

6.107 This is the frequency of the repetition of a feature at regular intervals to create an intentional series, at regular intervals, which breaks a design down into sub-sections, e.g. a row of windows, pillars, or trees. Too many of the same repetition can become boring, whilst an inconsistent rhythm can destroy any form of unity.

A rhythm of openings in an elevation unifies a terrace of varied built forms. Cottenham.

Blind windows used to continue the rhythm of openings in the façade of a terrace. St. Neots.

Repetition

6.108 This is the repetition of a feature to create unity throughout the design, other than a structured rhythmical repetition. Too much use of the same repetition can become boring, whilst an inconsistent rhythm can destroy any form of unity.

Variety

6.109 This is the intentional variation of the design composition to create interest and prevent the design composition becoming monotonous. Too much variety can become distracting to the observer and disrupt the visual composition, whilst too little can result in monotony.

Contrast, emphasis, dominance

6.110 Contrast is used to create variety and emphasis. Too little contrast will result in the design becoming boring. Too much contrast can disrupt the unity of the design, giving to much emphasis to one particular point, or giving too many points of emphasis.

The addition of a central gable, carriage arch and panel, a different treatment to the window above the arch, the inclusion of a clock and date stone, all add visual emphasis to the centre of the building. Smaller windows to the upper floor add visual emphasis to the lower floors, with the string course between the ground and first floors creating a visual plinth to the base of the building.

On a smaller scale the different shaped window and lintel above the door add emphasis to the centre of the building, whilst the larger lintels above the ground floor windows add visual emphasis to the ground floor. The loss of the chimney stack on the right-hand side of the building imbalances the symmetrical balance of the elevation, as does the later addition the sign and burglar alarm.

Simplicity

6.111 Simplicity is the counterbalance to the multiple use of the other elements and principles, which ensures their repetition does not become cluttered and disunited.

Unity

6.112 Unity is the combination of the design elements and principles into a united composition.

Harmony

6.113 Harmony is the perceived comfort of the design composition to the observer.

Balance

6.114 Balance is readily identified in a symmetrical design where whatever occurs on one side of a centre line is repeated on the other side as a mirror image. Balance can also be provided by offsetting a large feature against a small feature, with the large feature set further away from the centre of a composition.

The asymmetrical Kingspan building at the Off-Site exhibition, BRE Watford.

Buildings designed to break the symmetry of the front elevation to ensure future personalisation or alterations by residents will not visually unbalance the elevation. New Islington, Manchester.

Scale and proportion

6.115 This is the size of features within the design in relation to each other and in relation to human beings, in terms of people's perception and comfort.

The tree group counterbalances the open space to create an asymmetrical balance; whilst the trees, paving pattern and street furniture maintain a human scale in a large space overlooked by large buildings. Broadgate, London.

Sequence

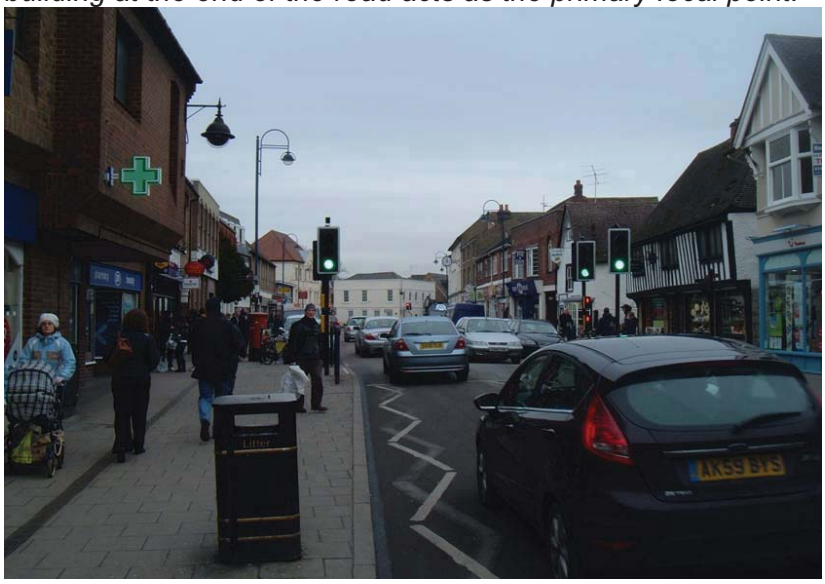
6.116 This is how the observer sees and perceives the overall design as they proceed through a series of spaces. This addresses how the design of spaces and places aids people to know where they are in a sequence, i.e. are they making an approach to a place, crossing an actual or perceived threshold to enter a place, or have arrived at a destination place.

1. The western approach to St. Neots provides a built edge to the town on the eastern bank of the river. Buildings edge on either side of the roadway create a narrow gateway to the town centre. The top of a church tower can be seen above the roofs on the right and the top of a church spire can be seen above the roofs left of centre.

2. Arriving at the gateway the roadway ahead meanders right and left passing through a visual pinch-point in the distance. The landmarks of the church tower and spire are obscured from view, whilst on the right hand side of the road a tall building as a new focal point.

3. Passing through the gateway the market square opens up to the right and the church tower becomes evident again.

4. Exiting the market square the street narrows through the pinch point and can be seen to widen out on the left hand side again ahead, whilst the tall building on the right acts as an intermediate focal point, with the white building at the end of the road acts as the primary focal point.



5. The roadway widens ahead, with the main route continuing off alignment to the right, with the central building ahead closing the view as an end stop at the opposite end of the main street to the gateway adjacent to the river.

6. On the right hand side a passageway providing a view of the church tower from the main street.

7. On the left hand side an opening in the built form fronting the street provides a view of the second church front with its spire.

BUILDINGS AND STREETSCAPE

6.117 The relationship of surrounding buildings to the street and the placement of buildings within their plots create a precedent that should be considered when designing new developments.

6.118 Within a settlement it is usually the buildings that define the boundaries of the public realm (street or open space) and, typically, the front wall of a building and the ridge to the roof are placed parallel to the street. This relationship should be followed on new developments, although deviations may be appropriate in special circumstances.

6.119 The size, shape and orientation of buildings in the streetscape will define the 'weave' of the built fabric. For example, detached buildings, which are placed in the centre of larger width plots, define a looser-knit settlement pattern than lines of terraced houses. Also, buildings that directly front on to the pavement generally define a narrower street than buildings set back with front gardens and garden walls.

6.120 Buildings should be grouped together to create unity in the townscape. At the same time buildings should be designed to create some variety and interest in the street scene. In villages this will be dictated by the existing townscape context.

6.121 The street frontage typically forms a public face, behind which lie the more private interiors and gardens. It is the public face that people directly relate to on a day-to-day basis, but it is the density and depth of accommodation away from the street that defines the life on the street itself. New sites affect both of these aspects and the impact on the public realm should be considered as part of the design process.

6.122 The height and massing of buildings is traditionally greater towards the centre of towns and neighbourhoods. Reinforcing this trend will mean that most efficient use is made of land that is particularly central or well connected relative to local facilities etc.

6.123 Building depths should respect the local character. Uncharacteristically large building footprints should not be located in sensitive areas. Domestically scaled traditional buildings have spans of no more than 5 – 6 metres.

6.124 In order to achieve a degree of visual cohesion developments should incorporate the following general principles:

- Building lines should normally run parallel to the back of the pavement, not at an oblique angle to it.

- In more urban situations buildings should front onto streets and other public spaces, creating perimeter blocks.

- Buildings should be grouped together to create positive public spaces; these may be streets, squares, crescents or courts.

- Buildings should be properly linked or properly detached; narrow gaps between them create a cramped appearance.

- Specially designed buildings should be used to turn corners so that a building face is presented to both street elevations.

- Blank facades facing public areas should be avoided.

- Buildings should reinforce the local character whilst creating distinctiveness.

- Design detailing and materials selection should prevent monotony and create interest commensurate with the building's context.

- When access to parking at the side of properties or in rear parking courts is required, suitably proportioned archways or other openings should be used to maintain the building line (where appropriate), rather than leaving gaps in the street frontage.

- Well-designed front boundaries can provide continuity within the streetscape but generally façade lines create a stronger definition.

- To ensure that developments have a unified 'feel', particularly where several developers are involved, the Council will require the prior agreement of a set palette of materials and details. This will ensure an element of co-ordination between developers, their house designs and finishes, so that unconsidered changes in form and materials are avoided.

6.125 Consideration of larger scale buildings in less sensitive areas outside the closely built settlement centres should include efficiency of the building in use. A depth of 5-7 metres provides the most flexible form and where buildings are less than 13m deep, they can be lit and ventilated naturally.

ENCLOSURE AND BUILDING LINES

6.126 Buildings need to properly enclose the spaces between them in order to achieve cohesion and a satisfactory urban form. A key factor in this is the relationship between street or space width and building height. The number and size of gaps in street frontage also has a significant impact upon the degree of enclosure. Traditional urban areas tend, or appear, to feature

continuous building frontages punctuated by occasional streets, lanes and archways. By contrast many suburban housing schemes are dominated by detached and semi-detached properties separated by modest gaps and garages, providing little sense of enclosure.

6.127 The height / width ratio of a space influences the dynamics of the use of that space. If it is too low physical containment is lost, together with a loss of orientation; if it is too high a deep claustrophobic space results. Empirical studies have shown that certain height to width proportions are generally regarded as the most satisfying (The Planting Design Handbook, Nick Robinson, 2004). The following enclosure ratios between the height of the buildings and the distance between their frontages are used as a guide to achieve a satisfactory degree of enclosure:

- Squares Between 1:2 and 1:4
- Streets Between 1:1 and 1:2.5
- Mews Between 1:0.75 and 1:1

6.128 The way that buildings are aligned in relation to one another should be informed by the analysis of good examples of local urban form and the aim should always be to achieve a coherent, attractive and efficient layout.

6.129 The buildings enclosing the public realm create active frontages when the designs incorporate the provision of:

- Frequent doors and windows.
- No blank walls.
- Narrow frontages to create a vertical rhythm to the street.
- Enlivening edges with articulation of facades with projections, bays, porches, balconies, colonnades, awnings, providing interest and a welcoming feeling.
- Lively internal uses and activities visible from the street or spilling out onto the street.
- Opportunities to enliven the space and create interest using a hierarchy of buildings, a landmark building or by positioning a building more prominently, subserviently or closely, relative to its surroundings; using a hierarchy of views within the space and enhancing the group using glimpses between buildings or long views over green spaces and countryside; and creating an element of surprise.
- Opportunities for those inside to see out ‘eyes-on-the-street’.

6.130 An increase in the height of a building relative to surrounding buildings can, in certain instances, be justified by the building's townscape role. Height can be used to provide variety to rooflines, form strong edges to otherwise undefined space, define nodes, provide increased presence for important spaces and act as local or district landmarks. The use of height other than in these instances undermines the legibility of a place to the detriment of the character of an area. A corner at the junction of two minor streets for example should be turned with a building that fronts both streets but the corner location in itself does not justify an increase in height.

Table 6.5: Enclosure and Building Line

Justification for increased height (above that determined by context bearing in mind the height/width guide)	**Criteria**
To provide variety to roofline. Townscape basis.	• Generally only appropriate where variation in roofline is already characteristic of an area. • Building should follow the plot width and building depth of adjoining buildings to avoid a massive appearance. • Height should not generally exceed 150% of the height of adjoining buildings.
To act as local landmark. Townscape basis.	• The townscape significance of a site revealed in a site and context appraisal should provide clear justification for a vista stop. • Height should not generally exceed 150% of the height of adjoining buildings.
To form an edge to a space. Townscape/functional basis.	• Appropriate where a large space warrants a built frontage for definition (e.g. a park).
To define nodes Townscape/functional basis.	• Typically only appropriate at the junction of two or more busy routes. • Importance of the node should be reinforced by the presence of non-residential elements in the block.
To provide presence to important spaces Functional basis.	• The space being addressed should have a clear civic or community function.
To act as a district landmark. Locational basis.	• The location should provide justification for a landmark.

Architectural Qualities

6.131 There are a number of general architectural qualities that come together in the design of a building and help convey a range of messages and meanings.

6.132 The size of a building is important but this is most often read and measured in relation to other buildings or features. The relative size of buildings and their parts is called scale.

6.133 The shapes of buildings are described as their forms. Massing of buildings often refers to the way different forms are combined together.

6.134 Proportion describes the relationship of one dimension or area to another. The proportions of a rectangle come from the relationship between the length of the long and short sides. Different proportions give different messages and some have a special balance or beauty.

6.135 Different proportions also give a building (or building element) a greater or lesser vertical or horizontal emphasis. Buildings with strong horizontal proportions can be seen as hugging the ground while those with strong vertical proportions take the eye up to the sky. The elements and details of a building can reinforce or play against these overall emphases. For instance, the walls of many traditional buildings have a horizontal emphasis but the windows can often have a vertical emphasis.

6.136 The proportions of the floor plans of buildings (the relationship of length to depth) and the proportions of cross sections (height to depth) are important, as is their shape and division. The plans of traditional houses in the district often had long walls running parallel to the street but were shallow in depth. Sections of vernacular house were often tall and narrow, and roof pitches were often steep, particularly those designed for thatch.

6.137 The impact of one part of a building relative to another is an important part of a building's expression. For example, a large roof which runs down to a low eaves can dominate a smaller area of wall below. Or walls can be dominant, with the impact of roofs reduced by screening parapets. Details emphasis these relationships: eaves and verges with deep overhangs make roofs more dominant.

6.138 Similarly, certain elements of a building – usually those most important and which the owner, builder or architect wants to highlight – are more prominent than others.

6.139 The way that the elements of a building, particularly doors and windows, are positioned is also a form of expression. (The windows and door at the front of a house can be compared to the eyes and mouth of a face). A

symmetrical balance of openings conveys a different message to other formal or informal arrangements and can give a sense of status, formality and completeness.

6.140 The degree of uniformity or variety in a building is an important part of its expression and is closely related to its function and meaning. A high degree of uniformity, for example, can suggest organization and discipline and has traditionally been used for military and institutional buildings.

6.141 Buildings with too much uniformity can appear dull and over-regimented and those with excessive variety, can seem haphazard and unsettling. Good architecture often combines and plays off the regular and irregular, the expected and the unexpected.

6.142 Buildings also have and combine different degrees of decoration and complexity. Traditionally, complex buildings are often of higher status than those that are simpler. Again the contrast between simplicity and complexity can be used to good effect.

6.143 Different materials inspire very different feelings. For example, stone walls can give a sense of strength and weight. Combinations of materials can make use of these differences so that a 'heavy' masonry plinth supports a 'light' timber frame wall above. Selected well, they can add to the sculptural qualities and interest of a building.

6.144 The way individual materials are used also increases or changes our associations and perceptions. Stone transformed into the delicate tracery of gothic windows creates a different feel to when it is used in massive castle ramparts. Deep window and door reveals can reflect or suggest a thicker wall and weight.

6.145 The ratio of wall to windows and doors is also important in terms of suggesting weight and how open, and even welcoming, a building is.

6.146 These architectural qualities combine with the relationship between a building's form, function, date, status and the other aspects described earlier in the chapter to give expression and meaning to a building. This is further enhanced by the 'patterns of buildings' considered next.

ARCHITECTURE

6.147 The detailed design needs to acknowledge the materials and vernacular traditions of the region (outlined in Chapter 3), but without resorting to pastiche. There are examples of contemporary design that have successfully achieved this, while others have been equally successful in adopting a more traditional design approach. Both approaches require a

rigorous and consistent design ethos, coupled with a careful attention to detail, proportions, scale and hierarchy.

FORMS, MATERIALS AND DETAILS

6.148 Building forms, materials and details can be drawn from surrounding examples, whilst also relating to the particular use proposed and qualities of space to be provided. Details and materials should be of as high a quality, or higher, as those found on existing adjacent properties. The existence of poor quality detailing and materials on existing properties will not be accepted as a reason for poor quality details and materials being proposed on a site.

6.149 The intention should be to specify new materials from local sources to minimise energy intensive transportation and costs.

Infill houses, Melbourn. The rendered walls and tall window proportions make reference to the listed house, with contemporary metal roofing and window frames (Plum Developments).

6.150 Traditional materials can offer guidelines for new buildings, although just as important is the quality of the element in its final form. For example, a wall may be designed to portray a feeling of mass and solidity, or be light and ethereal. Windows may be set deep within a recess, casting a shadow and appearing as openings 'punched' into a solid wall, or set flush with the face to maintain the plane of the wall. Each element carries a design intention, and appropriate justification should be presented for each.

6.151 Other than the purely decorative, detailing of materials should be related to the type of material and function of the new building. Timber rafters and beams may have expressed connections where they join, and brickwork may be detailed with projecting or recessed stringcourses. Careful study of historic details will reveal the design intent behind them; it is this intention that should be the starting point for new details, rather than the mimicking of form for its own sake.

6.152 Adjacent buildings should be studied for guidance on the proportion, form and spacing of window and door openings. The design should also take into account the orientation of the building (including the opportunity for passive solar gain) and the desired levels of daylighting. Architectural styles should be relevant to the particular location within South Cambridgeshire. Composition and elevational rhythms should clearly reflect context, even if the form of the building is contemporary.

6.153 Traditional forms may consist of simple wall planes with recessed windows under a pitched roof. Study and analysis will reveal the design intent of existing buildings; this could be based on historic use, or the status of the building, and it is this process that should be the starting point for the generation of new and appropriate building forms, related to choice of building materials and detail, whilst at the same time being specific to the village location.

6.154 The junction where a wall meets a roof is particularly sensitive. Eaves and verges may project or be cut tight back to the face of the wall. The wall may terminate with a dentil course or project past the roofline to form a parapet. Each type of detail places emphasis on a different element of the construction and should be consistent with the overall design intentions for the building.

6.155 Within the design of individual houses, chimneys are important elements of the skyline and help to provide an appropriate scale and articulation of the building and group.

6.156 Traditional walling materials found in South Cambridgeshire are, typically, buff coloured Gault Clay brick, stone (clunch, flint, claybatt and, occasionally, greensand) and timber weatherboarding. Windows are generally of timber or metal, and traditional roofing materials include clay tile (peg tiles and pan tiles), thatch and Welsh slate. Combinations of roofing and walling materials are common, often reflecting a hierarchy of building usage.

LARGE BUSINESS PREMISES

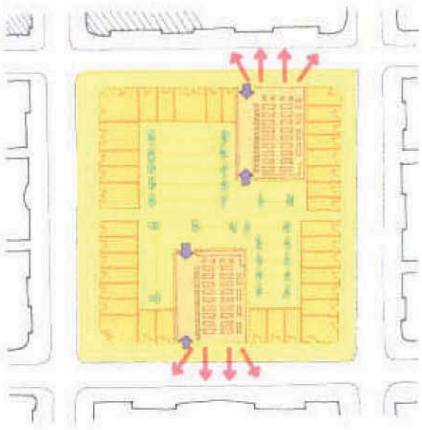
6.157 New buildings in business parks and on industrial sites are often large structures that can make use of ‘state of the art’ construction methods and materials. As a result they can have a significant visual impact on their locality and may be visible over a considerable distance, if sited in a prominent, isolated or exposed location.

6.158 Large buildings should be sited to avoid their mass breaking the skyline. Where this is unavoidable their design should mitigate the problem, possibly by breaking the building down into articulated blocks and through the use of landscaping as a screen and to break up the silhouette.

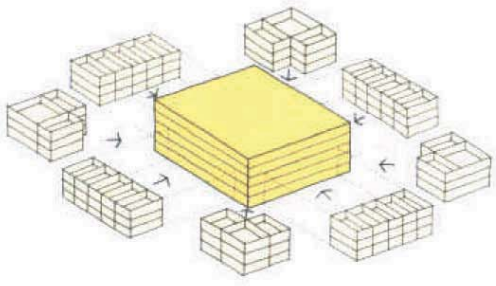
The large building form of South Cambridgeshire District Council offices has been broken down into sub-forms to reduce its bulkiness and visual impact.

6.159 The blank 'boxes' of large retail, industrial and storage buildings are particularly difficult to successfully integrate into the streetscape. 'Big-box' uses should be mixed horizontally or vertically with other uses to remove or minimise the blank inactive frontages they present to their neighbours. As many of the active uses as possible that will take place in the building e.g. cafes, offices, etc, should be located at the outer edges of the building to create active frontages. Smaller units can be constructed along the faces of the building.

Big box sheds surrounded by parking: potential active frontage is projected into the car park, rear elevations exposed and the streetscape undermined



By turning the sales floor 90° and inserting the building into a perimeter block, access is provided from both sides but active street frontage is ensured



Wrap big boxes with smaller units to create active frontage

Reducing the visual impact of large buildings (Urban Design Compendium, Homes and Communities Agency)

6.160 Travel Plans will be required to minimise car parking provision. Other uses can be constructed above the main building. Car parking, subject to the context of the location of a building, could be provided in a basement or on the roof to remove the expanse of surface car parking, associated with such buildings, that creates a void in the urban fabric and divorces the units from their neighbours. Other methods to mitigate the impact of large structures include articulation (employing L or T shaped plan forms); multi-span roof forms to reduce overall height of deep plan structures; and the graded massing of buildings, whereby smaller buildings are sited in front of larger structures. Avoid roof-mounted plant that exacerbates the visual appearance of large structures. Design buildings to incorporate such plant requirements within the building structure.

6.161 A good example of a local business park is at Kings Road, Hardwick, where barns have been converted for business use.

Kings Road, Hardwick, view of the main barn from the car park.

Kings Road, Hardwick, view into the central core.

Kings Road, Hardwick, view from the main road.

MATERIALS FOR BUSINESS PREMISES

6.162 The choice of materials and their colours can have a significant affect on the overall impact of a large new structure. When making the selection consideration must be given to how the materials will perform over time; bright colours frequently fade, while 'fashionable' detailing may quickly appear dated and shiny or reflective materials can attract undue attention to a structure, whereas natural materials (such as brick and stained timber) have been proven to 'grow old gracefully' and are particularly suited for sensitive locations.

6.163 A more contemporary approach may be appropriate utilizing high quality, modern materials, whilst ensuring that the building complements the character of the surrounding development or its landscaped setting.

PUBLIC AND PRIVATE SPACE

6.164 The network of streets, squares, parks and greens, forms the structure of the public realm. These places need to have a clear function and should be easily accessible. High quality materials should be used to enhance the character and attractiveness of public spaces and maintain their quality in the longer term. House frontages should be visible from these public spaces and enable surveillance of the public realm by occupants.

6.165 Creating high quality public and private spaces requires all those involved to develop places that suit the needs and activities of people rather than for cars. It also means designing public areas that are attractive, safe and comfortable, which are easily accessible and provide a range of facilities for the local community.

6.166 Opportunities should be found to incorporate existing features and to create squares, market places (streets wide enough to accommodate a market), greens, small seating areas, and play areas. Development is best designed around a pattern of connected streets and public spaces that can be easily understood; which should focus on busy pedestrian places that have an

identifiable and accessible heart. The heart of the development should have a sense of enclosure and include features and landmarks that define it as a special place. Development should be designed to ensure there are no left over spaces, with each space having clear purpose and definition. They should provide a hierarchy of spaces with, spaces to go to, spaces to stop in and spaces to go through.

6.167 Spaces at and associated with the local centre should be designed in a manner that creates emphasis for the location, reinforcing its role as the heart of the neighbourhood. It should be of sufficient size to accommodate community activities, so they can take place in the heart of the community and not have to go elsewhere, where they would become disconnected from the community.

6.168 Policy SF/11 of the Development Control Policies DPD sets out the Council's open space standard of 2.8 hectares per 1,000 people, comprising:

- Outdoor Sport – 1.6ha. per 1,000 people;
- Children's Playspace – 0.8ha. per 1,000 people;
- Informal Open Space – 0.4ha. per 1,000 people.

Reference should be made to the Council's "Open Space in New Developments Supplementary Planning Document". "Sport England's publication 'Active Design', promotes the concept of integrating opportunities for sport and physical activity into master plans through good design."

6.169 Public open space requirements should be provided in a variety of forms, formal pitch provision, informal games areas, formal park space, informal amenity space within development areas, play areas for different age groups and areas for wildlife conservation. Open space areas should be connected to provide a co-ordinated network. Ensure buffers are provided to protect any existing wildlife habitats from the pressures associated with people in new development areas. The Urban Design Compendium recommends that all residents should have some form of park space within a 400 metre walking distance of their home.

6.170 When there is a clear distinction between public and private spaces, management responsibilities can be clearly defined. The involvement of the local community in the design and management of local spaces can help to foster a sense of ownership and responsibility amongst local people. The Parish Council should be consulted if they are to take on the maintenance responsibility for public spaces.

6.171 Within more dense developments the importance of the quality external public space increases.

PAVING

6.172 Paved areas, including carriageways, footpaths, cycleways and other hard surfaced areas, are a major element of any new development and, as such, have a significant impact on the character of that development. The design of paved areas should be considered in its entirety as a unified design from building face to building face. Paving should be designed in a manner that creates visual interest as well as meeting the functional requirements.

6.173 Natural, high quality paving materials, such as stone, gravel and brick, as well as quality modern materials, can contribute positively to the appearance of outdoor spaces. Materials should be appropriate to the character of the development and its context. In Conservation Areas it is especially important to complement local traditional patterns, textures, materials and colours, and in rural areas the character of simple gravel or grass finishes should be preserved.

6.174 Muted colours are generally considered more suitable for paving materials, while large, unbroken areas of any particular surface materials should be avoided, especially where there are in situ materials that are protected by Listed Buildings legislation or cannot readily be lifted and re-laid. Areas can be successfully broken up using materials of the same colour but with different textures or simple patterns. Creative approaches can result in an equally functional but significantly more attractive alternative for highways requirements such as avoiding dividing areas of paving with concrete edging strips to identify the limit of highway adoptions.

6.175 Concrete kerbs with a high up-stand create a harsh and over-engineered appearance. They are particularly inappropriate in shared use and low traffic areas. Changing levels to reduce or omit the upstand will improve the appearance and enable wheelchair access, and using natural materials such as granite will improve the texture and appearance of the edging.

6.176 Granite or concrete setts may be useful for defining areas such as parking bays and shared-surface roads. A bound gravel or shingle surface dressing may be suitable for paths, private driveways, squares, and other shared-surface areas designed for low vehicle speeds and movements. It is more appropriate to use changes in surface material rather than painted demarcation to define changes of surface use.

6.177 Consideration should also be given to the appropriateness of the materials selected, with the use of non-slip and non-trip materials, especially where the elderly or infirm will walk. Where possible permeable paving materials are encouraged to maximise surface water percolation into the ground and minimise run-off.

STREET FURNITURE

6.178 Street furniture is anything erected on pavements or streets, including seats, bollards, litterbins, railings, lamp-posts, post-boxes, street-signs, telephone-kiosks. These should be selected and designed into the public realm from the outset, in an integrated manner. It should be carefully selected for its appropriateness for its location. Street furniture is a necessary part of the street-scene in terms of giving information and ensuring the street is suitably lit and a safe place, but it is important that the location, amount, design and materials of street furniture is carefully controlled to avoid unnecessary visual and physical clutter.

6.179 Where appropriate, street lighting and street nameplates should be mounted on buildings. Where posts are required for street lighting or road information, these should be used in a co-ordinated manner and carry more than one sign, thereby reducing the number of posts in any one street. The street furniture, including lighting, seating and local direction signposts, should be chosen imaginatively to complement the building design.

ADVERTISING, LIGHTING AND SIGNAGE

6.180 Advertising, lighting and signage are aspects of commercial developments that can have a significant impact, but are frequently not considered as part of the design. This can result in excessive lighting and signage, frequently of poor quality, being added to a development after its completion. The Council will expect planning applications for commercial developments to show how advertising, lighting and signage are to be integrated into the design, with the expectation that they will be kept to a minimum, use suitable materials and avoid light pollution.

6.181 Where the proposals replace existing signage or affect a Conservation Area or Listed building, a traditional, simple and minimal approach is appropriate and the intention should also be to retain any historic signage in situ. Advice is contained in the Council's Listed Building and Conservation Areas SPDs.

LIGHTING THE PUBLIC REALM

6.182 As part of and integrated with the design of the public realm, a lighting strategy should be developed, appropriate to the location and context, as there are some places where lighting would not be required or be appropriate. This should not only ensure the provision of well lit public areas, to assist in the creation of a safe and secure environment, but should also support and add emphasis to the hierarchy of public real spaces. Key landmarks, building and features should be lit to provide visual interest and support legibility for people moving through the development.

6.183 Where possible, lighting should be incorporated into the design of buildings and spaces, or wall mounted, minimising the number of freestanding lighting columns. To reduce the overall number of columns and posts in the public realm, other signage and/or landscape furniture should be attached to lighting columns where they are used.

6.184 Lighting of external areas will have an impact on surrounding properties. Consideration should be given to the appearance of lighting units, their efficiency in lighting the areas and features intended, and prevention of light spillage that could cause light pollution to other locations and adjacent landholdings. Lighting should also be efficient in its consumption of energy to minimise the production of greenhouse gases arising from the energy generation to power the lighting.

6.185 Lighting affecting Listed buildings or within their curtilage or setting should refer to the Council's Listed Buildings SPD.

COMMUNITY SAFETY

6.186 Good places are safe and secure. Safety and security stem from good site planning and the careful design of buildings and spaces. As well as being inherently safer, such developments will have a sense of public ownership and civic pride. Developments that meet the need of communities and are well managed are safer.

6.187 Developers will need to ensure that crime prevention is considered as an integral part of the initial design of any development and not as an after thought. Development should incorporate the principles of 'Secured by Design'. In particular, they will need to demonstrate how their development proposal has addressed the following issues, in order to design out crime:

- Natural Surveillance of public and semi-private spaces, in particular, entrances to a development, paths, play areas, open spaces and car parks.
- Defensible space and the clear definition, differentiation and robust separation of public, private and semi-private space, so that all the spaces are clearly defined and adequately protected in terms of their use and ownership.
- Lighting of the development, in particular streets and paths.
- Design and layout of pedestrian, cycle and vehicular routes into and within the site, including how these integrate with existing patterns.
- Landscaping and planting, in particular, potential hiding places and dark or secluded areas should not be created.

6.188 The design and layout of access opportunities is of fundamental importance to designing out crime and needs careful consideration to avoid the creation of opportunities for crime. Manual for Streets provides advice on security issues in relation to the design of routes and connections. It emphasises that while clear and direct routes through an area for all forms of movement are desirable, they should not undermine the 'defensible space' of particular neighbours.

Avoid arranging buildings in a manner that does not afford surveillance of main cycle or pedestrian routes and bus stops, Histon road, Cambridge.

6.189 In practice this means that Secured by Design status for new housing developments can be achieved through careful design and the use of a limited number through routes, so that they are well used, effectively lit and overlooked, thereby creating a safe and secure atmosphere (www.securedbydesign.com). To aid this process, public spaces and routes should, where possible, be defined by frontages that are visible from the street and are able to offer surveillance of the street from their occupants.

6.190 Developers should, at an early stage, seek advice from the Police Architectural Liaison Officer on designing out crime.

Table 6.6: Designing Out Crime

	Do (subject to site size and context):	Don't:
Routes	• make routes direct; • ensure they follow desire lines so that they are well used; • ensure routes are overlooked; • make sure routes are well lit; • ensure routes feel comfortable.	• make indirect routes; • provide unnecessary routes that will be little used; • create opportunities for people to hide close to paths, cycleways and entrances; • create dark alleys; • place routes between high fenced/walled/hedged gardens.
Structure	• use perimeter blocks; • create active elevations to routes; • plan in clear public and private space; • ensure public entrances are clear and visible; • gate accesses to private areas; • use robust, low maintenance materials; • mix compatible uses to create diversity of use.	• create long culs-de-sac; • place blank walls against public routes; • create indeterminate space without clear purpose; • create public entrances that are hidden from view; • provide parking courts that are not overlooked; • use poor quality materials that can be damaged easily or are difficult to maintain; • create areas of mono-use or monoculture that will be inactive at certain times of the day.
Public space	• relate spaces to the movement network to ensure they are used; • design attractive public realm that people enjoy using; • ensure public spaces are defined by buildings and are overlooked; • use robust street furniture; • carefully consider the location of street furniture; • ensure soft landscaped areas are robust and clearly defined; • ensure spaces are well lit; • think about the integration of	• create public spaces that are difficult to get to; • create non-descript spaces without a sense of place; • position back gardens against public space; • create undefined boundaries between public and private space; • use poor quality or weak street furniture; • position street furniture without considering its visual and functional impact on space or the potential for it to be used to assist in the execution of crime;

	play equipment at an early stage; • design with due consideration for the ongoing management and maintenance of public spaces.	• use fussy landscaping without identifying a regime for appropriate management and maintenance; • place sub stations etc within public open space.
Security measures	• incorporate modest glazed panels or spy-holes in front doors; • specify good locks to all doors and windows; • ensure cycle stores are secure; • ensure bin stores and sheds are secure.	• add in over specified or aggressive security measures that give a fortified appearance – they undermine the quality of buildings and space and give the impression that an area is particularly susceptible to crime; • create gated communities that weaken the scope for community integration.

6.191 Boundary treatments such as garden walls, fences, railings and hedges should relate in scale and material to the overall streetscape and the character of the context, whether urban or rural.

6.192 Streets can be characterised by trees, hedges and shrubs that overhang and define the edges of pavements and roads, but care should be taken when encouraging such features that they do not obstruct footpaths, cycleways or roads. Front, side and back gardens should be considered in conjunction with the new building(s), so as to create a plot design coherent with the street context. New indigenous planting will be encouraged, including trees. Such planting should be based on species and locations that take account of the implications of climate change.

ALLOTMENTS

6.193 Allotments provision is also required as part of the provision of community facilities. Provision of allotments on the Cambridge city fringe will be required in accordance with Cambridge City Council policy; and in the rest of the district in accordance with national guidelines of the National Society of Allotment and Leisure Gardeners.

CHAPTER 7

SMALLER SCALE DEVELOPMENTS

7.1 Smaller scale developments include new infill developments within established built environments, small groups and residential schemes, conversions of redundant buildings to appropriate new uses, extensions to existing buildings and minor householder alterations.

7.2 The single building and smaller scale design parameters and guidance already given in previous chapters are especially relevant to each of the above types of development. The following sections supply detail on further considerations unique to small developments. Smaller scale developments within Conservation Areas should be read in conjunction with the Conservation Areas SPD.

INFILL DEVELOPMENTS

Context

7.3 Infill plots are small-scale plots within existing developed areas. The basic context and criteria for small development infill plots is contained in Chapter 5. To retain the semi-rural character of villages it is appropriate to retain some vacant plots.

7.4 New uses may include (but are not limited to) residential and commercial. Mixed-use developments may be appropriate, and will be encouraged where they positively add to the variety of life of the area. Unsuitable new uses would be those that have an adverse impact on traffic congestion and use patterns in the locality.

Criteria

7.5 Each infill plot has unique characteristics. Infill plots typically relate to a street or village frontage, and to adjacent buildings and gardens.

7.6 Proposals will be expected to relate well to the topography and geography of a site and to acknowledge the pattern of historical use of that site.

7.7 New buildings should respect important vistas within and views out of streets and settlements. The aim should also be to create new views and juxtapositions of elements which add to the variety and texture of the setting.

7.8 Proposals for infill developments must respect their surroundings. These may contain buildings from the fourteenth to the nineteenth centuries, but that does not mean that the new development should necessarily be pastiche or attempt to mimic historic styles. High quality design, relevant to

context, is the most important factor, and a contemporary solution that provides modern spaces, while at the same time considers the scale, materials, grain and elevational rhythm of its context may provide a better solution. Todays high-quality buildings are tomorrow's heritage.

7.9 What may be a difficult site to develop, or a landmark site within a settlement, should generate innovative design solutions and architectural excellence.

ANCILLARY BUILDINGS

Context

7.10 Ancillary buildings include garden buildings, garages, stables and boathouses. They are subservient to a main building, usually a dwelling.

Criteria

7.11 The location, scale, proportions and materials would be characteristic of a subservient building.

7.12 Garden buildings include summerhouses and sheds. Traditionally, sheds are simple and constructed in brick, flint, clay bat or weatherboard on a timber frame and have a subservient roof material such as thatch, pantile, slate or corrugated iron. In Cottenham, traditional black boarded sheds sit prominently gable on to the road frontage, interspersed between houses, but elsewhere sheds tend to be smaller or set well back in rear gardens. Summerhouses are set within a landscape which may be extensive or intimate. They may hark back to historic examples using substantial materials such as flint or brick, or be much more lightweight in character using timber boarding on a timber frame. They use local materials, sometimes in an imaginative and contemporary way, and have simple balanced proportions. Contemporary garden buildings sometimes have large expanses of glass, which may not be appropriate in a historic context and should be sited carefully to avoid becoming a hazard to birds or bats.

7.13 Garages are generally prominent within the streetscape. Within a historic context specific care is needed to ensure they merge into their surroundings. Often the traditional cartshed is used as a basis for the design of a detached garage, but the depth of a garage, even when limited to 5.5 or 6 metres, is greater than many traditional single storey outbuildings and a double garage is almost square, giving roofs that are uncharacteristic of traditional forms. Often where the building is prominent, the depth is visually reduced by incorporating a lower eaves level on one side giving a lean-to with a catslide roof. Where the gable is seen, the lean-to may be set back nominally to give a balanced symmetrical gable. First floors above garages are discouraged as they tend to give a top-heavy appearance.

Garage doors are better set in the long elevation rather than the gable as they resemble cart openings but are unlike any proportions of doors traditionally found in gables. Doors to traditionally designed garages in sensitive settings, such as in Conservation Areas, should be traditional side-opening timber doors with traditional wide vertical boarding and external strap hinges. Apart from the garage door, there should be very few openings and care should be taken to avoid the building appearing domestic.

7.14 Stables and other buildings for animals are generally set to the rear of a site and are agricultural in character with traditional walling and roof materials as described for sheds. New stables are often timber framed with boarding rather than traditional masonry. Poor quality examples have narrow shiplap boards and fibre cement or felt roofs at a very slack pitch. These are not long-lasting and not appropriate for a traditional or historic setting.

7.15 Boathouses are appropriate additions to the waterfront where there is a built-up river frontage and groups of boathouses already, but elsewhere they disturb the tranquility of open views across rural watercourses and meadows. Reflecting the unfussy natural surroundings, they are characteristically low, single storey, lightweight and simple, with timber frame and timber weatherboarded walls.

CONVERSIONS

Context

7.16 The buildings proposed for conversion include rural and agricultural buildings, industrial buildings, large houses and outbuildings, commercial and community buildings.

7.17 In all cases, the District Council will expect sufficient detail to determine the principle of conversion; to include the significance and character of the building, the efforts made to keep the building in its existing use, and the full implications of the proposed change of use including proposed and necessary changes to the structure, fabric and setting. The retention of the building in its existing use is normally preferable, and if so, the justification for a change of use should include extensive marketing of the building.

7.18 The intention with all conversions is to sustain, enhance and preserve the quality of our built and natural environment. This involves preserving the language of existing buildings, whilst adding to them in ways that respect contemporary building materials and methods of construction. Designs for conversions must aim to facilitate new and sustainable uses without compromising the character of the existing building.

Criteria

7.19 Every conversion is unique. To determine how appropriate a building is for conversion, consideration should include location, accessibility, the character of the surrounding area, and the character and condition of the building.

7.20 Policy ET/7 in the Development Control Policies DPD states that conversion of rural buildings to employment uses will be permitted subject to specified criteria being met including that the buildings are in keeping with their surroundings and that their existing characters are retained. Policy HG/8 says that conversion of rural buildings to residential use will only be accepted in exceptional circumstances and subject to specified considerations and criteria including that the buildings are in keeping with their surroundings and that their existing characters are retained. Under PPG15 it is accepted that the best way to ensure the retention of a Listed Building is for it to have an appropriate and viable use. Where the original use has ceased and cannot be reasonably reinstated, or the building is designated as being at risk, the local authority will encourage sympathetic conversion, if it represents the best way to retain a Listed Building. However, conversions of Listed Buildings that result in significant loss of historic fabric or elements of the building's special character, and thereby compromise the reason for their listing, will not be supported. There is also a presumption against conversion should the Listed building represent a significant, sensitive and comparatively rare example of a particular period or type of building that would potentially be harmed by any works for conversion, or by works inherent in the specific type of conversion proposed. In those cases, a low key use such as non-intensive storage would be more appropriate. The building should also be capable of conversion without significant extension.

Special Characteristics

7.21 Special opportunities arise within each situation, and these should be taken advantage of; notable places are made through recognising and enhancing these particular local characteristics.

7.22 The conversion may be directed to a specific type of use by the context, local infrastructure, access roads and local transport links, existing links to communications, and the local provision of employment or residential buildings.

7.23 It is important to understand the special characteristics of the particular building and what makes it capable of conversion. These may be structural, spatial, environmental and architectural.

7.24 To understand the building and the impact of the proposals, a historical study and impact of alternative uses will be required and this should inform

the proposals. The extent of information required to establish the acceptability of proposals should be available at an early stage and would include plans, elevations, sections and surveys with overlays of any inserted floors and clarification of any disturbance of an historic timber frame.

7.25 An understanding of the original structure, materials and modes of construction forms an essential basis for any proposal for conversion. Evidence in the form of a structural engineer's report will normally be required to accompany planning proposals.

7.26 Buildings originally constructed with specialised uses may pose a challenge for new use proposals. Examples include churches, chapels and schools, and agricultural and industrial buildings such as barns, stables, drying sheds, maltings and mills. Part of the character of the building may incorporate minimal or no window openings, very low floor to ceiling heights, large undivided internal volumes, fittings and fixtures from the previous use, insubstantial structure, exposed finishes giving minimal thermal provision, large windows or an open rural non-domestic setting. The loss of any element of that character is likely to weaken the interest of the building, and this would need to be considered against the justification and principle of conversion, benefits of the scheme to the future of the building, its setting or local community, and identification of the most sensitive design reasonably possible.

7.27 Rural and agricultural buildings are characterised by simple traditional elevations and materials. The barn may be a large black weatherboarded box or a box in undisturbed brickwork and will provide a challenge to any designer to provide any windows to sizes required under the Building Regulations without significantly damaging the structure or interrupting the simplicity of the form. In the limited instances where any new build is justified, the character of rural buildings limits it to structures that resemble simple modest traditional farm buildings. Domestic additions such as conservatories or garden rooms are therefore alien in this setting. New outbuildings should be resisted, but where a new building would enhance the group it should respect the scale, form, setting, massing and materials of the original building. Existing ancillary buildings and structures should be retained and repaired. If small, they may be able to accommodate meter boxes or storage. The interior of a barn would normally be an open volume that does not readily accommodate subdivision into rooms or inserted intermediate floors. If there is an attached smaller building, it may better accommodate the smaller spaces. Even where some subdivision is accepted, it would be expected that the majority of the internal volume would remain open. Original features such as doors, vents, boarding, floor bricks and threshing floors should be retained and may limit the use of the building. Original divisions and larger features such as stable stalls should be repaired and retained although in some justified cases they may be

relocated within the same space. New fixtures and fittings should retain a simple character in detail and materials, in sympathy with the existing quality of the building; this does not mean reproduction 'heritage' ware, but appropriate design functionality. The setting may be rural and open, so vulnerable to harm by subdivision, car parking and domestic paraphernalia. Conversions should involve a minimum of change to a building's setting, especially the large simple open external areas and rural agricultural boundaries characteristic of the farmstead. Where re-surfacing is considered appropriate, gravel or bound gravel, and occasional limited brick or granite paving may be considered.

A contemporary addition and interior to a converted barn. ('Quaker Barns', Hudson Architects)

7.28 Commercial buildings proposed for conversion are often in village centres or as part of an industrial or agricultural group. The change of use of buildings such as pubs and post offices often represents a significant loss of village and rural facilities. Any proposal for change of use of a community facility should investigate the history of that use, the possibilities of retaining the use including the extent and results of the marketing process, the potential relocation of the community facility, alternative new uses, and the implications of each alternative use on the character and setting of the building, to include highways and parking provision, and signage. If the building has a long historic link with its original use, such as a historic building originally built as a pub, the impact of the proposed change of use is expected to be more harmful than it is to a more recently established use. Signage is an important element of commercial buildings and again if the signage is historic or relates to a historic name of the building, such as the earliest pub names, its loss will not be supported. It will be expected that the proposal would include some enhancement of the site and building where reasonable.

7.29 Restoration of original built fabric is considered an essential part of any conversion. Equally, the objective with any repair or addition is to clearly identify the building's evolution.

7.30 Converting historic buildings can involve complex structural work. For structural surveys, façade retention, underpinning, internal demolitions and temporary works, advice must be sought from a professional structural engineer and negotiated with the Council as necessary.

7.31 Integrating new work with the old fabric is essential to the success of the conversion. However, contemporary insertions should not necessarily be designed in a way which tries to mimic historical styles. A well-considered and detailed contrast can often be a better way to respect and enhance the existing built environment.

7.32 Innovative plan forms and uses are often required to successfully convert a building from its historic use to another. Rather than compromising the fabric and character of the existing building, new uses will be expected to be adapted to fit the constraints and challenges of the building. Some new uses with less flexibility, more subdivision and requirements for numerous new openings are inherently more difficult to accommodate in this way.

7.33 There is an assumption that original openings in the building envelope will be retained, complete with historic frames, doors, windows and shutters, and that new openings in the historic fabric will be kept to a minimum. Original openings that have been subsequently blocked may be re-opened as part of the adaptations. New openings should be justified and only considered where necessary to achieve minimum day lighting levels and it is noted that open plan internal layouts are often easier to light from existing windows. The effect of new windows on the building's elevations must be carefully considered and they should refer to the size and proportions of existing openings.

7.34 A sparing use of rooflights may be acceptable to achieve internal day lighting levels, provided that they are compatible with the style of the building and do not clutter a roof or distract from a simple form. Depending on the design and materials, they can be compatible with an industrial or domestic character but are less easily accommodated on some structures such as a barn, small scale agricultural building or building with a thatched or pantiled roof. They may take the form of cast metal conservation rooflights or, in certain instances larger areas of carefully detailed patent glazing may be appropriate. Dormer windows are usually too fussy unless the building is domestic in character, and are at variance to the simple rooflines found in other vernacular and agricultural buildings. The positioning of any rooflights should reflect structural bays.

7.35 Modern materials, detailing and techniques of construction can add to the quality of a conversion project and may be appropriate when having to repair or replace larger areas of fabric, provided any potential differences in the structures (such as thermal movement and permeability are resolved);

for example, large openings such as barn doors could be suitable for an expanse of minimally framed glazing.

Contemporary sliding metal window applied to surface of existing brickwork wall, separating new materials and elements from old, clearly showing the building's evolution (Hudson Architects)

7.36 Old roofs can be a haven for protected wildlife species, such as bats and owls. It is an offence to damage or disturb their habitat, and their presence may have implications for any conversion work. Advice should be sought from the Council's Ecology officer and reference made to the Council's Biodiversity SPD.

EXTENSIONS

Criteria

7.37 All extension proposals must offer a high quality of accommodation and design that will sustain, enhance and preserve the quality of our built and natural environment. By definition, extensions are additional components and should consequently remain ancillary or subservient to the original building. Every extension site is different, and will have a different level of impact depending on whether it is at the front, side or rear of a property, or involves work to the roof.

7.38 Extensions should always complement the form and character of the original building rather than seek to transform it into something else. This may be achieved either by continuation of the established design form, or through an appropriate contrast in high quality contemporary design. The design of an extension should not necessarily be pastiche or attempt to mimic historic styles. High quality of design, relevant to context, is the most important factor, and in certain cases a contemporary solution that provides modern spaces, while at the same time considers the scale, materials, and elevational rhythm of its context may provide the better solution.

Extended cottage, Barrington. The openings of the right-hand extension balance the front cottage elevation, with painted render and a clay pantiled roof. The dark stained open timber frame of the left-hand carport helps it to recede from view.

7.39 The scale of an extension and its position will normally emphasise a subservience to the main building. This will usually involve a lower roof and eaves height, significantly smaller footprint, spans and lengths of elevations, and the use of different and traditionally subservient materials.

7.40 Some buildings are more sensitive to extension than others. Symmetrically designed buildings or buildings with a complete design (such as lodges) or inherently small size may not be able to accommodate an extension without becoming unbalanced or dominated by the extension, or by detracting from the original design. Buildings that have been extended before may also be limited by the cumulative impact of the extensions.

7.41 An analysis of the immediate surroundings should form the foundation of any design. This must consider:

- Whether or not the property is Listed, or is contained within a Conservation Area.
- The location of the extension in relation to the public zone of the street and the nature of that streetscape.
- The effect that the extension will have on adjacent properties and land.
- The effect that the extension will have on the existing property.
- The forms and scale of existing built structures near the site.

- Traditional and contemporary building materials used in the locality.
- The condition of the land upon which the extension is to be built.

Location

7.42 Many South Cambridgeshire villages present important frontages to the surrounding landscape, contain Conservation Areas and contain or frame numerous strategic views (both within the settlement and out to the landscape). Extension proposals may be to Listed or unlisted buildings, and the sites may be adjacent to buildings of particular architectural merit or important open spaces within the fabric of a settlement. Consequently, the impact of the extensions on the wider village, or landscape, must be considered. Further detailed advice should be read in conjunction with the Council's Listed Buildings and Conservation Areas SPDs.

Streetscape

7.43 Adjacent buildings can often provide pointers for the design of an extension. This includes the relationship between the surrounding buildings and the street, and the placement of adjacent buildings (together with any extensions) within their grounds. The immediate context should frame the design approach.

7.44 Extensions on a street frontage should typically follow the pattern set by previous developments on adjacent buildings. This includes the distance from the building's front walls to the pavement edge, and storey heights of buildings. Extensions can dramatically change the character of a street; for example, infilling between detached or semi-detached houses can change the appearance from one of individual villas to a terrace. Consideration must therefore be given to the existing character of the street, to ensure that the extension will not compromise the established rhythm or visual identity.

HOUSEHOLDER MINOR CHANGES

Criteria

7.45 Householder applications can be submitted for minor works to single non-listed dwellings, including dwellings in a Conservation Area. The relevant works include conservatories, side or rear extensions and garden sheds and the intention is that the information required with this type of application is simplified. The design will still be expected to be of high quality and appropriate for the context of the building.

LISTED BUILDINGS

Criteria

7.46 Special consideration must be given when considering alterations, extensions and other development affecting Listed Buildings, curtilage Listed structures, and their settings. There must be a reasoned justification for the size, use, form, materials and details employed. The character, setting and particular interest of a Listed Building must always be respected and the impact on the historic fabric will be assessed on a case-by-case basis. More detail is contained in the Council's Listed Buildings SPD.

Extended listed building, Little Abington. The existing cottage (a former public house) was extended to provide a new hall and kitchen/dining room. An existing flint wall was extended on the street front, with a mainly glazed aspect to the rear garden (Snell David Architects).

CONSERVATION AREAS

Criteria

7.47 The character of a Conservation Area may be assessed in the relevant Conservation Area Appraisal, or in the absence of an Appraisal, an analysis of the special interests of the Conservation Area should be made at an early stage to inform the design.

7.48 The impact of proposed development within a Conservation Area, or within its setting, should be considered prior to making any application, and its special interest should be respected and preserved in any proposals.

7.49 Specific guidance relating to Conservation Areas is contained in the Council's Conservation Areas SPD.

CHAPTER 8

ENVIRONMENTAL SUSTAINABILITY

8.1 Sustainability should be at the heart of good design within the creative process of developing or reshaping our built environment (structures and infrastructure). In the fullest sense this embodies the three principles of:

i. Concurrency – meeting current needs;
ii. Resilience – lasting in the face of change, and;
iii. Adaptability – being able to adjust to future needs.

8.2 Underlying each of these is the need to effectively and fairly manage our use of the Earth's resources so that present and future generations can live within the planet's capacity to support us all. This approach lies at the heart of what is termed 'environmental sustainability' and is perhaps most easily communicated through the concept of 'one-planet living'. We are currently exceeding this threshold. If everyone in the world lived as we do in the United Kingdom we would require the natural resources of at least three planet Earths. This relationship between the productive land area required to support our lifestyles and the amount of productive land that could be evenly allocated to each man, woman and child on the earth is referred to as our ecological or environmental footprint. In South Cambridgeshire the average ecological footprint per resident is 5.3 global hectares (this is 'actual' hectares adjusted for land type and quality), a figure which very seriously exceeds the average 'earthshare' of 1.8 global hectares per person. This is clearly unsustainable in the broadest sense of the word.

8.3 Apart from eroding the Earth's natural capital we have also, through the extensive and almost exclusive use of fossil fuels to power our lives, released (and continue to release) excessive quantities of carbon dioxide (CO_2) and other greenhouse gases into our atmosphere. This is enhancing the global greenhouse effect to the point where our climate is destabilising and changing in increasingly threatening ways. This parameter is often referred to as our 'carbon footprint' and can be expressed in tons of CO_2 per capita of population. In terms of local emissions in South Cambridgeshire, Central Government has calculated the average figure as 10.2 tons CO_2/person/year (2006). To meet Local Area Agreement targets this must be 9 tons by 2011 and to meet Central Government targets we would be looking at 6-7 tons by 2020 and no more than 2 tons by 2050.

8.4 The gravity of the over-exploitation of environmental resources and climate change – and its implications – is now accepted by most scientists and politicians. Together they dominate, and will continue to dominate, the twenty-first century concept of environmental sustainability. Many of the technological solutions to mitigate the situation already exist. The challenge for sustainable design and construction professionals (and the institutions

that support them) is to ensure that this crucial sector does not fail in its responsibilities of ensuring that the transition to low carbon sustainable living is made within the pressing timeframes required (CO_2 emissions must peak by around 2016 and then decrease year on year by at least 3-4%).

8.5 The understanding and sphere of influence of both of these components has swollen dramatically over the past five years, as the planning system has found it necessary to re-evaluate what it means to protect and enhance the environment and to use natural resources prudently.

8.6 The rapidity with which the imperatives of environmental sustainability have impacted on the world of design and construction presents a new challenge to architects, urban designers, quantity surveyors, policy makers, developers and builders to keep up in terms of skills, knowledge, budget and management.

8.7 Sustainable design and construction are now a key concern of the planning system. The environmental sustainability design criteria raised and discussed within the following text are fundamental to twenty-first century design and must be included from the outset of any development and planning application process.

THE DEVELOPING POLICY CONTEXT

8.8 As the extent and urgency of the environmental sustainability agenda has been recognised, so planning policy has developed by way of response. The relevant principles behind South Cambridgeshire's Local Development Framework (LDF) current Core and Development Control Policies have hardened nationally and regionally since they were adopted – especially in terms of target setting and how they should be delivered in practice.

8.9 The fundamental sustainable design and construction parameters of planning for a lasting built environment still hold, but the context and pressure has changed with a new and urgent focus on reducing carbon emissions, decentralised energy, water conservation and climate change adaptation. Since the adoption of the Development Control Policies DPD in July 2007, new important drivers have subsequently been formally brought forward. These stand to strengthen the role and relevance of environmental sustainability in land-use decision making. As additional or revised accountabilities they reflect the priority and urgency that is now attached to tackling the imperatives of the climate change agenda. Of these the following have been specifically taken account of in subsequent sections of this guidance:

- Planning and Climate Change Supplement to Planning Policy Statement 1 (December 2007)

- Government policy commitment to modify the Building Regulations to achieve zero carbon homes by 2016 and zero carbon buildings by 2019 (Building a Greener Future, July 2007)
- Definition of zero carbon homes (consultation closed March 2009)
- UK Renewable Energy Strategy (July 2009)
- Heat and Energy Saving Strategy (consultation closed May 2009)
- UK Low Carbon Transition Plan (July 2009)
- Code for Sustainable Homes: Technical Guide (May 2009)
- EU Energy Performance of Buildings Directive (October 2008)
- Cambridgeshire Together Local Area Agreement Targets on climate change (2008-2011)
- Flood and Water Management Bill (draft April 2009)

SUSTAINABLE DESIGN AND CONSTRUCTION

8.10 Elements of the built environment are designed and constructed at any one time to meet a set of specific needs. These needs will focus upon occupational requirements, with space, amenity and access functions designed around them. These requirements are generally immediate, i.e. 'we need this building here and now because…'

8.11 Environmental sustainability demands that these requirements are placed within a wider context. One that encompasses more than the present needs of the initial occupier. As the pressures of population, household numbers and conventional economic growth continue, so to do the pressures upon land, natural resources, energy and water supply and waste management: meaning that the cumulative impact of development becomes greater. This impact builds in a way which is not always apparent or immediately relevant to the developers of a single site and is likely, where recognised, to be traded off against what seem more immediate and relevant matters. This gap between the individual benefit and the long term broader social, and even global, benefit is where the parameters of sustainable design and construction step in to unite the two. Sustainable design and construction recognises that underlying the ebb and flow of social and commercial activity driving our everyday lives that there is an imperative to look after the environmental capital upon which this socio-economic activity is essentially built. Compromise the environment in a world where natural resources are stretched up to and beyond their capacity to last indefinitely, and the social and economic activities that define our way of life will contract, decline or collapse. The 2006 Stern

Report made it clear that steps taken today to mitigate climate change will be far more cost effective than trying to manage unmitigated consequences in the future.

8.12 The purpose of this Sustainable Development section of the District Design Guide is therefore to ensure that the development of our built environment, from the extensive growth areas to the single home extension, actively incorporate measures that will not undermine the local and global environment for the wider use of present and future generations.

8.13 It is important to remember that sustainable design and construction in itself does not have to follow any particular 'look' or 'style' and often does not necessarily need to be more costly or complicated than more traditional means. As an approach it should therefore be sufficiently flexible to accommodate the other design criteria, parameters and guidance presented throughout this document.

POLICY CRITERIA

8.14 South Cambridgeshire's planning policy direction, as expressed through the LDF, is very clear as to the environmental sustainability criteria that it expects applicants for planning permission to take account of within their proposals:

- Minimise the use of energy and resources.
- Reduce carbon emissions.
- Maximise the use of renewable energy sources.
- Incorporate water conservation measures.
- Use sustainable drainage systems.
- Adaptation to the impacts of climate change.
- Use sustainable building methods and materials.
- Recycle construction waste.

8.15 The above policy criteria will raise a series of questions in the minds of applicants as they draft or assess their proposals. The following text has been designed to support applicants when considering their answers to these questions.

ENVIRONMENTALLY SUSTAINABLE DESIGN AND CHOICE

8.16 In taking account of each of the above policy criteria during the design process various choices will have to be made. These relate to:

- Layout and orientation.
- Building form and structure.
- Technology availability and suitability.
- Occupancy behaviour.

8.17 The choices made will either enlarge, reduce or contain the ecological and carbon footprints of any proposed development. It is therefore crucial that each is dealt with transparently so that the reasoning behind each choice is clear for all to see.

8.18 The sustainability elements of this District Design Guide will inevitably have an impact upon the more physical and tangible elements of layout, orientation, building form and structure. Managing the use of energy and resources, meeting carbon reduction targets and adapting to climate change will, however, extend beyond installation on the ground. The majority of measures will quite likely bring future residents and occupants into contact with some degree of unfamiliar technology, equipment, operation and maintenance. Unless the rationale and benefits behind such measures are specifically introduced to and understood by those that will be living with, using and maintaining them, then their full potential will almost certainly be compromised. As a matter of good practice therefore, all applicants should look to ensure that fully accessible user guidance and technical information is directly passed on to future occupants so that they are able to make the very most of all the sustainable design and construction features included within the new development.

ESSENTIAL CONSIDERATIONS AND OPTIONS

8.19 The following sections are intended to provide guidance on fulfilling the local planning authority's policies as they relate to sustainable design and construction as presented within the Development Control Policies DPD of the South Cambridgeshire LDF, alongside subsequent drivers such as the Planning Policy Statement 1 Climate Change Supplement and issues around behaviour and occupier engagement. All policies should be taken account of and if a compromise is proposed then it should be fully validated – cost on its own is not grounds for compromise.

8.20 Sustainable design and construction is a tremendously creative, expanding and developing field. Guides such as these are very readily overtaken by events and technical advances. The advice and guidance offered should therefore be seen as a flexible framework. A framework in which there is room for creativity, new approaches and the finer details (that only come from thorough site appraisal) in meeting the authority's adopted policies.

8.21 'Major development' (over 1,000m^2 or 10 dwellings) applications require the submission of a Sustainability Statement to demonstrate how the sustainability criteria have been fulfilled (alongside the submission of a Water Conservation Strategy and a Resource Re-use and Recycling Scheme).

8.22 In considering each of the following elements it is important to remember that they do not stand alone from each other. They all contribute to the integrated design of a whole project – from the ground up and from 'cradle

to grave' every element has an effect on every other. This complexity means that it is very difficult to set out a definitive approach. In tying together location, orientation, structure, infrastructure, adaptability, construction and materials so some degree of trade-off is inevitable. There is no exact science to help, but what is essential is that any compromises are clearly described and the decision-making process succinctly explained.

SITE APPRAISAL

8.23 There remains a prevalence amongst developers, architects and builders to view environmental sustainability options as post hoc 'bolt-ons' to site and building design. This frequently means that new development is unable to take full advantage of its site's potential, especially in terms of layout and orientation to best facilitate sustainable energy and resource use (e.g. solar gain, shading, drainage, access etc.). Therefore, in order to make the most of a site it is necessary to get a full understanding of its opportunities and constraints from this perspective. In a nutshell, an effective site appraisal should ensure that:

- Sustainability proposals are working with a site rather than being imposed upon it;
- The opportunity to develop the best site-specific solution is more likely to be realised, and
- Environmental sustainability lies at the heart of a site's functionality.

8.24 The extent of such an appraisal would depend upon the size of the development – a small application, such as a home extension, would only require a brief statement and/or annotated plans.

8.25 The principal environmental sustainability issues to be covered by the site appraisal would include:

- Movement and accessibility.
- Water and biodiversity.
- Sunlight.
- Wind speed and direction.
- Microclimate, soil, drainage and water table.
- Existing buildings and potential for re-use.
- Levels of atmospheric and noise pollution.
- The potential for a combined heat and power scheme.
- Site stability and contamination.

8.26 The above should be set alongside more conventional issues such as the character of the area, historic interest and building features.

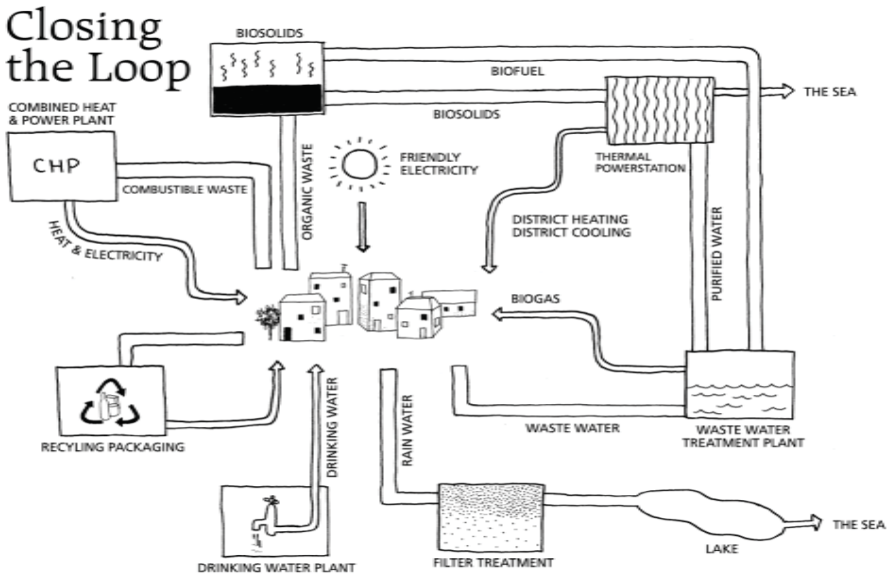
8.27 The importance of establishing the site's intrinsic sustainability potential is an invaluable first step in meeting the authority's policy requirements in the most effective and economically viable way possible. At the end of the appraisal process, detailed information should be held on previous use, layout, building orientation, solar energy potential, vegetation, wind energy potential, landscaping, movement and transport, and water.

Minimise the Use of Energy and Resources

8.28 Desired outcome: consideration of this over-arching criteria at the outset of the design process is crucial to realising the full environmental sustainability potential of any proposed development. A comprehensive review of the environmental implications and interrelationships of design choices relating to layout and orientation, building form and structure, materials, adaptation to future conditions and occupancy behaviour should be carried out in the round. The integral and systemic nature of many measures to minimise the use of energy and resources make it hard to over-emphasise the importance of including these issues within the early feasibility stages of examining alternative design and construction approaches and cost implications.

8.29 Principles: The concept of 'one-planet living' is useful in understanding the goals of environmental sustainability. However, when it comes to developing the working principles for development proposals its relevance fades as the need for realistic quantification in assessment and accounting processes comes to the fore.

8.30 It is more useful to breakdown the energy and resource flows that are likely to emanate from proposals and then understand how they can be worked up within the new development in such a way that they will contribute to closing the energy and resource 'loops' of which they are inseparably a part of. On-site renewable energy generation, rainwater harvesting, grey-water recycling, passive solar gain, natural ventilation, use of thermal mass, composting and space for growing food are all examples of measures which can subsequently minimise energy and resource use through employing thoughtful, creative and innovative approaches to design and construction.



Closing the loop.

8.31 Essential requirements: all schemes, whatever their size, will benefit from the inclusion of a sustainability statement, or similar document, that clearly illustrates the environmental sustainability choices that have been made in relation to the development's: orientation and layout; building form and structure; materials to be used; ability to adapt to future conditions, and; the behaviour of the envisaged occupants.

8.32 Delivery options: there are a range of baseline assessment tools available that will facilitate the bringing forward of environmental sustainability choices, from carbon and ecological foot-printing to baseline energy analysis, formal pre-construction assessments and comprehensive checklists.

Reduce Carbon Dioxide Emissions

8.33 Desired outcome: new development, specifically where it does not replace previous development, will in almost every case increase carbon dioxide concentrations in the atmosphere: attracting new emission sources through the running of building services, transport to and from, and the consumption patterns of its occupants. Sensitive, yet practical, design can have a tremendous influence upon reducing these emissions through measures that reduce demand and improve the efficiency of heat and power usage. Applicants should demonstrate how their proposals will maximise the incorporation of energy conservation and efficiency measures – aiming for a minimum 10% reduction in CO_2/m^2/year compared to the current (2006) Building Regulations (Policy NE/1 of the Development Control Policies DPD). Specified levels for carbon reduction are increasingly being tied to

the Code for Sustainable Homes (to be extended to cover other premises through the Code for Sustainable Buildings). All new dwellings will be expected to achieve a 25% reduction in CO_2 emissions over the 2006 Building Regulations by 2010, 44% by 2013 and achieve a zero carbon emissions figure by 2016 (for other buildings this is likely to be 2019). The zero-carbon emissions target includes the non-regulated energy used within homes – the Code Level 6 figure for carbon emissions is therefore in excess of the 100% at Code Level 5 that is only for regulated energy supplies. The development and implementation of the Code for Sustainable Homes (/Buildings) is unifying the standards for sustainable design and construction and the technical guidance available will increasingly prove a useful reference document. Applicants are encouraged to realise as high a level of the Code as possible.

Specified levels for Carbon reduction

8.34 Principles: by far the greatest release of carbon emissions into the atmosphere is tied to energy generation from fossil fuels (other relevant sources that may need to considered include some specific chemical processes, land use change and influences upon certain 'natural' processes). For the purposes of this guide the overriding principle is to apply sustainable design and construction techniques to significantly reduce, and where possible break, the functional link between the needs of a building and its use of fossil fuels to meet those needs.

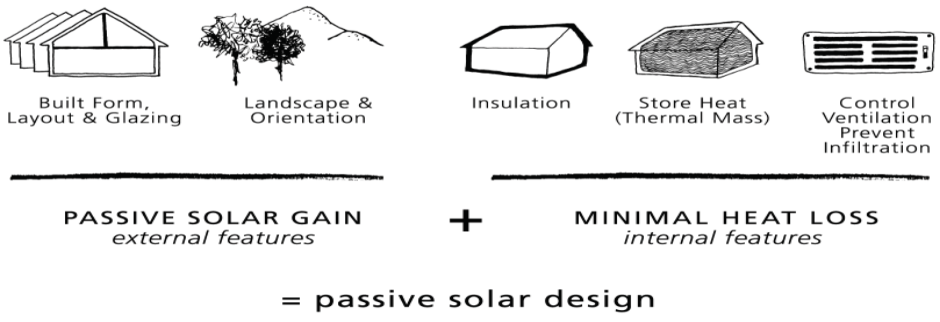
8.35 BREEAM (the Building Research Establishment's Environmental Assessment Method) is regarded by the UK's construction and property sectors as the measure of best practice in environmental design and management for non-residential buildings. The methodology defines the level of performance of a particular building type on a scale from pass to excellent and consideration should be given to achieving a BREEAM rating of at least good for all new commercial structures within South Cambridgeshire.

8.36 Essential requirements: this reduction and disconnection in the use of fossil fuels will require that all new developments, renovations and extensions make assessments of building, transport and occupancy energy needs. Such assessments should take the form of a tabulated calculation covering each potential energy use for residential and/or non-residential purposes – showing the baseline figures and the figures that will be achieved after the proposed energy conservation / efficiency measures have been applied (see Appendix 10).

8.37 Energy consumption for the proposals should be calculated using SAP or SBEM methodologies (for non-regulated domestic-type uses BREDEM-12 should be used). Calculations should include all end uses / private infrastructure (e.g. communal areas and car parks lighting/heating) and process loads. All energy values should be converted using the carbon emission factors set out in the current version of the Building Regulations. Alternatively the benchmarks set out in the London Renewable Toolkit may be used (converted into $kgCO_2/year/m^2$).

8.38 Delivery options: the importance of determining the optimum layout, orientation and overall landscape parameters to improve the energy conservation and efficiency functions of a development cannot be overstated (the implications for maximising sustainable energy generation will also be a part of this process).

8.39 Energy efficiency in design is tied to identifying natural orientation factors (e.g. topography and tree cover) to harness solar gain and associated benefits such as thermal mass (balancing day and night heat storage) and natural day lighting. The design will also need to incorporate passive shading features to curtail summertime over-heating.



Passive Solar Design

8.40 Designing to conserve heat is the other parallel consideration through good insulation, attention to window size and placement, draught management and ventilation. Examples of how these issue can be taken to fully integrated delivery can be found in “Passive House” standards where conservation and efficiency measure are taken sufficiently seriously that a

conventional central heating system is no longer required. Low energy lighting and appliances, alongside the use of energy management systems, are all other important measures that should be taken account of when developing proposals.

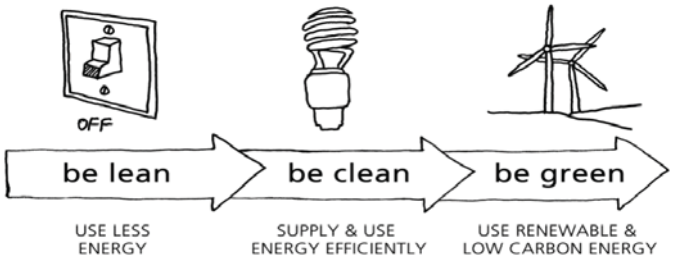
Maximise the Use of Renewable Energy Sources

8.41 Desired outcome: the incorporation of renewable energy sources within building designs permits the further reduction of carbon emissions beyond that which can be achieved by conservation and efficiency measures alone.

8.42 Serious consideration should also be given to the potential of exporting excess or supplementary heat and power to either the national grid or nearby properties as a means of increasing viability and allowing the development to offset other related carbon emissions (e.g. transport) or become a site of net carbon reduction. These opportunities are only likely to become more accessible as less flexible means of remuneration are superseded or supplemented by schemes such as 'feed-in tariffs' and 'renewable heat incentives'.

8.43 Principles: in order to save unnecessary cost and capacity in renewable energy installations it is essential that all of a development's potential energy conservation and efficiency measures have been utilised.

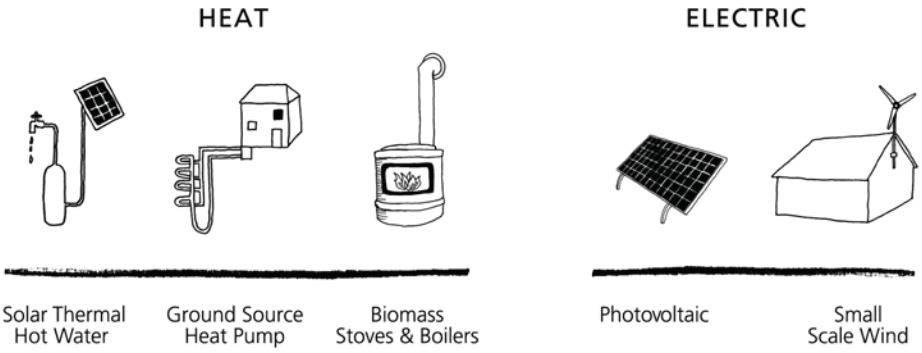
8.44 A careful and rigorous assessment procedure will need to be carried out early in the design process in order to determine the effective technology, or mix of technologies, that can be incorporated within the development site to meet as great a proportion as possible of heating, cooling and electricity needs.



Efficiency Measures

8.45 In terms of carbon reduction, it is important to recognise that carbon emission factors vary depending upon the fossil fuel source that is being replaced – for example the current Building Regulations (2006) state that a kWh of electricity accounts for the emission of 0.42kg of CO_2, whereas a kWh of gas accounts for 0.19kg of CO_2. These emission factors also highlight the differences between heat (e.g. for space and water) and power (e.g. to run electrical appliances) and why it is therefore so important to use $kgCO_2/year/m^2$ as opposed to $kWh/year/m^2$ when assessing carbon

reduction through energy conservation, efficiency and renewable energy generation measures.

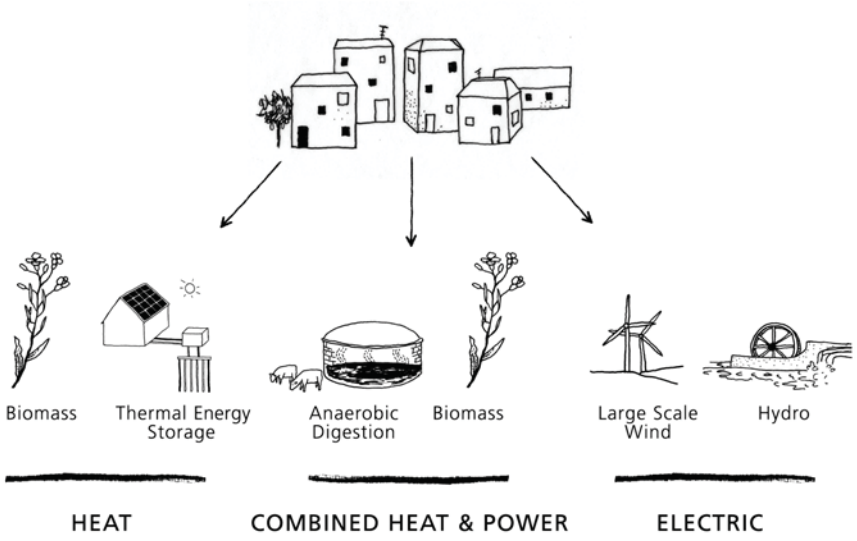


Building integrated renewables

8.46 Essential requirements: applicants with proposals greater than 1,000m^2 or 10 dwellings will be expected to ensure that 10% of their predicted energy requirements are met through the inclusion of on-site renewable energy technologies (Policy NE/3 in the Development Control Policies DPD). Some areas of the district have higher standards (see the relevant Area Action Plans for details). This requirement should be calculated in kgCO_2 not kWh for the reasons outlined above (see Appendix 10).

8.47 In order to bring forward the most appropriate renewable energy solutions for such a development, applicants should include (at the outline submission stage) a feasibility assessment of the options that have been considered. This assessment, when combined with baseline data on predicted energy use, target emissions and measures to improve conservation and efficiency (refer to previous sections) will comprise the Energy Statement that must accompany the application.

8.48 For major developments, applicants are strongly encouraged to consider options for site-wide solutions as early as possible in the development process. Such options have the potential to deliver major cost, energy and carbon savings but will almost certainly need to be integrated within development plans from the outset.



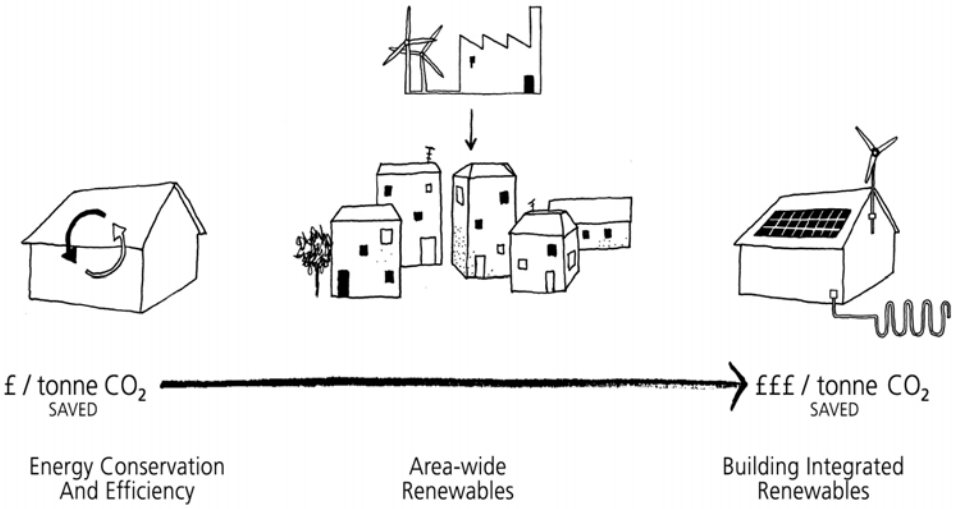
Area wide renewables

8.49 Delivery options: in considering their feasibility assessment it can be useful for applicants to present the options in a hierarchy of suitability and viability. Selection of the most appropriate technology, or mix of technologies, is at the applicants discretion with the following as a guiding list of those that may be considered:

- Solar thermal hot water systems.
- Solar photo voltaic (PV) cells/panels.
- Ground, air or water source heat pumps.
- Wind turbines.
- Geothermal.
- Biomass (boilers, stoves and combined heat and power).
- Anaerobic digestion.

8.50 Should the applicant have any queries regarding suitability then they should contact the Council's Strategic Sustainability Officer in advance of submission.

8.51 The delivery scale of all the above technologies may in theory be varied to lesser or greater extents for different scales of development from single buildings to community or district schemes: bringing varying benefits in terms of cost per unit and user interaction.



Towards zero carbon

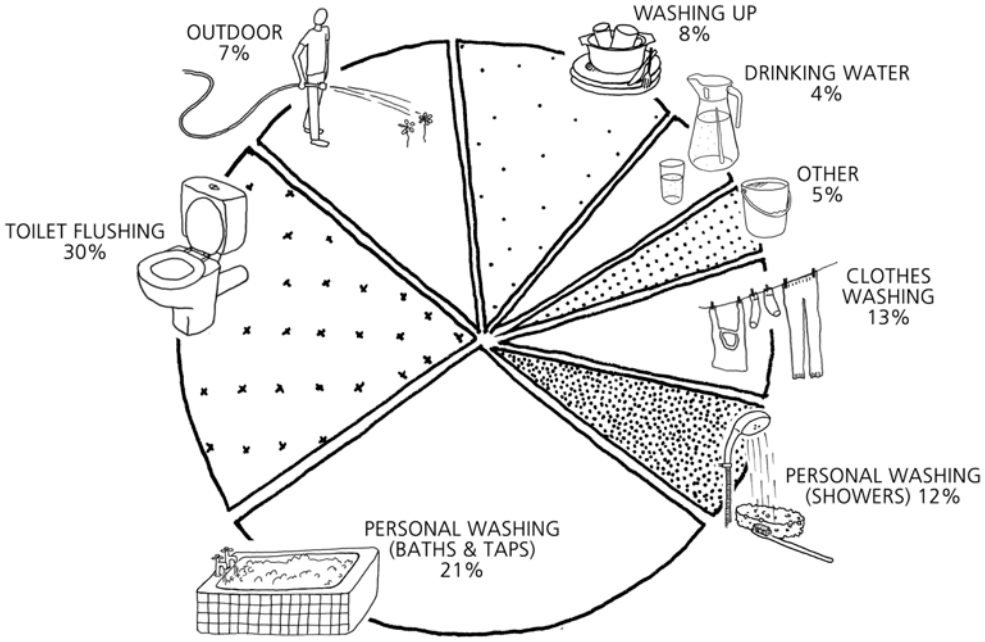
8.52 Currently biomass, anaerobic digestion and geothermal technologies have the greatest potential to be scaled up to provide district/community level heating schemes. Typically within the UK, the former two are also used to generate electricity. When used for both applications they are known as combined heat and power (CHP) systems (they may even incorporate a cooling function and are then known as CCHP systems). Scaling up to the district / community level can greatly improve the viability of multi-unit development schemes seeking to achieve the higher levels of carbon reduction (50% plus).

8.53 Clearly if a CHP system uses fossil fuels it cannot be regarded as renewably powered. It can however, with the correct infrastructure, still bring significant carbon savings through cutting electricity transmission losses and using 'waste' heat. If applicants are considering such an approach, they should contact the Strategic Sustainability Officer as early as possible in the application process to discuss their proposals in relation to the authority's renewable energy policies.

Incorporate Water Conservation Measures

8.54 Desired outcome: alongside energy, responding to the sustainable supply and use of water within the design and construction process is almost certainly the most pressing resource management issue that new development must tackle and lead on. This is especially the case in the East of England where rainfall is the lowest in the country (South Cambridgeshire averages less than 50mm per month). As with energy,

consumption has increased dramatically in recent decades. At the domestic scale, each of us now averages a daily consumption in excess of 150litres of water – almost all of which is delivered to premises as a drinking standard (with not insignificant carbon emission implications) even though the vast majority is used for washing, toilet flushing and watering the garden.



Water use in home

8.55 Again as with energy, new development will, unless very tightly accounted for, increase gross water resource usage. Reducing 'mains' water consumption is thus considered a priority outcome in the consideration of planning applications.

8.56 The importance of reducing consumption is recognised within the Code for Sustainable Homes where water usage is set as a mandatory standard for Levels 1 and 2 at 120 ltrs/person/day, Levels 3 and 4 at 105ltrs/person/day, and Levels 5 and 6 at 80 ltrs/person/day.

8.57 Principles: As with most sustainable resource management issues, the design principles for reducing water usage are held within a hierarchical framework. The first level, as always, involves reducing need or demand for water in domestic, business and industrial activities attached to the development. The second level is to intercept and use rainwater before returning it to mains, or ideally a sustainable, drainage system. The third level involves a more concerted interception of water already used within a residential or commercial process for a lower grade use such as waste removal (e.g. toilet flushing) or municipal or domestic irrigation.

Water saving hierarchy

8.58 For the hierarchy to generate maximum and lasting returns, the behaviour of the building occupants will play a vital role. As with energy, applicants should take specific steps to raise awareness of the problem of profligate consumption and the importance of personal responsibility in minimising waste and improving efficiency in use.

8.59 Essential requirements: planning policy within South Cambridgeshire requires that new development incorporate all practicable water conservation measures and that for development over 1,000m^2 or 10 dwellings a Water Conservation Strategy be submitted to demonstrate how such measures will be brought forward and implemented. Some areas of the district have higher standards (see the relevant Area Action Plans for details).

8.60 For larger developments, the interception of surface water run-off for domestic or commercial purposes may have implications for local water courses and water tables. In such instances a careful balance must be struck between rainwater harvesting and the release to surface run-off.

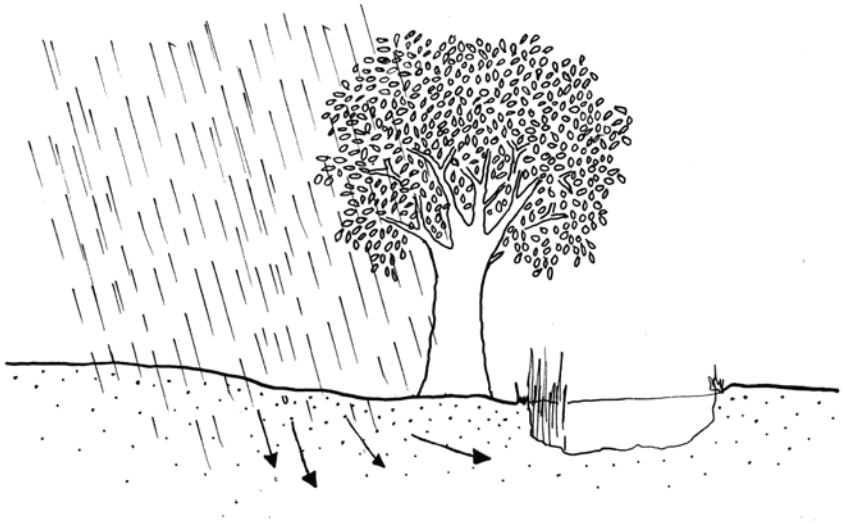
8.61 Delivery options: behaviour change and the reshaping of commercial processes to bring down demand is clearly a crucial element of water conservation. Thoughtful design may be used to encourage this change. For example, through incorporating smaller baths and the more accessible location of water meters (along with home information packs or building user guides) or use of sub-metering to enable effective water management by the occupants. Attention should also be given to landscape and garden planting that does not require supplemental watering (xeriscaping).

8.62 Other more technical responses to maximise water efficiency should be specified as a matter of course, e.g. aerated taps and shower heads, low flush toilets and water efficient appliances. Basic rainwater harvesting using water butts should also be included as a standard where the opportunity exists. For industrial and office units, that often have significant roof areas, rainwater collection should similarly be the norm (where uses

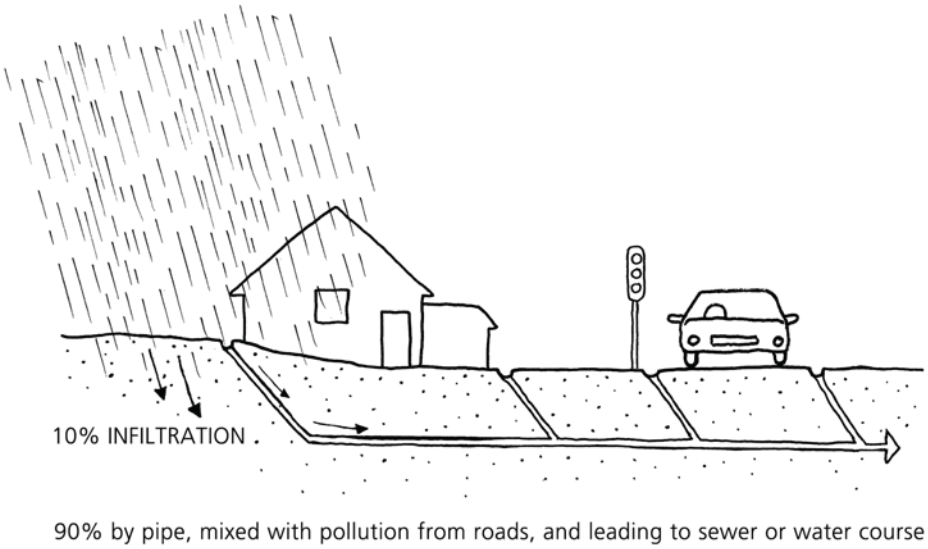
can run from commercial processes to toilet flushing). Greywater recycling is a more sophisticated approach and will almost certainly be required for level 5 and 6 of the Code for Sustainable Homes (where the standard required is 80 litres/person/day). Community scale schemes are now coming forward and have the very real potential to enhance financial viability for multi-user developments.

Use Sustainable Drainage Systems

8.63 Desired outcome: the essential purpose of a sustainable drainage system (SuDS) is to manage the precipitation falling upon a development in such a way that it mimics the natural drainage of the undeveloped site.



SuDS pre-development conditions

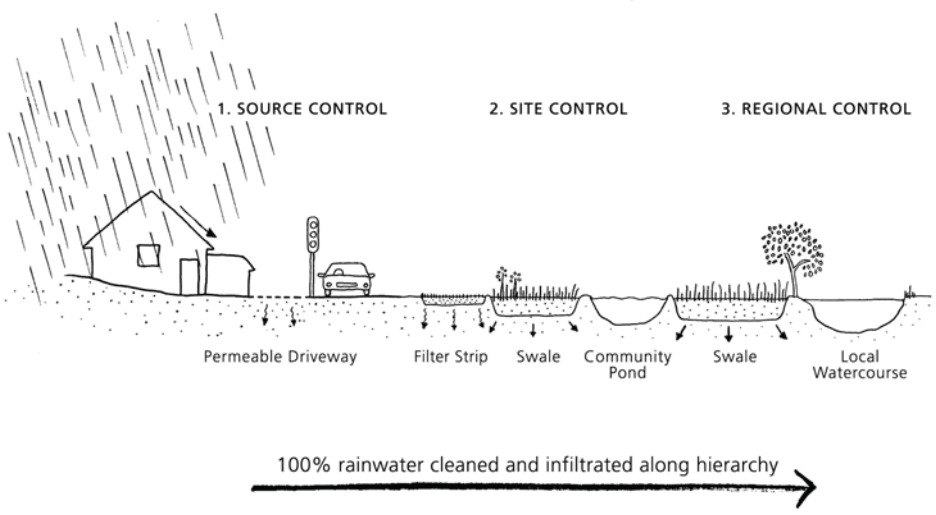


Typical post-development drainage

8.64 SuDS offer a more environmentally, socially and frequently economically sustainable alternative to conventional underground piped systems with street level grates or storm drains.

8.65 High quality SuDS can reduce flood risk, provide community amenity value (e.g. ponds) and promote biodiversity through the creation of new or improved wildlife habitats.

8.66 Principles: a well designed SuDS will consist of a series of infiltrating water transport features known as the 'management train'. This promotes evaporation and infiltration as close to the point of precipitation as possible, with the balance being progressively cleaned / filtered in its journey to the nearest watercourse.



SuDS hierarchy

8.67 Essential requirements: the extent of a SuDS scheme will depend upon the size of the proposed development and the extent of open space available. Even in the smallest development, however, valuable elements and features should be considered for incorporation. Good quality SuDS will require careful design consideration to ensure that they are straightforward to maintain whilst, primarily, ensuring that the scheme satisfactorily fulfils its drainage role and, secondarily, maximises its landscape, amenity and biodiversity value. The authority will be fully supportive of such schemes.

8.68 Long term adoption of larger schemes, extending beyond private property boundaries and into public open space, will be an important issue. In such cases, applicants should discuss appropriate arrangements with the authority.

8.69 Delivery options: the management train diagram above illustrates some of the elements that applicants may seek to include within a SuDS scheme. The scale of the development and inclusion of roads will be important factors in the design of delivery options.

8.70 Smaller scale schemes within the boundaries of private property could include: green roofs, permeable driveways and parking, soakaways, proprietary treatment systems, and, geocellular storage (preferably combined with rainwater harvesting).

8.71 SuDS in road transport corridors could include: filter strips, swales, rain gardens (bioretention), filter drains, and, canals and rills.

8.72 Larger scale SuDS incorporating significant open space could include any of the above plus ponds and wetland, and infiltration and retention basins. Where basins and ponds are to be incorporated, they should be designed to appear as natural as possible (with contours blending into the landscape, and with different margin depths and shelves to maximise opportunities for the enhancement of biodiversity) or form part of a wider landscape design strategy that may introduce alternative forms into the landscape depending upon the context. Well designed SuDS schemes also favour other multi-functional uses such as the provision of green infrastructure for public access.

SUSTAINABLE URBAN DRAINAGE SYSTEMS

8.73 Conventional drainage systems that pipe surface water run off away from hard paved areas, can cause problems elsewhere, especially following periods of intense, or prolonged rain. Opportunities to incorporate Sustainable Drainage Systems (SUDS) into the design of external areas should be explored. SUDS comprise a range of techniques that allow surface water to be managed in a more natural manner as close to its origin as possible, through the use of permeable surface treatments, filter strips

and swales and basins and ponds. As well as helping to lessen the risk from flooding, such techniques can also offer benefits in terms of pollution control (through improved filtration), habitat creation and visual amenity.

8.74 Applicants developing SuDS should be aware that certain conventional landscape design and planting practices may require modification to facilitate an effective management train, account for different soil / moisture profiles, reduce soil erosion, and promote nature conservation. Access to an appropriate degree of SuDS engineering expertise will be an important issue for applicants – especially for larger schemes.

Mitigate Against the Impacts of Climate Change

8.75 Desired outcome: there is scientific consensus that human induced climate change is almost certainly upon us today. Limiting the impact, by reducing emissions, is a priority issue. Adapting to the level of climate change to which we are already committed is also a matter of great importance and one in which sustainable design and construction stands to play a prolific role. Although some uncertainty remains as regards precise timings and the upper and lower levels of impact, there is agreement that we should expect greater seasonality with less stable weather patterns bringing more extreme weather events as long-term changes in climatic conditions begin to make themselves felt. All new development should therefore be proactively designed to mitigate against such impacts, which include:

- Increasing risk of heatwaves and extreme temperatures.
- Wetter winters, more intense downpours and drier summers (increasing seasonality).
- Greater risk of drought and flood.
- Higher potential for more intense and frequent storms.

8.76 The outcome should be a design process that ensures that development takes account of the expected changes over its envisaged lifetime or be readily capable of adaptation without compromising carbon reduction measures (e.g. avoiding the use of fossil-fuelled cooling equipment).

8.77 Principles: the longevity of the built environment renders adaptation a current rather than future issue. The driving principle is of designing in the capacity for resilience to the impacts of future climate change. This designing-in should seek to ensure that occupants do not become dependant on the high use or retrofitting of costly and resource intensive building services to maintain their wellbeing – e.g. cooling and water supply in the case of heatwaves and drought respectively. Thoughtful adaptation strategies will deliver multiple benefits: enhanced liveability and quality of life in communities of the future, protection of investment, reduced insurance costs and enhanced biodiversity.

8.78 Essential requirements: in order to satisfactorily fulfil the Council's policy on mitigating against the impacts of climate change within new development, applicants should demonstrate that their proposals deliver built-in resilience to such impacts: high temperatures, storm / flood risk (including strong winds), water stress, and earth movement in areas of subsidence risk.

8.79 Delivery options: the scale of a proposed development will influence the extent of the delivery options available to applicants. Designing for larger developments will permit the inclusion of a more comprehensive cascade of measures. For most scales, however, the options available generally share a similar approach.

8.80 Managing high temperatures:

- Promotion of evaporative cooling through the use of green open space, water bodies and features (e.g. SuDS).
- Provision of shading, to reduce excessive solar gain, through street and building orientation and structural features along with planting.
- Careful and creative design to maximise passive ventilation potential.
- Use of cool building materials, reflective surfaces and green roofs and walls to curtail heat penetration.
- Inclusion of thermal storage or mass – absorbing heat during hot periods which can be dissipated when it is cooler (ground coupled systems make use of sub-surface storage).

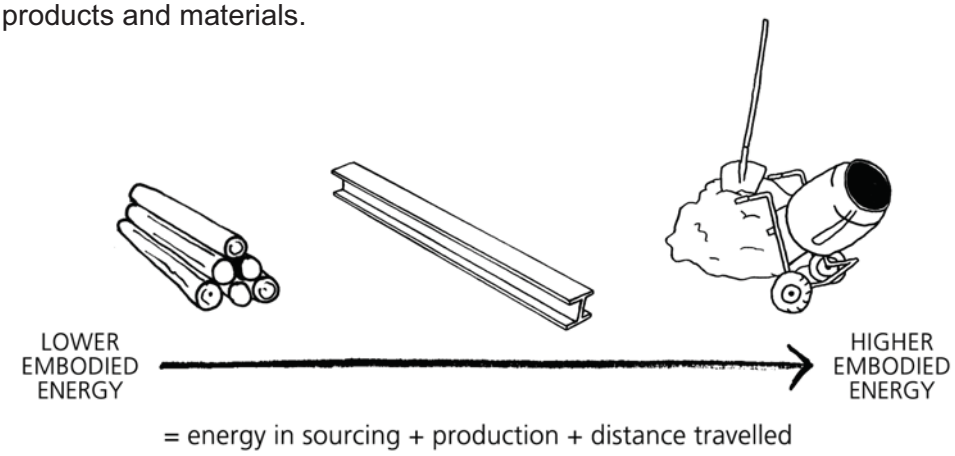
8.81 Managing flood risk:

- As a point of principle avoid developing on sites at high risk of flooding.
- Effective land management, SuDS features and planting to reduce the rate of surface run-off.
- Widening drains and drainage features.
- Removing pinch-points in flood pathways.
- Raising water sensitive services and equipment beyond potential flood-line.
- Use of specific flood resilient materials and building features.
- Managing water availability and quality risks.

- Collect and store rainwater (harvesting from roofs and SuDS).
- Incorporation of rainwater recycling.
- Installation of water efficient fixtures, fittings and appliances.
- Managing ground conditions.
- In areas of high risk take expert advice over structural reinforcing and retaining options.

Use Sustainable Building Methods and Material

8.82 Desired outcome: the use of sustainable building methods and materials is an area of huge creative expertise within design and construction. One that stands to significantly reduce the negative natural resource, energy and carbon emission implications of the building process. From the climate change perspective, conventional methods of construction and materials used will 'embody' within them a relatively high amount of fossil-fuel derived energy – the carbon emitted in the production of building materials and their bringing together in the completed building. Approximately 10% of national energy consumption is used in the production and transport of construction products and materials.



Embodied energy

8.83 Sustainable building methods and materials should be used to bring down this embodied figure whilst also sustaining the source of natural materials used without degrading habitats and the long-term wellbeing of indigenous populations (e.g. timber and aggregates).

8.84 Principles: materials such as concrete, UPVC, PVC and extruded polystyrene all require high volumes of energy and resources to make them. These, and others such as alkyd (oil-based) paints and phosphogypsum (used in plasterwork) also generate pollution and toxic compounds – dangerous to ecosystems and human wellbeing. To counter these, and

other issues, the principles associated with the use of sustainable building materials should incorporate the following distinct procurement and quantity surveying elements:

- Employ re-used and recycled materials as a first course of action.
- Do not use or waste unnecessary materials.
- Where practicable, source materials that require the minimum energy use in their production.
- Where possible, source materials locally to reduce transportation impacts.
- Source materials that have been ethically harvested, processed or manufactured.
- Carefully monitor the use of materials during the construction process.

Sustainable sourcing

8.85 In terms of construction methods, there is a marked division between those employing 'modern methods of construction' (pre-fabrication of industrially produced materials and partial off-site construction) and those wishing to utilise natural materials in an expressly ecologically sensitive manner in what is termed 'low impact construction' (these are the 'deep green' buildings typified by projects practised at a small scale and usually in rural areas ideally using locally sourced natural materials with very low embodied energy in their fabric e.g. cob, rammed earth, hemp, straw bale or green timber). Both of these strategies to sustainable construction share an approach founded upon drawing all of the above principles into an integrated design for the whole project.

8.86 Essential requirements: applicants should make an early assessment of their outline proposals in consideration of how they could practically incorporate sustainable building methods with verifiably sustainable

materials (including recycled) that have, as far as possible been locally sourced.

8.87 Delivery options: this guide cannot provide comprehensive information on the sustainability of all building materials – other publications such as the BRE Green Guide to Specification are far better placed for this purpose. In making a choice, the applicant will need to find a balance which meets their sustainability priorities. This is an inevitably complex area and one in which the full lifecycle environmental implications of a material (from production to disposal / re-use / recycling) must also be taken account of. It is, however, an area that applicants should look to take account of.

8.88 As a preliminary primer, material specification should, where applicable, actively consider including the use of:

- Certified timber.
- Natural insulation products.
- Natural flooring material.
- Timber framed windows.
- Structural timber frame.
- Timber cladding.
- Natural paints.
- Products with a high recycled content and naturally sourced.

and, excluding the use of:

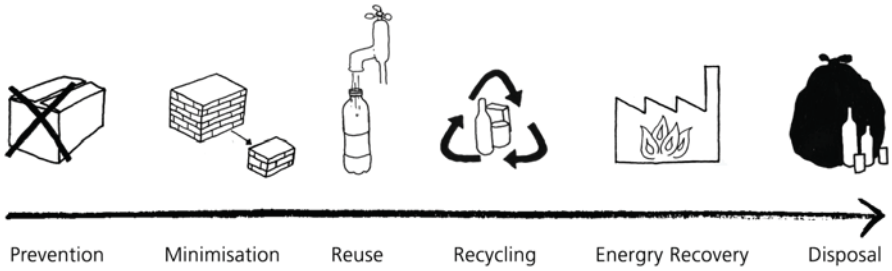
- Organic solvent based floor finishes, paint, glues, stains and adhesives.
- Energy intensive products (e.g. PVC, aluminium, copper and lead).
- Virgin aggregates.

Recycle Construction Waste

8.89 Desired outcome: approaches to recycling construction waste are closely tied to the use of sustainable building methods and materials as discussed in the previous section. It is a very significant issue, with construction and demolition waste representing 24% of total UK waste by weight. Development therefore adds significantly to the burden of existing waste that must be managed. Unfortunately a significant proportion of this waste is still disposed of to land fill. The recycling or reuse of this waste should therefore be a priority for all applicants and carefully planned to cover all waste arising during construction.

8.90 Principles: applicants are expected to ensure that their proposals incorporate the principles of the waste management hierarchy. The least preferred option is disposal to landfill and the most preferred option is, through careful design, to negate or reduce the demand for materials that

more conventionally, or less thoughtfully, would otherwise have been required.



Waste hierarchy

8.91 Essential requirements: applicants should prepare a Resource Re-use and Recycling Scheme to cover all waste arising during the proposed construction and/or demolition. Where possible, this should include the appropriate accommodation of construction spoil within the development and maximising the re-use and recycling of any suitable raw materials currently available on site during construction, such as redundant buildings or infrastructure. The Site Waste Management Plans Regulation 2008 places a legal requirement upon applicants to have a Site Waste Management Plan (SWMP) for all new construction projects costing more than £300,000. A SWMP will need to forecast how much of each type of waste will be produced on site and how it will be managed.

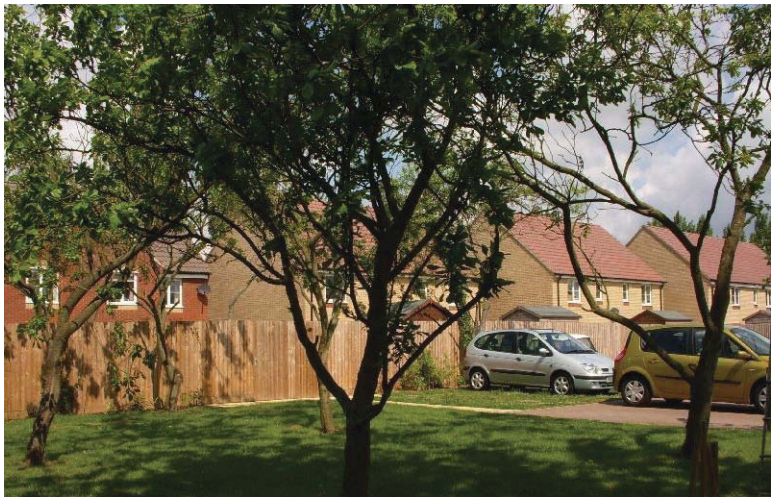
8.92 Delivery options: applicants should demonstrate how they are planning to use recycled material, reduce waste and ensure that as much of this is re-used or recycled as possible. Acting upon these objectives will probably require that the site incorporates facilities for waste sorting and recycling alongside procedures to minimise waste and maximise recycling during construction and demolition.

CHAPTER 9

BIODIVERSITY

9.1 Biodiversity is the word used to describe all flora and fauna. It originates from "Biological Diversity" and was first used after the Rio Conference in 1992. The UK Government has pledged to reduce the decline in biodiversity and as such has produced a series of Biodiversity Action Plans (BAPs) to guide conservation work with respect to important species and habitats. BAPs have also been produced at the county level by the Cambridgeshire and Peterborough Biodiversity Partnership. The BAPs can be viewed at:
www.ukbap.org.uk
www.cambridgeshire.gov.uk/biodiversitypartnership

9.2 Biodiversity conservation should be considered as a key element of good design as interaction with wildlife enriches people's lives and green spaces provide health benefits as well as adding value to developments.



Retention of old fruit trees to conserve an orchard within a new housing estate at Heydon

9.3 The distribution of species and habitats is influenced by the landscape. This can result in particular species being found in certain parts of the district and in turn reinforces an area's local distinction or landscape character. For example, the Western Claylands extend from Wimpole to Hatley St George and include some the best ancient woodlands within the district. Their ground flora can include bluebells, wood anemone and oxlip. In contrast one would not expect to find these plants naturally within the Fen Edge landscape character where willow trees tend to dominate and extensive woodlands are not characteristic. Consideration must therefore be given to species' introduction when considering landscape schemes within different landscape character areas as they will ultimate influence the biodiversity to be found there.

9.4 Development should contribute to the protection and further enhancement of biodiversity, and where possible, seek to restore and add to biodiversity. For example, the Trumpington Meadows development of 1,200 homes will result in the restoration of extensive wildflower flood meadows adjacent to the River Cam where arable production had been undertaken in recent decades.

Flood meadow restoration at Trumpington Meadows to deliver locally distinctive riverside habitats of willows and meadows alongside the River Cam.

9.5 Biodiversity and sustainable development sit side-by-side. Sustainable developments should aim to have a minimal impact upon the environment. Where change is unavoidable new opportunities may present themselves for habitat enhancement or creation such as community woodlands as open spaces and carbon sinks to help counter-act the effects of climate change.

Creation of Stockbridge Meadows community park in Melbourn following adjacent house building.

9.6 In addition to biodiversity conservation is the system of legally protected species and designated sites. A Protected Species is a species which receives protection under UK or European legislation – the protection could be partial (prohibiting sale, for example) or full, in which case the disturbance, killing or injuring of just one of the species could constitute an offence. Details of the species afforded protection under the various pieces of legislation can be found on Natural England's website (www.naturalengland.org.uk). Development should avoid causing harm to such species.

9.7 Similarly, a number of sites (Sites of Special Scientific Interest, Special Area of Conservation and Special Protection Areas) are legally protected under UK or European legislation due to their importance for wildlife. At a level below these are County Wildlife Sites which receive no legal protection but are a material consideration within planning policy. All such sites are considered as Designated Sites within the SCDC Biodiversity SPD which should be referred to for further guidance. Development should avoid harm to such sites.

BIODIVERSITY CONSERVATION IN DEVELOPMENTS

9.8 The existing ecology of the site will need to be properly understood prior to submitting a planning application otherwise it is not possible to deliver effective species and habitat conservation. It is likely that a Priority Species Survey and Assessment or a Biodiversity Site Survey and Assessment will be required to support a planning application. The extent of such surveys can be established through pre-application discussions with planning staff. The SCDC Biodiversity SPD, chapter 3, provides detailed guidance on this aspect and should be referred to of particular importance are tables 1 and 2 which list development types and biodiversity sites that will trigger the need for specific biodiversity information..

9.9 Consideration should be given to the type of habitat found at a site and the species that it could support. For example, watercourses and drainage ditches may provide habitat for water voles. Redundant buildings (especially those in rural areas) may be used by barn owls or colonies of bats, while large mature gardens and undeveloped areas within villages can often provide refuges for biodiversity. These green areas may be acting as "stepping stones" or corridors for species such as great crested newts and, therefore, small infill plots should never be disregarded as having no biodiversity potential. When considering in-fill development it may be necessary to provide habitat features, such as native hedge and grass strip planting, to provide continuity of habitats.

9.10 Applicants should be aware that some developments may require the collation of ecological data over an extended period of time in order to assess likely impacts and to propose a mitigation scheme. This is

particularly likely in the case of protected species where Natural England will require survey information to support its protected species licensing procedures.

9.11 To assist the consideration of various development types on certain species and to illustrate what form of mitigation might be appropriate six development types are explored in Table 9.1. The contents of the table are not definitive and each development will have to be considered on its own merits.

Table 9.1: Potential Impact of Smaller Scale Developments on Biodiversity

Development Type	Initial Surveys	Possible Impact	Possible Mitigation
Barn conversion	Bat survey Barn owl nest site survey	Loss of bat roost Loss of barn owl nest site	Time works to avoid disturbing hibernation or breeding periods. Erection of artificial nest sites or create specialist bat roosts.
Listed building alteration	Bat survey to find roost and emergence points. Breeding bird survey or search for nest sites.	Loss of bat roost or access to bat roosts. Loss of bird nesting opportunities	Provision of new access points. Provision of specialist artificial nest sites for house sparrows, starlings or swallows.
House extension and Backland Development	Breeding bird survey Great crested newt survey	Loss of mature garden shrubs Loss of garden pond	Provision of new planting and suitable nest boxes Reconsider design to retain pond, or recreate pond in new location
Creation of boathouse on river or lake	Water vole survey Otter survey Kingfisher nest site survey	Loss of water vole habitat Disturbance of otters Disturbance of kingfisher nest site	Retention of natural water frontage. Sensitive lighting Sensitive screening
Outhouse demolition	Bat survey Search for newts around building periphery (inside and out) Search for nest sites	Loss of bat roost Loss of great crested newt hibernation site Loss of potential bird nesting site	No demolition whilst bat using the structure Provision of alternative hibernation site. Provision of suitable nest boxes

New dwelling on disused plot	Breeding bird survey Phase 1 Habitat Survey (see South Cambridgeshire Biodiversity Strategy) Invertebrate survey Badger survey	Loss of scrub habitat Loss of deadwood habitat for invertebrates Disturbance of badger sett	Provision of suitable nest boxes Provision of new native planting Retention or replacement of deadwood habitat Retention of suitable screening and habitat around sett

9.12 Applicants are strongly encouraged to enter into pre-application discussions and to seek advice from Council's Ecology Officer on biodiversity matters.

CHAPTER 10

ENVIRONMENTAL HEALTH ISSUES

WASTE / REFUSE COLLECTION AND RECYCLING-OPERATIONAL

10.1 Adequate, safe and secure provision should be provided for the storage of the waste and recycling materials collection receptacles (Council or Private Contractor), for all residential (domestic) and non-residential buildings (commercial) uses, without creating a nuisance or being unsightly for the occupants or the general streetscape.

10.2 To prevent the storage of such materials becoming a nuisance or unsightly in the future, the design of storage facilities should be sufficiently large to accommodate future expansion of recyclable materials collected and therefore an increase in the number of recycling containers required to be stored.

10.3 Access for refuse, delivery and emergency vehicles is best provided by means of permeable grid layout, but where dead ends are unavoidable, turning heads must be provided. Development layouts and the provision of operational waste and recycling provision on-site must accord with Building Regulation H6 and the requirements of the Recycling in Cambridgeshire and Peterborough Partnership (RECAP) Waste Management Design Guide 2008 (RECAP Guide) and the Cambridgeshire Design Guide for Streets & Public Realm. The RECAP Guide was originally published by the RECAP Partnership in 2008 and adopted as SCDC policy in 2008. It has been recently revised by the County Council together with Peterborough City Council as a draft Supplementary Planning Document (SPD) and will be subject to public consultation in February / March 2010 and likely adoption in mid to late 2010.

10.4 Guidance contained within the emerging County Council draft Supplementary Planning Documents will also relate to policies 16 and 28 in the emerging Minerals & Waste Core Strategy covering Waste Minimisation, Re-use, and Resource Recovery and the provision of Household Recycling Centres. This draft Supplementary Planning Document entitled “The Location and Design of Waste Management Facilities” will also be subject to public consultation in February / March 2010 and likely adoption in mid to late 2010. It will guide the design and location for strategic Waste Management Facilities in Cambridgeshire to ensure high quality design in accordance with best practice and to demonstrate how these facilities can be developed in both urban and rural settings.

10.5 The RECAP Guide addresses the issue of waste management in new developments and redevelopments of a residential, commercial or mixed (residential and commercial) nature. It is to be used by:

- Developers and designers to ensure effective segregation, storage and collection of waste materials; and
- Planning Authorities in assessing each planning application to ensure that waste management needs are adequately addressed.

10.6 The Guide covers the following areas:

- Waste Storage Capacity
- Waste Storage Points
- Waste Storage Methods
- Waste Collection
- Recycling Centres
- Bring Sites
- Waste Management in flats & apartments
- Technical Appendices

10.7 The aims of the Guide are as follows:

- Detail the waste segregation, storage and collection requirements that designers and developers need to satisfy.
- Provide a strategic tool for use by Planning Authorities when assessing development applications.
- Address the unique waste management problems presented by high density (residential) developments.
- State the requirements for developers regarding the funding and provision of additional waste management infrastructure.
- Highlight the financial implications of waste management upon developers.
- Highlight examples of good practice demonstrating what can be achieved.
- Contribute to sustainability and reduced environmental impact.

10.8 The RECAP Guide includes a 'ToolKit' to be used by developers to set out how they have addressed waste management requirements as part of their planning application. The ToolKit is on the 1App list of required documents

and as such a completed ToolKit must accompany any planning application in order for it to be registered as a valid application.

10.9 The purpose of the County Council Draft SPD on Waste Management Design Guide mirrors that of the RECAP Guide and sets out a series of development principles based on recognised good planning and design practice.

10.10 The Draft SPD provides advice on the design and provision of waste management infrastructure in new developments and redevelopments of a residential, commercial or mixed (residential and commercial) nature, including advice on:

- **Internal storage capacity**: including a requirement to provide between 35-40 litres of space within the kitchens of new homes to give residents sufficient space to allow for recycling and composting (as appropriate).

- **External storage capacity**: the Guide sets out recommendations for amount of space which is required to store bins for different types of waste to serve residential and commercial developments including different standards for communal bins in relation to flats / apartments. In the case of commercial development the amount of space required is dependant upon the use of the land e.g. requirements for restaurants and fast food outlets are greater. For residential development it is dependant upon whether it is a house or the number of rooms in the case of flats / apartments (excluding kitchens and bathrooms). For example a single house would need to provide 775 litres, with a one bedroom flat with a living room in a 4 floor development would need to provide 320 litres.

- **Location of waste storage:** issues which should be considered in relation to location of bins including ensuring that they are accessible for both users and collection crews and that the amenity of residents is protected.

- **Waste storage infrastructure:** sets out a minimum specification for compounds to store residential and commercial waste above-ground and guidance in relation to the design of underground facilities.

- **Highway design**: requirements for the design of new roads given the emphasis away from car dominated environments in urban design to take into account the need for waste collection vehicles to serve new developments effectively.

- **Additional waste management measures**: identifies a range of complementary measures, which can be introduced to support the effective management of waste e.g. educational schemes.

NB: the above detailed capacities are indicative and may need adjusting subject to local and national requirements / priorities and the final version of any adopted County Council SPD - Waste Management Design Guide.

10.11 The Cambridgeshire Design Guide for Streets & Public Realm (Cambridge Horizons 2007), complements national design guidance, such as the Government's Manual for Streets to promote the highest possible standards in all new developments, large and small. The purpose of the Design Guide for Streets & Public Realm is to set out the key principles and aspirations that should underpin the detailed discussions about and requirements for the design of streets and public spaces that take place on a site-by-site basis. The aim is to integrate street design with the RECAP Guide so that there are adequate street widths and access arrangements to accommodate refuse / recycling vehicles so that suitably located waste / recycling collection points can be reached and serviced.

10.12 The Environment Services Team within Health and Environmental Services can provide further information and advice.

AIR QUALITY

10.13 Air pollution and poor air quality can have detrimental impacts on health and the amenity of users of land in terms of odour, dust and nuisance. Policy NE/16- Emissions within the Local Development Framework aims to improve air quality in the district and helps to implement the objectives of the Air Quality Action Plan (AQAP), relating to land use.

10.14 The District Council and the planning system has a key role in protecting people from unacceptable risks to their health and in providing an adequate protection to the amenity value of land. Low Emission Strategies and S106 agreements can act as a main instrument to minimise the impact of development on the local community and to ensure the developer carries out measures to provide benefit to the environment and community.

10.15 Part IV of the Environment Act 1995 sets out the system of local air quality management in which local authorities take the lead in the form of the National Air Quality Strategy (NAQS). The NAQS contains health based air quality objectives for common pollutants.

10.16 Under the above legislation, South Cambridge District Council is required to carry out periodic reviews of air quality in their area and to assess against the stated objectives. Where such objectives are unlikely to be met by the target year, local authorities are required to designate an Air Quality Management Area and consequently create and implement an Air Quality

Action Plan, which contains the measures required to reduce pollutant concentrations and lower emissions in order that the national objectives are met. This not only aids in the objectives for sustainable development, it also improves the quality of life for existing communities.

10.17 Air quality is a material planning consideration and clear links have been established between air quality and land-use planning with transport identified as the main source of pollutants in towns and cities. By guiding the location of new development and preventing or mitigating the exposure of sensitive receptors to poor air quality, reducing the need to travel and promoting smarter and cleaner transport choices by considering a Low Emission Strategy (LES), land use planning and design will form an important element of an integrated strategy to achieve the air quality standards and objectives.

10.18 Air pollution and climate change are intrinsically linked. Both arise from the emission of combustion processes to the atmosphere. Exhaust emissions including carbon dioxide, nitrogen dioxide and particulate matter, continue to increase from transport and transport is the main reason for the Air Quality Management Area (AQMA) declaration in South Cambridgeshire following a national trend for concentrations of nitrogen dioxide and particulate matter to breach health based standards. South Cambridgeshire's AQMA is located along a stretch of A14 to the North of Cambridge City and further information and a map of the AQMA can be viewed in Appendix 4B and via the following link: http://scambs-airquality.aeat.co.uk/index.php?action=chapter&f_page_id=7

10.19 Low Emissions Strategies (LES) provide a package of measures to help mitigate the transport impacts of development on local air quality and on climate change. The LES is secured through a series of planning conditions and legal obligations.

10.20 The LES will bring together the Council, the County Council, the Highways Agency and, through the improved use of S106 agreements, developers in working towards improving the local air quality and reducing emissions. In addition, it will help towards achieving the target within the new National Indicator NI194: Air quality – % reduction in NOx and primary PM10 emissions through local authority's estate and operations.

10.21 The South Cambridgeshire Local Development Framework contains Policy NE/16, relating to emissions and air quality. The policy reads:

1. Development proposals will need to have regard to any emissions arising from the proposed use and seek to minimise those emissions to control any risks arising and prevent any detriment to the local amenity by locating such development appropriately.

2. Where significant increases in emissions covered by nationally prescribed air quality objectives are proposed, the applicant will need to assess the impact on local air quality by undertaking an appropriate modeling exercise to show that the national objectives will still be achieved. Development will not be permitted where it would adversely affect air quality in an Air Quality Management Area.

10.22 When will air quality and emissions be considered?

- The Council will identify any developments that have the potential to contribute significant emissions to the local area.
- Any developments within or adjacent to an AQMA boundary.
- Proposals that will result in increased congestion, a change in traffic volumes – an AADT or peak traffic flow which increases by more than 5% for roads with more than 10,000 AADT.
- Proposals which change the traffic composition (i.e. increase the proportion of HGV's).
- Proposals that include car parking or the increase in provision for more than 300 spaces.
- Developments that could give rise to significant dust emissions in areas where people and/or commercial activities could be exposed.
- Pre-application discussions with the developer to exchange ideas and determine the extent of the LES and possible contributions towards air quality improvements using S.106 agreements.

10.23 What will the LES include?
The LES will include all proposals to mitigate the impact of emissions including transport emissions arising from the development. This could be travel to work plans, residential travel plans, priority parking for low emission vehicles or the infrastructure for recharging electric vehicles.

10.24 Emissions Impact Assessment
This will be an identification and quantification of all emission sources from the development.

10.25 Package of mitigation measures
This should be a full detailed explanation of the mitigation measures intended by the developer, also including a statement of intent for S.106 contributions if this is necessary. It will be linked to the Emissions Impact Assessment to show how reductions, using a variety of methods and technologies, will be achieved.

10.26 Applicants should be directed towards the following documents for help in achieving a low emission development:

- Low Emissions Strategies – using the planning system to reduce transport emissions - Good practice Guidance - January 2010, prepared by the Beacons Low Emission Strategies Group August 2009, available free to download at: http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/low-emissions-strategies-2010.pdf

- Air Quality – A Guide for Developers South Cambridgeshire District Council, 2009, available free to download at: (coming soon).

- Planning Policy Statement 23 (PPS23) Planning and Pollution Control, Defra, 2004, available free to download at: http://www.communities.gov.uk/publications/planningandbuilding/planningpolicystatement23

10.27 Further guidance is provided in Appendix 4:Air Quality.

NOISE

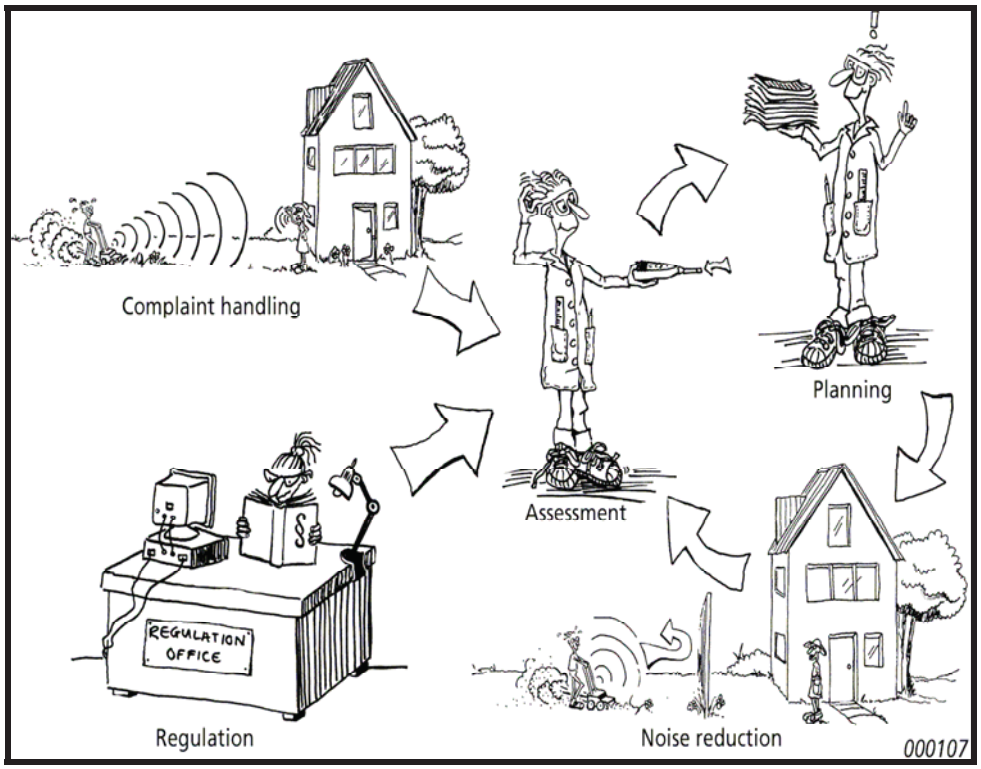
10.28 It is a fact of life that we all make noise, that is we all make "unwanted sound" in one form or another, often unintentionally. Noise is an unavoidable part of our lives. However, it can have an adverse effect on people's quality of life and there is emerging medical evidence that exposure to unwanted sound can affect our health and welfare.

10.29 In relation to noise control, prevention by preempting and avoiding or mitigating to an acceptable level, is better than cure. Protection against noise in the construction, design and layout of residential developments is essential to ensure that existing or future residents are not subjected to unacceptable levels of noise in their own homes or external amenity areas, part of sustainable development in terms of noise.

10.30 The likelihood of noise affecting future residents is a key factor in assessing the suitability of a site for residential use.

10.31 Planning Policy Guidance 24-Planning and Noise (PPG 24, 1994) guides Local Planning Authorities (LPAs) on the use of their powers to minimise the adverse effects of noise and outlines the considerations taken into account in determining planning applications both for noise-sensitive premises and for those, which generate noise. PPG 24 acknowledges that noise can have a significant effect on the environment and on the quality of life enjoyed by individuals and communities, so its consideration and control is an important part of sustainable development in providing a healthy and quality living environment and is integral to place making.

10.32 With higher densities, more mixed-use development, and more demand for late night activities, good acoustic design needs to be actively promoted if noise is not to become a threat to SCDC growth areas and quality of life. Environmental Health Officers and/or acousticians should be involved at an early stage.



Environmental Noise Protection and Planning for Good Design
Brüel&Kjær Sound&Vibration Measurement A/S

10.33 Noise can be a material consideration in the determination of planning applications and the planning system is tasked with guiding development to the most appropriate locations whilst advising on noise design issues.

10.34 The underlying principles of PPG24 advocate the use of the planning system to ensure that, wherever practicable:

- New noise-sensitive developments are separated from major sources of noise such as road, rail and air transport and certain types of industrial development having regard to both the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future.

  This includes the introduction of new noise sensitive development such as new residential dwellings, schools and hospitals into or locating near to an existing noisy environment, such as noise from road, rail traffic, aircraft, commercial / industrial and or agricultural related and existing building services plants or equipment.

- New development involving noisy activities that have the potential to generate noise should, if possible, be sited away from noise-sensitive land uses.

  Development that have the potential to generate noise are likely to be commercial / industrial and agricultural uses with associated process equipment and or building services plant of one description or another, usually air-conditioning / ventilation equipment. In addition, noise associated with vehicular movements to a development for example deliveries / collections or a significant increase in general traffic movements off site outside the development site can also have an impact on residents. Applications associated with pubs, clubs and places of entertainment are dealt in the attached appendix on other noise issue.

10.35 Planning balances various competing environmental, social and economic needs and where it is not possible to achieve separation of incompatible land uses, for example noise sensitive development from noisy activities, local planning authorities should consider whether it is practicable to control or reduce noise levels by careful urban design, or to mitigate the impact of noise, through the use of conditions or planning obligations. However, an inflexible approach would inhibit regeneration and development and place more pressure on green-field sites.

10.36 Solutions to acoustic problems can be technically complex and expensive and very expensive if considered retrospectively. In all but small developments or particularly quiet locations, it is likely that specialist advice will be required from acoustic consultants.

10.37 Delaying contact with such specialists until later in a project may result in avoidable additional costs being incurred at the design and construction stages.

10.38 Where it is unlikely that residents will be able to keep windows open or sit on/in a balcony / garden without being bothered by one or more external noise sources, such as traffic, industrial noise or customers of entertainment venues, noise will be a material planning consideration and will require careful consideration at the pre-application and design stage.

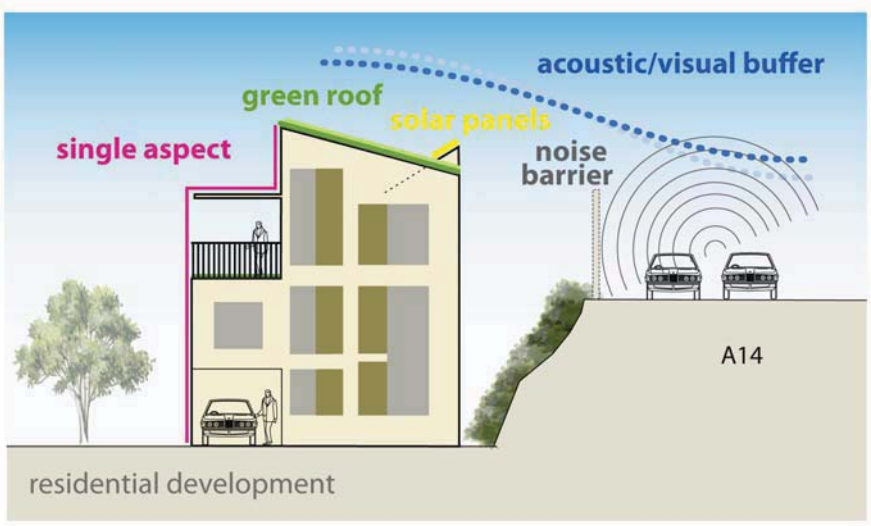
10.39 Mitigation of the effects of noise can be achieved by:

i. Control at the source (measures to reduce noise emissions at source such a quiet plant, noise insulating buildings, plant enclosures or quiet road surfaces and or noise barriers).

ii. Control of the transmission path (adequate distance separation, building location, form and orientation, screening / noise barriers).

iii. Control of noise at receiver (sound-conscious design: internal planning such as non habitable rooms providing a buffer, orientation of noise sensitive rooms and balconies and gardens way from noise by barrier dwelling blocks, single aspect courtyards schemes and staggered terraces, careful fenestration, noise insulation scheme for the building envelope of noise sensitive buildings and also buildings generating noise, reduced external amenity, acoustic ventilation).

iv. By controls over the operations that generate the noise (such as controls over the hours of operation, deliveries / collections).



Environmental Noise Mitigation Measures-Planning for Good Design

10.40 The applicant is encouraged consult the LPA at an early stage about the possible use of such measures and whether they are desirable or achievable, as this may enable the incorporation of such noise mitigation measures into the design of the proposal before it is formally submitted for determination, the concept of “Sound-conscious urban design”. Noise mitigation measures integrated into the overall design of the development should be first in a hierarchy of noise mitigation measures. The control of the noise at the receiver in terms of noise insulation of the building envelope shall be a last resort and the final line of defense against adverse external noise.

10.41 Further environmental noise guidance, LDF policies and standards are detailed in Appendix 6 - Noise, which should be followed for all residential development, in areas where internal or external noise is a determining factor and when noisy commercial / industrial type development is proposed.

ODOUR

10.42 Odour, dust or fumes from plant serving any planning applications for commercial, industrial and agricultural buildings should be considered in relation to nearby sensitive receptor development. When determining an application the Council may include a condition requiring the submission and approval in writing by the local planning authority of the location and type of such plant and details of any equipment for the purpose of extraction and/or filtration and/or abatement of fumes and or odours before the use of the plant commences.

10.43 It will be necessary to ensure adequate discharge and or abatement of odours to ensure odour nuisance and or malodours are not caused and to protect the amenity of neighbouring premises.

10.44 Extraction, filtration and odour / fume abatement systems must also be designed so that they do not have an unacceptable impact on visual amenity.

10.45 The installed systems must not appear as an incongruous feature in the street scene. To be acceptable the proposed extraction system will have to be:

- Located preferably to minimise its visual impact on the street scene;
- Of a colour, finish and design to blend in with the buildings to which it is attached, incorporating cladding where appropriate; and·
- Installed within the building where practicable and particularly where the proposal is within a conservation area or within the setting of a listed building.

10.46 If unacceptable smells and fumes cannot be prevented by means of an effective extraction or abatement system, or if ducting cannot be installed without significant detriment to visual amenity, planning permission will not normally be granted.

10.47 Odour can be a prevalent problem at low levels of concentrations and has the potential to impact on a wide area and affect amenity.

10.48 When there is the potential for odour and or fumes to be generated, SCDC may require the submission of a detailed odour assessment with a planning application, if it is felt that there will be serious detriment to the amenity of the area.

10.49 To satisfy the odour and or fume filtration / extraction condition, it is recommended that an effective and appropriate odour/fume extract system

be installed to ensure an odour nuisance is not caused to the occupiers of neighbouring premises. For example for food premises any system will need to deal with the two main phases of contaminants within cooking emissions: the particulate (grease, small food and smoke particles) and gaseous (odour vapour / volatile organic compounds).

10.50 Examples of systems available are as follows:

- An extract system running upwards, either internally or externally with the flue height terminating above roof ridge level to which it is attached by at least one metre. A minimum operating efflux velocity of 10 to 15 metres a second should be achieved. However, the effectiveness of this system is dependent on buildings nearby. If buildings nearby are likely to have an effect on the dispersion and dilution of odour, the flue height should be at least one metre above the ridge of that building.

- If an appropriate height cannot be achieved, a high efficiency odour abatement measure should be incorporated, such as:

    - grease filters with pre-filter particulate filtration (electrostatic precipitator or passive pre-filters) followed by activated carbon filters;

    - grease filters with pre-filter particulate filtration (electrostatic precipitator or passive pre-filters) followed by an odour neutralisation system;

    - a high dilution / high velocity system (HDHV) with a minimum operating efflux velocity of 10 to 15 metres a second.

10.51 This list is by no means exhaustive as there are other similar systems on the market. Each system has its own advantages and disadvantages in terms of cost, physical size, pressure loss, maintenance requirements, odour arrestment effectiveness and associated noise generation.

10.52 It is recommended that flue terminals such as rain cowls / caps do not impede the final discharge termination point.

10.53 Further advice regarding the control of odour from end uses, is contained in the following guidance documents:

- Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (January 2005- Product Code: PB 10527) produced by Department for Environment, Food and Rural Affairs (DEFRA).

- Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers, DEFA 2009

- Technical Guidance Note IPPC SRG 6.02 (Farming) "Odour Management at Intensive Livestock Installations", Environment Agency, Guide to Odour Management, May 2005

- Integrated Pollution Prevention and Control (IPPC), DRAFT Horizontal Guidance for Odour Part 2 – Assessment and Control, Technical Guidance Note IPPC H4: October 2002

- BS EN 13725:2003: Air quality. Determination of odour concentration by dynamic olfactometry

POTENTIAL CONTAMINATED LAND

10.54 The actual or possible presence of contamination is a material planning consideration. Persons submitting planning applications are expected to declare any knowledge they may have about potential land contamination. In many cases it will be an advantage to determine whether there are likely to be any contamination issues on site before submitting an application for planning consent. On large-scale developments it could form a part of a pre-application enquiry where any necessary investigations can be determined prior to submitting a planning application.

10.55 On any site where there is the potential for contamination to exist, or the proposed use would be particularly vulnerable to the presence of contamination i.e. residential, a contamination assessment, also known as a Phase 1 Desk Study Investigation, should be submitted as part of the application. An essential part of any Phase 1 Investigation is a site walkover to establish current land use as well as a review of historical land uses to identify potential sources and receptors. The Phase 1 Investigation should produce a 'Conceptual Site Model' and Preliminary Risk Assessment that characterises all plausible pollutant linkages. This will form the basis of any subsequent work undertaken as part of a Phase 2 Intrusive Investigation.

10.56 On review of the information submitted as part of the application, the Council may attach a condition to the application requiring a Phase 2 Intrusive Investigation of the site followed by, if necessary, remediation and validation. A Phase 2 Site Investigation should determine the nature, extent and severity of contamination by means of intrusive investigations. The Site Investigation Report should include borehole / trial pit logs, sample locations and copies of all laboratory analyses. It should provide an updated Conceptual Site Model and details of remedial options.

10.57 The site investigation procedure involves specialist technical knowledge and it is essential that competent and experienced professionals conduct all phases of the site investigation. Health and Environmental Services and

Development Control will work together to ensure that the application sites are appropriately investigated, managed and, if applicable, remediated. It is ultimately the developer's responsibility to ensure that the site is suitable for its proposed use.

10.58 The primary aims are to avoid or mitigate risks to human health and the environment to ensure that the proposed development will be suitable for use.

10.59 Further detailed guidance is provided in Appendix 5 to this document.

FOOD HEALTH AND SAFETY

10.60 Food safety and health and safety principles are traditionally not part of the formal planning process. This has led to some poor design of commercial premises design, which has required improvement once the workplace is operational. Early consultation with the Environmental Health should avoid the need for costly remedial work; the Service runs a monthly surgery where businesses can attend to discuss plans with an Environmental Health Officer. Surgeries are run on the last Thursday of each month.

10.61 The appropriate design and construction of premises and equipment help food businesses maintain and manage high standards of food safety. Regulations EC No 178/2002, 852/2004 and the Food Hygiene (England) Regulations 2006 require food premises to meet certain standards; covering layout, design, construction, equipment and facilities.

10.62 All persons managing commercial premises as a workplace have a general duty to ensure the health safety and welfare of employers, members of the public and persons affected by the business. Integral to this is design, choice of building fabric, organisation of the workplace and specification of workplace features such as flooring. Environmental Health Officers apply the Construction (Design & Management) Regulations 2007 in some developments for early, proactive intervention on design issues. Advice on this aspect can be sought by contacting Health & Environmental Services and raising your queries with an officer.

10.63 Further detailed guidance is provided in the Appendix 8 to this document.

LIGHT POLLUTION

10.64 In a predominantly rural environment such as South Cambridgeshire, the impact of lighting associated with development can have an adverse impact upon both the surrounding landscape and residents of surrounding properties. In certain circumstances lighting is critical in terms of public safety and security but in others, the amount of light emitted only serves to create a form of pollution either through windows of bedrooms. In such

cases, the District Council will seek to reduce the amount of pollution, particularly in the context of new development where lighting is required for the road system or security lighting for remote developments.

10.65 Therefore it is necessary to try to find a balance between the need for lighting and the negative implications associated with it. Lighting in itself may not need planning permission but the Council will use planning powers where appropriate to manage the effects of lighting to achieve the objective of this part of the SPD which is to reduce excessive, intrusive and unnecessary lighting in both rural and urban areas.

10.66 Problems of glare, (the uncomfortable brightness of a light source when viewed against a dark background), and light trespass, (the spilling of light beyond the boundary of the property on which the source is located), are other forms of light pollution. Such light pollution is a waste of electricity and therefore increases energy consumption and emissions.

10.67 Designers are advised to have regard to the type of location in designing lighting proposals and devising techniques for limiting light pollution and its impacts.

10.68 Policy NE/14 requires that development proposals which include external lighting should ensure that:

a. The proposed lighting scheme is the minimum required for reasons of public safety and security;

b. There is no light spillage above the horizontal;

c. There is no unacceptable adverse impact on neighbouring or nearby properties or on the surrounding countryside;

d. There is no dazzling or distraction to road users including cyclists, equestrians and pedestrians;

e. Road and footway lighting meets the District and County Councils' adopted standards.

10.69 Further guidance and policies are contained within Appendix 7.

LITTER AND DOG BINS

10.70 The provision of litterbins and dog bins is entirely functional but can have a considerable impact on the appearance of the street or location. SCDC has therefore adopted a standard design, colour and specification for all litter and dog bins. In future large developments consideration will be given to the provision of litterbins that facilitate recycling of segregated litter. The

assumption that the provision of litterbins will prevent littering is not always right. The provision of litterbins is not linked to resident or property numbers but the local land use, e.g. a parade of shops or the route from a school to the nearest sweet shop is likely to benefit from a litterbin rather than a normal residential street.

10.71 This council has also decided to provide and install all bins to ensure the appropriate standard and method of fixing. This provides better continuity of / and the service as control is lost once a developer has moved on.

10.72 Problems encountered:

- Poor design.
- Poor siting / location – obstructions, spoiling views etc.
- Embellishments drawing too much attention to bins.
- Servicing arrangements / problems.

Guidelines

10.73 The Environment Operations section of SCDC's Health And Environmental Service should be consulted at the earliest opportunity to seek advice and guidance regarding all proposals to provide litter and / or dog bins.

10.74 Provision of dog bins in areas adjacent to where children are allowed to play is not encouraged in order to minimise the risk to Toxocara Canis infection: a common worm infection in dogs. Infective stages of this parasite can be found in the environment - particularly in areas frequented by large numbers of dogs - kennels, public parks and exercise areas. Children can be infected by picking up the disease from the environment or from handling dogs.

10.75 All bins located on land other than public highway (as defined by the Highways Act, 1980) will not be emptied by SCDC unless the developer or landowner pays for this service. Consideration should therefore be given how the bins are serviced once provided.

Types

10.76 The Council's standard is the Glasdon Topsey twist-lock in dark green with the Council logo, stubber plate and fire retard for litter and the Glasdon 55 litre Retriever for dog waste.

DRAINAGE AND FLOODING-SCDC AWARDED WATERCOURSES

10.77 SCDC has adopted an integrated approach to water cycle management that aims to manage all of the components of the water cycle (rainwater, storm water, sewage, ground water, surface water and recycled water) to secure a range of social, economic and environmental benefits. Reference should

be made to the South Cambridgeshire Strategic Flood Risk Assessment 2005 (SCDC SFRA 2005). The Assessment provides a detailed and robust assessment of the extent and nature of the risk of flooding to specific growth areas within South Cambridgeshire and its implications for land use planning. It enables South Cambridgeshire to better meet the obligations created by Planning Policy Guidance Note 25: Development and Flood Risk. SCDC's SFRA 2005 can be downloaded from: http://www.scambs.gov.uk/Environment/Planning/DistrictPlanning/LocalDevelopmentFramework/Archive/FloodRisk.htm."

10.78 There is a policy commitment to minimising flood risk, managing surface water and achieving sustainable drainage principles in new and existing development whilst ensuring that the re-use and recycling of water is given priority. This approach is in line with Planning Policy Statement (PPS) 25: Development and Flood Risk (2006) that emphasises, "all forms of flooding and their impact on the natural and built environment are material considerations".

10.79 Notwithstanding PPS25 there are additional requirements that may fall on developers in connection with the South Cambridgeshire's Awarded Watercourses system. In addition to the warded drains / watercourses, it should be noted that the Environment Agency, Internal Drainage Boards and other landowners / bodies have responsibility for other watercourses. These will also need to be given careful consideration by developers in order to mitigate any potential adverse impact such as flooding".

10.80 The Council is responsible for the maintenance of approximately 280 km of awarded watercourses at a variety of locations within the SCDC area. The watercourses are controlled using the Land Drainage Act 1991 and the Council's Land Drainage Byelaws. Copies of the Byelaws and information on the location of the awards are available from the Council's Drainage Manager.

10.81 Any works in the vicinity of the award drains will require careful consideration and may require consent under the terms of the Byelaws. In particular, the Byelaws designate a 5-metre maintenance strip, along both sides of the awards, that must remain clear at all times. Additionally, any proposal to increase the rate of flow or volume in an awarded watercourse will require the prior consent of the Council. Developers should be aware that, under certain circumstances, a contribution to the cost of the award drain maintenance may be required by the Council.

10.82 SCDC's Drainage Manager in Health and Environmental Services can provide further information and advice on drainage and the impact on awarded watercourses.

HEALTH IMPACT ASSESSMENTS

10.83 Policy DP/1 Sustainable Development of the LDF requires a Sustainability Statement and a Health Impact Assessment for all major developments, to be submitted with the application demonstrating that the principles of sustainable development have been applied.

Health Impact Assessment – Policy Context and Purpose of HIA's

10.84 New communities and developments should be planned and designed at the beginning of the process to take full advantage of the opportunities to improve the health of local people and to reduce health inequalities.

Health Impact Assessment - Background

10.85 Spatial planning and development has the potential to impact on human health and wellbeing. This is because a wide range of social and environmental factors affects the health of local communities within South Cambridgeshire. These are known as the "Wider Determinants of health" and include:

- Individual lifestyle factors such as smoking habits, diet and physical activity.
- Interactions with friends, relatives and mutual support within a community.
- Wider influences on health including - living and working conditions, unemployment, water and sanitation, health care service, housing, food supplies, education, and the work environment.

10.86 Ensuring these issues are considered at the planning and design stage can improve both the physical and mental health of the population. Guidance expressed within this District Design Guide SPD can contribute to sustainable planning, good design and the development of community resources. These can encourage environments which: increase people's sense of safety and wellbeing, their opportunities for social interaction and community connectivity, improve air quality and water conservation and promote active travel and physical activity.

10.87 It is important to consider the effects of the wider determinants of health on not only the physical environment (e.g. air pollution, traffic patterns, housing stock) but also the social environment, which refers broadly to the social norms and values shared by members of social groups, as well as the quality, content, and volume of interpersonal interactions within urban and rural and between urban and rural communities. It is also known that these wider determinants are not distributed equally among populations (e.g. those people living in areas of deprivation tend to have poorer health

outcomes). By considering these effects and their distribution, development policies and plans can enhance the potential to influence health and wellbeing, and health inequalities.

Health Impact Assessment – Aims and Objectives

10.88 Health Impact Assessment should:

- Appraise the potential positive and negative health and well-being impacts of the proposed development on planned new communities and the adjacent existing communities in the development area.

- Highlight any potential differential distribution effects of health impacts among groups within the population by asking 'who is affected?' for the impacts identified.

- Suggest actions / mitigations that aim to minimise any potential negative health impacts and maximise potential positive health impacts, referencing where possible the most affected vulnerable groups.

Building Healthy Communities

10.89 In addition to Health Impact Assessments, which look at the impacts the development will/may have on health, it is also important to examine in detail how the proposed development is going to ensure that the new community is a vibrant and healthy one. Building new houses and shops does not build communities. Infrastructure within new communities will need to be more than the roads connecting the built environment; it has to include the social infrastructure as well. The social infrastructure will include, but is not limited to, the opportunities to meet neighbours, to get information and to take part in running the local organisations and councils.

10.90 To assist in the preparation of a Health Impact Assessment, further guidance will be provided in an additional Supplementary Planning Document to be published in 2010.

CHAPTER 11

NATIONAL LEGISLATION AND STANDARDS

BUILDING REGULATIONS

11.1 Building Regulations were originally created to ensure the health and safety of people in and around buildings and more recently to provide accessible and thermally efficient buildings.

11.2 South Cambridgeshire District Council's Building Control section provides advice and guidance on Building Regulations and works closely with the Council's own Planning, Design and Conservation sections wherever there is an impact on design and the historic environment. The applicants and Building Control consultants who are not currently part of the Council's own Building Control team are encouraged to work with the Council at an early stage to identify any issues, provide a flexible and informed design that protects the interests of the context and to ensure that the works comply with Council standards.

11.3 Those works that affect buildings in a Conservation Area or buildings identified as being of architectural and historical interest would need to be discussed with the Conservation Section. Early consultation is encouraged in order to identify if any element is unacceptable and to negotiate any alternatives in conjunction with the Building Control section. English Heritage's guidance, Building Regulations and Historic Buildings, 2004 provides advice for work to any buildings of Historic interest.

11.4 The Council's Listed Buildings and Conservation Areas SPDs, together with Appendix 9, provide specific guidance for the application of Building Regulations to work with historic buildings.

11.5 The Dorset Model is an accepted alternative method of compliance for Part B for thatched roofs but needs additional consultation with the Fire Authority and neighbours.

DISABILITY DISCRIMINATION ACT

11.6 The Disability Discrimination Act (DDA) was introduced in 1995 and updated in 2005. It aims to allow equal access to services for all. The Act requires the provision to be reasonable, and the level of reasonable accessibility will therefore vary according to the limits of the specific building and the uses involved.

11.7 For new buildings, commercial buildings and buildings open to the public, it is expected that at least primary functions are accessible to all. Where the most accessible option is potentially damaging to a Listed building, other

provision such as alternative facilities and a Management Plan may be reasonable.

11.8 Part M of the Building Regulations provides practical guidelines for the implementation of elements of the DDA. Access Audits / Statements and Management Plans are encouraged for any works that form part of Part M or the DDA. British Standard 8300 provides additional guidance on the requirements.

11.9 English Heritage's guidance, Easy Access to Historic Buildings, 1999 provides advice for application of the DDA to any buildings of Historic interest.

11.10 Access Audits / Statements and Management Plans are encouraged for any works that form part of Part M or the DDA. British Standard 8300 provides additional guidance on the requirements under Part M.

Disabled access ramp and steps introduced into a tight site at the Michaelhouse Centre, Cambridge.

LIFETIME HOMES

11.11 Policy HG/2 in the Development Control Policies DPD requires a proportion of new dwellings to be designed to incorporate the Joseph Rowntree Foundation's Lifetime Homes standards. The 16 features designed to make homes more flexible and accessible are (see www.jrf.org.uk):

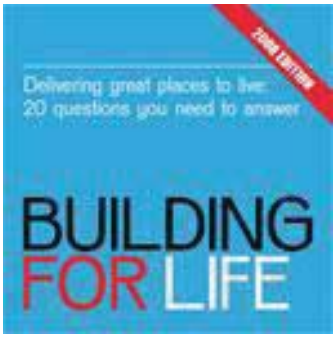
1. Where car parking is adjacent to the home, it should be capable of enlargement to attain 3.3 metres width.
2. The distance from the car-parking space to the home should be kept to a minimum and should be level or gently sloping.
3. The approach to all entrances should be level or gently sloping.
4. All entrances should be illuminated and have level access over the threshold, and the main entrance should be covered.
5. Where homes are reached by a lift, it should be wheelchair accessible.
6. The width of the doorways and hallways should accord with the Access Committee for England's standards.
7. There should be space for the turning of wheelchairs in kitchens, dining areas and sitting rooms and adequate circulation space for wheelchair users elsewhere.
8. The sitting room (or family room) should be at entrance level.
9. In houses of two or more storeys, there should be space on the ground floor that could be used as a convenient bed space.
10. There should be a downstairs toilet that should be wheelchair accessible, with drainage and service provision enabling a shower to be fitted at any time.
11. Walls in bathrooms and toilets should be capable of taking adaptations such as handrails.
12. The design should incorporate provision for a future stairlift and a suitably identified space for potential installation of a house lift (through-the-floor lift) from the ground floor to the first floor, for example to a bedroom next to the bathroom.
13. The bath/bedroom ceiling should be strong enough, or capable of being made strong enough, to support a hoist at a later date. Within the bath/bedroom wall provision should be made for a future floor to ceiling door, to connect the two rooms by a hoist.
14. The bathroom layout should be designed to incorporate ease of access, probably form a side approach, to the bath and WC. The washbasins should also be accessible.
15. Living room window glazing should begin at 800mm or lower, and window should be easy to open/operate.
16. Switches, sockets and service controls should be at a height usable by all (i.e. sockets 450 – 600mm, switches, door handles and thermostats 900 – 1200mm).

11.12 In addition to these items, the design and layout of new housing should also make provision for the secure storage of bicycles and discrete space for wheelie bins / waste / recycling receptacles in accordance with the RECAP Waste Management Design Guide. Further information on the provision wheelie bins and or waste / recycling provision is provided in Chapter 10 - Environmental Health - Waste / Refuse and Recycling-Operational.

BUILDING FOR LIFE

11.13 The Council encourages new residential developments of 10 units or more to achieve a minimum 'silver standard' under the CABE Building For Life scheme. The standard provides a means of assessing the design quality of new developments. Building for Life assessments will be scored out of 20, with scores categorised as:

- Very good - 16 points or more
- Good - 14-15 points
- Average - 10-14 points
- Poor - 10 points or less

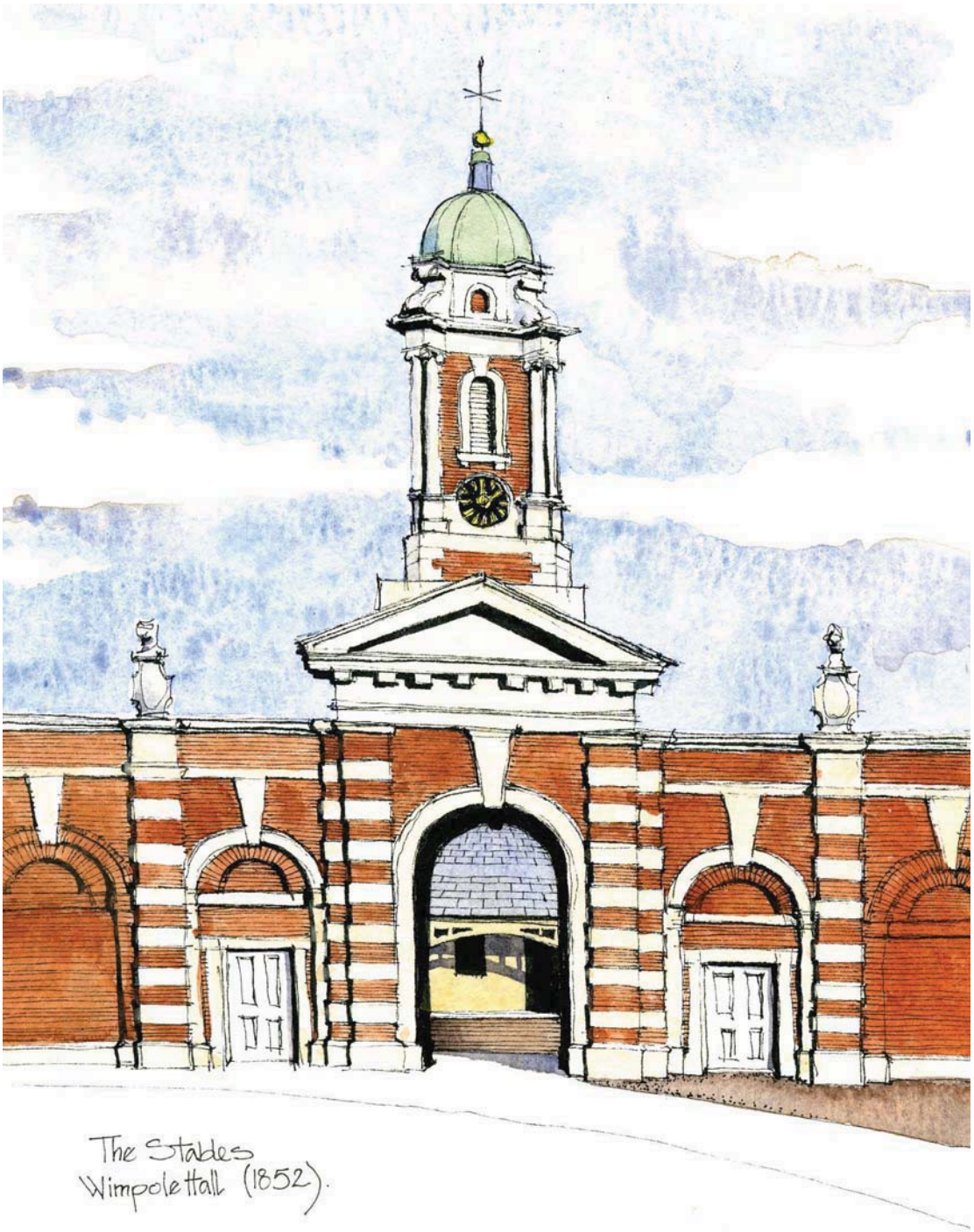


11.14 Results of the Building for Life Assessments will be reported on as part of the Councils Annual Monitoring Report. The assessment is required for Indicator H6: Housing Quality which records the number and proportion of total new build completions on housing sites reaching very good, good, average and poor ratings against the Building for Life Criteria.

11.15 The criteria provides a valuable framework to help planners assess the quality of a proposed development and have been set to embody what housing developments should be: functional, attractive and sustainable. Developers should be aware that their application will be assessed against the Building for Life criteria and so are encouraged to submit evidence of how the proposed scheme meets each of the design criteria as part of their planning application. This could be included within the Design and Access Statement, which will often be the first place assessors will look when undertaking the assessment. The Council expects the developers to use the Building for Life criteria (see http://www.buildingforlife.org/about) as the basis for development briefs to help speed up planning approvals and win local community support.

PART III

PROCEDURES AND APPLICATIONS



CHAPTER 12

DESIGN DOCUMENTATION

INTRODUCTION

12.1 In order to fully understand development proposals, brought forward for consideration, and to enable the Council to fully engage with developers and their architects, the Council wishes to see how the design has been influenced at all stages of the design process. To assist this it will be of great assistance to have sight of options that have been dismissed.

12.2 The following is an indicative list of the design stages and the documentation the Council wish to see evidence of.

SITE SURVEY

12.3 The site survey is a factual exercise, compiling information about the site and its context. During later discussions it may be necessary to make reference to this information to establish matters of fact, therefore this should be available for reference.

SITE APPRAISAL

12.4 Prior to any design work being undertaken, it is essential that the site in its context is fully understood. This is where the development proposals should be thoroughly assessed against all the facts from the survey, which should result in the clear identification of the constraints that result from existing features or previous use etc. together with the opportunities the site offers. A result of the appraisal process should be the identification as to how a development will be integrated into the existing communities, townscape, landscape and movement patterns.

12.5 The site appraisal should also acknowledge the Government's policy of promoting the re-use of brownfield sites over greenfield development.

12.6 The following checklist identifies areas of research that should be completed before design work commences. Evidence of this research should be summarised in design and planning statements accompanying a planning application. This list should not be considered as the definitive list of matters to be considered.

Table 12.1: Site Appraisal Checklist

Issue	Possible research required	Reason
Planning background	• Identify relevant Development Plan allocations and policies	To understand the Council's broad approach to the area / topic / site.
	• Identify other planning constraints (presence of listed buildings/ conservation areas and preserved trees etc)	To help determine the significance of site features.
	• Identify relevant planning guidance affecting the site (e.g., planning briefs, village design statements and planning obligations SPD)	To appreciate how the Council wishes to see a site developed and understand how development of the site could fit into a wider planned context.
	• Identify any live planning permissions on the site or in the immediate locality	To determine whether something similar has been tried before.
Relationship of the site to surroundings	Facilities, connection routes, morphology, architecture, etc. Townscape and landscape.	To understand the context of the site.
Accessibility	• Identify train stations, bus services, cycle, footpath and road networks in vicinity of site, together with potential access points	To determine how well connected site is and scope for improved connections.
	• Identify proximity to local facilities.	To determine how well connected site it – this will inform the form / intensity of development that is appropriate.
	• Rights of way	To establish who has access over the land, when and for what purpose, together with the implications for the design.

Existing buildings, features and uses	• Visual inspection/planning history search	To identify important buildings and uses.
	• Historic buildings analysis in respect of any buildings of regional, national or local importance	To establish how to ensure compatibility between new and existing uses.
	• Historic analysis in respect of any structure to be demolished within a Conservation Area	To establish the relative significance of buildings and scope issues for future consideration.
	• Historic Parks and Gardens	To establish the relative significance of the landscape for future consideration.
	• Buildings and structures, both historic and recent.	The analysis should include an assessment of condition and value.
	• Services (both above and below ground, together with related ancillary structures such as substations).	To establish where existing facilities are located, their suitability for future use and their impact on the design if they have to remain in situ.
The property market	• Contact with local agents.	To determine the ability of an area to support non-residential uses. To guide the type of accommodation provided.
Topography	• Views • Levels survey • Orientation	To inform design process. Identify relationship to sun path, exposure to prevailing wind etc.
Landscape features	• Refer to Landscape Character study.	To determine significance of landscape character.
	• Identify natural and man-made features and landscape – field patterns (which may be ancient and include 'ridge and furrow' patterning), trees and hedgerows, other landscape features, water-bodies and watercourses.	The analysis should include a tree report with an assessment of condition and potential for wildlife habitat. The analysis should include the contribution of water-bodies to drainage/flood prevention and ecological value.

Biodiversity (wildlife conservation)	• Pre-application discussion with respect to the level of biodiversity information to support an application • Refer to Biodiversity SPD Undertake desktop study using Cambridgeshire and Peterborough Biological Records Centres www.cpbrc.org.uk and Natural England's www.natureonthemap.org.uk Protected Species awareness www.naturalengland.org.uk Undertake Survey and Assessment. • Arboricultural survey in accordance with BS 5837:2005	Some development types may not require biodiversity information, others may be more complex Detailed guidance on species, sites and the necessary information to support planning applications. Enables applicant to gain site information. Need to understand the likelihood of Protected Species being present on site. Provides biodiversity information to enable the LPA to assess level of likely impact.To determine the significance and amenity value of trees on and near the site. To determine the significance and amenity value of trees on and near the site. To determine the presence of protected species and levels of biodiversity, to help devise mitigation strategies and enhancement measures.

Geology and ground conditions	• Desktop study	To understand the nature of historic and adjoining uses that may lead to contamination. To identify geology and soils to inform foundation design and direct the selection of plant species for landscape works.
	• Intrusive investigations for potential contaminated land.	To identify the specific nature and degree of any potential contamination and the steps / measures required to ensure development is suitable for proposed end use.
Risk of flooding	• Identify watercourses, drainage ditches, lakes, ponds and drains.	Identify potential sources of flooding.
	• Check Environment Agency flood maps (available on their web site at www.environment-agency.gov.uk). Undertake flood risk assessment for both the site and the risks/implications downstream. • Check the Council's Strategic Flood Risk Assessment • Check with the Council's Drainage Manager • Check with the Inland Drainage Board • Check with landowners	To determine flood risk and whether a Flood Risk Assessment is required. To establish whether the principle of development is acceptable and determine what special measures may be required to enable development.
	Pollution	To identify the extent of any quality issue and determine design implications and considerations.

Archaeology	• Scheduled Ancient Monuments • Desktop study • Intrusive investigations.	To identify specific features associated with the site. To determine the likelihood of items of interest or features of significance being damaged or destroyed during the course of development . To determine the specific nature of deposits to enable a strategy for dealing with the archaeology to be devised.
Noise	• Site visit, enquiry to SCDC • Noise pollution testing Noise measurement / assessment Noise Predictive Modelling	To identify significant noise generators or noise sensitive uses in the locality. To determine how likely the site is to be affected by noise, and what measures are required to make particular use combinations or types of development work and deliver a suitable noise environment (see PPG24), (including flight paths). Noisy development impact.
Air quality	• Site visit/enquiry to SCDC Council • Pollution testing Air Quality Monitoring Detailed Air Quality / Emission Monitoring	To determine the whether air quality is an issue ie locating sensitive receptors in an air quality management area and whether the area is an air quality management area. To identify the extent of any air quality issue and determine design implications and considerations.
Utilities	•Letters to utilities asking form information on the presence of equipment, capability of their systems to accommodate new development.	To identify work required to enable development and establish hidden costs may be involved in developing the site.

Health	• Contact local Primary Care Trust & Public Health Specialist at SCDC • Health impact assessment. Building Healthy Communities	To identify the scope of any issue with capacity at local surgeries. To determine the impact of new development on existing health facilities and identify appropriate measures to offset impact.
Education	• Contact Cambridgeshire County Council Schools Service	To determine whether there are capacity issues at local schools that need to be addressed through planning obligations relating to new development.
Energy Survey	• Renewable energy options	To identify scope for onsite renewable energy generation including determining an optimal layout and orientation to maximise benefit from solar gain.
Party Wall Act.	Development in close proximity to, or abutting, existing property fabric is subject to the requirements of the Party Wall etc Act.	This sets out duties in respect of notifying and procedures, and includes facade retention, structural demolitions, temporary works and surveys to minimise adverse impacts. Advice must be sought from a professional structural engineer and/or surveyor where appropriate. Although this is not a planning matter consideration should be given to it to prevent future problems.

12.7 The information gathered through the site analysis should be graphically summarised in the form of a Site Appraisal Diagram, which should then be included as part of any subsequent planning application (thereby enabling the Council to fully understand those aspects that may have influenced the design).

12.8 The output from this analysis should be summarised into a Site Appraisal drawing that should pull together the principal constraints and opportunities in a graphical form. It is anticipated that this site appraisal will form part of any subsequent planning application, helping those assessing the application to understand the thought process that was behind the design.

DESIGN CONCEPT

12.9 At the outset of the design process it should be made clear to the Council what the intended design concept is, and how following the site analysis it is appropriate for the development and the site context. The concept should clearly identify the underlying ethos of the scheme in relation to the social, commercial and/or educational purpose, the visual and aesthetic intent and imagery, the environmental performance, etc. A clear design concept will ensure that all subsequent stages of the design process are undertaken in the context of clear direction to ensure the correct decisions are taken to achieve a particular end.

CONCEPT DIAGRAMS

12.10 A concept diagram illustrates how the key principles of the design concept will be applied to the site in the context of the site appraisal, indicating how the development proposal responds to the constraints and opportunities presented by the site and its surroundings.

PARAMETER PLANS

12.11 The design principles should be plotted to produce parameter plans that establish the key structuring principles of the development. These should include the movement network and hierarchy, development areas, open space areas, frontages, building heights, etc.

MASTERPLANS

12.12 On large-scale sites a masterplan will be needed to complete the overall structuring of the development proposals. Larger scale development sites are likely to be realised in a number of phases, often with different developers preparing detailed proposals for adjacent phases. It is essential that the overall masterplan for the development clearly identifies through routes, pedestrian and cycle ways, structural landscape areas and the like that may need to be continued from one developer's site onto an adjacent site. The site specific proposals prepared by the separate developers will then be expected to acknowledge these common aspects, and to incorporate them into their individual proposals in a positive manner.

12.13 The Commission for Architecture and the Built Environment (CABE) has been tasked by the Government to ensure that significant projects within the Sustainable Communities Plan (which include developments such as Northstowe) are well designed and based on proper masterplanning. The Department for Communities therefore agreed that CABE should become a non-statutory consultee for such projects and CABE encourages developers and local authorities to seek their advice at an early stage in the

development of these projects. Initial contact with CABE should be via the Design Review Programme Officer at CABE.

DESIGN AND ACCESS STATEMENTS

12.14 Planning and Listed Building applications must be accompanied by a Design and Access Statement. Section 327A of the Town & Country Planning Act 1990 specifies that applications not accompanied by a Design and Access Statement shall not be "entertained". This means that they cannot be registered as valid applications.

12.15 Design and Access Statements are not required with planning applications for changes of use (not involving operational development), householder applications outside a Conservation Area, advertisements, reserved matters, engineering or mining operations, and tree works.

12.16 A Design and Access statement is required with Listed Building applications, although the Access statement can be omitted for applications only involving internal works.

12.17 A statement covering design concepts and principles and access issues must now be submitted with an application for planning permission and listed building consent. The key facts are:

- A Design and Access Statement is required for all Planning Applications (outline or full).
- South Cambridgeshire District Council is precluded from entertaining an application unless it is accompanied by a Design statement and an Access statement, where required.
- One statement should cover both design and access, allowing applicants to demonstrate an integrated approach that will deliver inclusive design, and address a full range of access requirements throughout the design process.
- A Design and Access statement is a concise report accompanying and supporting a planning application to illustrate the process that has led to the development proposal, and to explain and justify the proposal in a structured way.
- Design and Access statements must not be used as a substitute for drawings and other material required to be submitted for determination as part of the planning application itself. They provide an opportunity for developers and designers to demonstrate their commitment to achieving good design and ensuring accessibility in the work they

undertake, and allow them to show how they are meeting, or will meet the various obligations placed on them by legislation and policy.

- The level of detail required in a design and access statement will depend on the scale and complexity of the application, and the length of the statement will vary accordingly. Statements must be proportionate to the complexity of the application, but need not be long.

- For local planning authorities, Design and Access statements will enable them to better understand the analysis that has underpinned the design and how it has led to the development of the scheme. This will help negotiations and decision-making and lead to an improvement in the quality, sustainability and inclusiveness of the development.

- Design and Access statements will allow local communities, access groups, amenity groups and other stakeholders to involve themselves more directly in the planning process without needing to interpret plans that can be technical and confusing. This will help to increase certainty for people affected by development and improve trust between communities, developers and planners. It will also enable the design rationale for the proposal to be more transparent to stakeholders and the local planning authority.

What is required in a Design & Access Statement?

12.18 A design and Access Statement should include (as required by Circular 01/06):

- A contextual appraisal of the site.

- A Statement explaining the design principles in terms of amount, layout, scale, landscaping and appearance.

- A Statement explaining access in terms of how access for all will be achieved to building entrances and in terms of movement and circulation around the site, and also access and provision for emergency and waste vehicles.

- A rationale of how the proposed design reflects the local, regional and national policies.

12.19 For detailed information go to Section 3 of DCLG Circular 01/2006, the Cabe Design and Access guidance document and the Cambridgeshire Design Guide for Streets & Public Realm (Cambridge Horizons 2007), which complements the Government's Manual for Streets.

LANDSCAPE DESIGN

12.20 This should be read in the context of the Council's Landscape in New Developments SPD, where full details of the documentation required are set out. For small schemes information could be included in drawings, but most large schemes will include a series of drawings with supporting written information.

12.21 Information required will typically include:

- Survey and appraisal.
- Landform.
- Details of utilities.
- Significant landscape features; including significant trees, hedgerows, or other areas of significant vegetation (for further information see the Trees and Development Sites SPD).
- Visual qualities context.
- Special designations e.g. SSSIs.

LANDSCAPE DESIGN DETAILS

12.22 Design proposals will typically include:

- Treatment to site boundaries.
- Access and circulation.
- Areas of hard and soft landscaping.
- Significant features such as landscape structures or public art.
- Consideration of sustainability including haul roads.
- Details of proposed management.

12.23 Design proposals will include:

- Plant lists with details of species.
- Specifications for hard surfaces, walls, railings and other hard materials.
- Details of biodiversity enhancement.
- Informal and formal open space, including sports provision.
- Public access and rights of way.

HERITAGE STATEMENTS

12.24 Heritage statements are required for non-householder Planning Applications within or adjoining Conservation Areas, adjoining Listed Buildings, or impacting on other Heritage assets. The level of information required will vary dependant upon the complexity of the scheme, but should contain a brief history of the development site, including a planning history and maps, and an assessment of the significance of the building and impact of the proposals. The Heritage statement should be submitted separately to the Design and Access statement and it is recommended that the

information for the Heritage statement is obtained at an early stage in order to inform the design. For further information the Council's "Guidance for the Production of Heritage Statements" should be consulted and is on the Council's website.

CONSERVATION STATEMENTS AND CONSERVATION PLANS

12.25 Listed Buildings, and in particular those listed at Grade I and II*, should have more detailed Conservation Statements in the form of Conservation Plans. These Conservation Plans will help ensure the future well-being of these important structures, and will also include an assessment of significance. A Conservation Plan should be an A4 document illustrated with drawings and photographs arranged under the following headings, though this may need to be adapted to suit individual heritage assets:

- Summary
  A brief single page statement summarising the main conclusions of the plan.

- Background
  Authorship and circumstances of the plan, its scope and any limitations of the study, a note of all consultations undertaken and a statement concerning the adoption of the plan by all the major stakeholders in the Listed Building concerned.

- Understanding the asset
  An analysis of the site that draws together documentary and physical evidence, and is illustrated with images, maps and phasing plans.

- Assessment of significance
  An assessment of the significance of the asset both generally and in detail for each of its main components, making value judgments about the degree of historical, biological, wildlife, geological, cultural, aesthetic, archaeological, social and other types of significance.

- Defining Issues (i.e. vulnerability)
  Details of the issues that have affected the significance of the site in the past affect it now or may do so in the future.

- Conservation Policies
  Puts forward policies for the conservation of all aspects of the significance of the asset, which show how: its significance will be retained, defines a conservation philosophy, prioritises repairs and, where relevant, identifies appropriate new uses.

- Implementation and review
  Identifies a strategy for implementing the Conservation Plan and sets out who will review the Plan and when.

- Appendices
  To contain detailed information that is summarised elsewhere within the document.

SUSTAINABILITY, WATER CONSERVATION AND RECYCLING STATEMENTS

12.26 Major development' (residential development of 20 or more dwellings or 0.5ha. and other development of 1,000m^2 or site area of 1ha. or more) applications require the submission of a Sustainability Statement and a Health Impact Assessment to demonstrate how the sustainability criteria have been fulfilled, in accordance with Policy DP/1 in the Development Control Policies DPD.

12.27 They also require a Water Conservation Strategy and a Resource Re-use and Recycling Scheme.

12.28 All planning applications should be accompanied by a completed RECAP Waste Management Design Guide ToolKit to allow the effective evaluation of the waste management requirements for a development. Further information on the RECAP Guide is provided in Chapter 10 - Environmental Health - Waste / Refuse and Recycling - Operational.

12.29 SCDC local requirements require the submission of noise information if it is considered a determining factor. It is not always obvious when and what level of noise information is required and government guidance recommends that the local planning authority should not require a level of detail to be provided that is unreasonable or disproportionate to the scale of the application. To ensure a smooth passage through the planning system, even when a full environmental assessment is not mandatory, proposals for developments on noisy sites, or sites which generate noise should take account of noise. Further information on the requirements is contained in Appendix 6 Noise.

12.30 This list is not exhaustive – refer to the 1App standard application form for local requirements.

APPENDIX 1

CONTACT DETAILS AND USEFUL ADDRESS

Conservation Team
TEL: 03450 455 216

Health and Environmental Services
TEL: 03450 450 063

Strategic Sustainability Officer
TEL: 03450 455 216

Urban Design Team
TEL: 03450 455 216

Planning Policy Team
TEL: 03450 450 500

South Cambridgeshire District Council
South Cambridgeshire Hall
Cambourne Business Park
Cambourne
Cambridgeshire
CB23 6EA

Tel: 03450 450 500
Website: www.scambs.gov.uk

URBAN DESIGN

Cambridgeshire County Council, Environment Services,
Castle Court, Shire Hall, Cambridge, CB3 0AP. Tel: 01223 717111

Commission for Architecture and the Built Environment (CABE),
1 Kemble Street, London, WC2B 4AN. Tel 020 7070 6700
www.cabe.org.uk

Royal Institute of British Architects, 66 Portland Place, London W1B 1AD
Tel: 020 7580 5533

Royal Institution of Chartered Surveyors, RICS Contact Centre,
Surveyor Court, Westwood Way, Coventry, CV4 8JE. Tel: 0870 3331600

Royal Town Planning Institute, 41 Botolph Lane, London, EC3R 8DL.
Tel: 020 7636 9107

CONSERVATION AND LANDSCAPE

Bat Conservation Trust, 15 Cloister House, 8 Battersea Park Road, London, SW8 4BG. Tel: 0207 627 2629
www.bats.org.uk

Cambridgeshire Biodiversity Partnership Co-ordinator, Cambridgeshire County Council, Castle Court, Shire Hall, Castle Hill, Cambridgeshire, CB3 OAP
Tel: 01223 717111
www.cambridgeshire.gov.uk

Natural England, Eastbrook, Shaftesbury Road, Cambridge, CB2 8DR
Tel: 01223 462727
www.naturalengland.org.uk

Environment Agency, Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE. Tel: 01480 414581

Landscape Institute, 33 Great Portland Street, London W1W 8QG.
Tel: 020 7299 4500

English Heritage www.english-heritage.org.uk

Institute for Historic Building Conservation www.ihbc.org.uk

Images of England www.imagesofengland.co.uk

Heritage Gateway www.heritagegateway.org.uk

Historic Scotland www.historic-scotland.gov.uk

Pevsner Architectural Guides www.lookingatbuildings.org.uk

Royal Institute of British Architects www.riba.org

Society for the Protection of Ancient Buildings www.spab.org.uk

Vision of Britain www.visionofbritain.org.uk

Disability Discrimination Act
www.direct.gov.uk/en/DisabledPeople/RightsAndObligations

Disability Discrimination Act www.opsi.gov.uk/acts/acts1995
Church of England, Church care www.churchcare.co.uk

Energy Saving Trust www.energysavingtrust.org.uk

Historic Environment Local Management www.helm.org.uk

Royal Institute of Chartered Surveyors www.rics.org.uk

English Heritage and climate change www.climatechangeandyourhome.org.uk

Funds for historic buildings www.ffhb.org.uk

Architectural Heritage Fund www.ahfund.org.uk

Georgian Group www.georgiangroup.org.uk

Victorian Society www.victoriansociety.org.uk

Garden History Society www.gardenhistorysociety.org

20th Century Society www.c20society.org.uk

Ancient Monuments Society www.ancientmonumentssociety.org.uk

Council for British Archaeology www.britarch.ac.uk

Maintain our Heritage www.maintainourheritage.co.uk

Maintain your building www.maintainyourbuilding.org.uk

Thatching Association www.thatch.org

East Anglia Master Thatchers www.eamta.co.uk

ARCHAEOLOGY

Cambridgeshire County Council, Historic Environment Team, Box No: ELH 1108,
Castle Court, Shire Hall, Cambridge, CB3 0AP. Tel: 01223 717312

CRIME AND SAFETY

Cambridgeshire Constabulary (Architectural Liaison Officer),
Whittlesey Police Station, 8 Queen Streeet, Whittlesey, Cambridgeshire,
PE7 1AY. Tel: 01345 606518

ACCESS

The Equality and Human Rights Commission
Helpline: 0845 604 6610
http://www.equalityhumanrights.com

National Register of Access Consultants
Tel: 020 7735 7845
www.nrac.org.uk

ENVIRONMENTAL HEALTH (in addition see specific Env Health sections)

The British Standards Institution (BSI) www.bsi-global.com

The Chartered Institution of Building Services Engineers (CIBSE) www.cibse.org

The International Commission on Illumination (CIE) www.cie.co.at

The Department for Transport (DFT) www.dft.gov.uk

The European Committee for Standardisation www.cenorm.be

The Institute of Lighting Engineers (ILE) www.ile.org.uk

APPENDIX 2

REFERENCES AND FURTHER READING

SOUTH CAMBRIDGESHIRE DISTRICT COUNCIL

Core Strategy Development Plan Document (DPD)
Development Control Policies DPD
Cambridge East Area Action Plan (AAP)
Cambridge Southern Fringe AAP
Northstowe AAP
North West Cambridge AAP

Affordable Housing Supplementary Planning Document (SPD)
Biodiversity SPD
Conservation Areas SPD
Landscape in New Developments
Listed Buildings: works to or affecting the setting of SPD
Open Space in New Developments SPD
Public Art SPD
Trees SPD

PLANNNG

Planning Portal www.planningportal.gov.uk

Planning (Listed Buildings and Conservation Areas) Act 1990 www.opsi.gov.uk

Planning Policy Guidance notes 15 and 16 www.communities.gov.uk

Planning (Listed Buildings and Conservation Areas) Act 1990
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URBAN DESIGN

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http://www.communities.gov.uk/publications/planningandbuilding/environmentalimpactassessment

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http://www.urbandesigncompendium.co.uk/

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http://www.standardsforhighways.co.uk/dmrb/index.htm

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National Playing Fields Association (2001), The Six Acre Standard

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ENVIRONMENTAL HEALTH (in addition see specific Env Health sections)

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BS EN 13201 (2003) Road Lighting – Part 2: Performance Requirements

Light Pollution Leaflet, Environmental Protection UK downloadable from http://www.environmental-protection.org.uk/assets/library/documents/Light_Pollution_booklet_Jan08.pdf

DEFRA Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (January 2005- Product Code: PB 10527) www.westminster.gov.uk/.../odour_control_kitchens-1244026659.pdf

BUILDING REGULATIONS

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Cambridge City Council (2009) Sustainable Drainage Systems: Design and Adoption Guide

Department of Energy and Climate Change (2009) UK Low Carbon Transition Plan http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx

Department for Business Enterprise & Regulatory Reform (2009) UK Renewable Energy Strategy http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx

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Cambridge City Council (2007) Sustainable Design and Construction: Supplementary Planning Document
http://www.cambridge.gov.uk/ccm/content/policy-and-projects/sustainable-design-and-construction-supplementary-planning-document.en;jsessionid=68B03ED9284E4C37DF5B7D1081E3C342

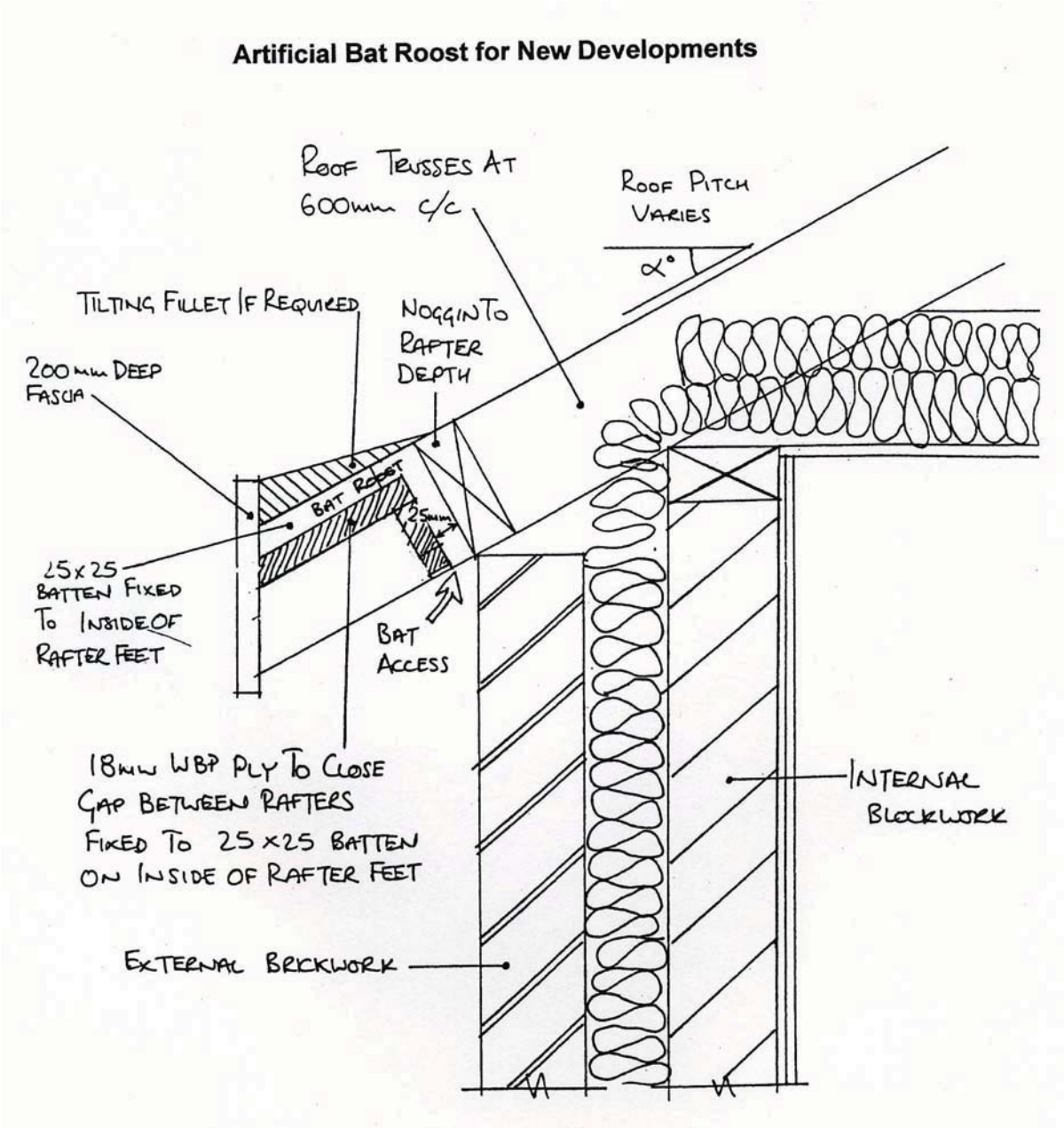
APPENDIX 3

BIODIVERSITY GUIDANCE

	Statutory Protection	Classification Examples	Key Legislation and Guidance
Sites	It is a requirement to consult with Natural England before undertaking any operation potentially leading to damage of a protected site.	Special Areas of Conservation (SAC) (Eversden and Wimpole Woods) Special Protection Areas (SPA) (Cam Washes) Site of Special Scientific Interest (SSSI) (37 sites)	Council Directive (92/42/EEC) on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), 1992. Wildlife and Countryside Act, 1981 (as amended) Natural Environment and Rural Communities Act, 2006 Planning Policy Statement 9: Biodiversity and Geological Conservation, 2005
Species	It is a requirement for developers to avoid or mitigate adverse effects upon protected species.	Specially protected species are listed in the Schedules appended to the Wildlife and Countryside Act, in the Habitats Regulations, or in their own legislation. The Schedules are reviewed every five years.	

	Non-statutory Protection	Classification Example	Key Guidance
Sites	Wildlife Trust and Local Authority may identify sites according to agreed criteria. Sites are then included upon Proposals Maps within Local Development Frameworks (LDF).	County Wildlife Sites (CWS) Local Nature Reserves (LNR) Protected Roadside Verges (PRV)	Cambridgeshire and Peterborough County Wildlife Sites Selection Guidelines, 2009 Cambridgeshire and Peterborough Biodiversity Action Plans

Species	Species and habitats given priority in a BAP (National or Local)	UK: 1150 priority species and 65 priority habitats. Cambridgeshire: 10 species and 24 habitat action plans.	Local Development Framework (LDF). South Cambridgeshire Biodiversity Strategy, 2006 SCDC Biodiversity SPD 2009



APPENDIX 4

AIR QUALITY: SUPPLEMENTARY DESIGN GUIDE

Contents

1.0 Introduction

The aim of this document is to provide guidance on the way in which air quality and air pollution issues will be dealt with through the planning system. Air pollution and poor air quality can have detrimental impacts on health and the amenity of users of land in terms of odour, dust and nuisance. The Local Planning Authority considers that the planning system has a key role in protecting people from unacceptable risks to their health and in providing an adequate protection to the amenity value of land. These considerations must however be balanced against other aims of the planning system such as to secure economic regeneration and provide adequate levels of housing. The aim is to achieve sustainable development in the district that achieves the best balance of social, economic and environmental considerations. All of these considerations can have significance for both spatial policy and individual development control decisions.

This SPD will supplement planning policy NE/16 within the Local Development Framework. The purpose and objectives of this SPD are to underpin and endorse the policies within the Local Development Framework to improve air quality within South Cambridgeshire. In addition, it will help to implement the objectives of the Air Quality Action Plan (AQAP), relating to land use.

Specifically, the objectives of this SPD are to:

- To emphasize the role South Cambridgeshire District Council has in improving air quality within the District through planning processes.
- To identify developments where Low Emissions Strategies will be required.
- To provide advise and guidance on potential mitigation measures that may be employed to reduce the impacts of new developments.
- To provide guidance on when air quality assessments may be required and what is required within them (see Appendix 3: Air Quality: A guide for Developers).
- To provide guidance on the use of S.106 agreements to improve air quality.

2.0 Policy Background

2.1 The Environment Act 1995

Part IV of The Environment Act 1995 provides the legal framework for requiring Local Authorities in England and Wales to review the air quality in their area. The Act introduces Local Air Quality Management (LAQM).

2.2 The Air Quality Strategy (for England, Scotland, Wales and Northern Ireland)

The main elements of the Air Quality Strategy (AQS) can be summarised as follows:

- National Air Quality Standards and Objectives that must be achieved by each Authority.
- The use of policies by which objectives can be achieved and which include the input of important factors such as industry, transportation bodies and local authorities.
- The predetermination of timescales with target dates for the achievement of objectives.

The Strategy requires the following actions to be taken by each Authority:

- To carry out an air quality review and assessment (AQRA) in accordance with Section 82 of the Environment Act 1995
- Depending upon the results of the AQRA, to make an order designating an Air Quality management Area (AQMA)
- Prepare an air quality action plan (AQAP)
- Modify and update the AQAP
- Continually review and assess the air quality within the district by way of Updating and Screening Assessments (USA) and Progress Reports
- Implement any actions in an action plan
- Revoke or modify an AQMA or Order

At the centre of the AQS is the use of national air quality standards to enable air quality to be measured and assessed. These provide the means by which objectives and timescales for the achievement of objectives can be set.

Most of the proposed standards have been based on the available information concerning the health effects resulting from different ambient concentrations of selected pollutants and are the consensus view of medical experts on the Expert Panel on Air Quality Standards (EPAQS). The standards and associated specific objectives to be achieved between 2004 and 2010 are attached as Appendix 4A. This shows the standards in $\mu g/m^3$ with the number of exceedences that are permitted.

Limit values have been adopted for various pollutants based upon their potential effects on health. Where limit values are not being met for any of the pollutants, the

Act gives provision for the Local Authority to declare an Air Quality Management Area (AQMA) for that pollutant.

On declaration of an AQMA, the Local Authority is required to draw up an Air Quality Action Plan, within which are details of potential feasible actions that will help to reduce concentrations of the pollutant within the AQMA. Realistic time scales should be provided for implementation of the identified solutions and an indication as to how progress will be monitored.

In February 2009, South Cambridgeshire District Council adopted its' own Local Air Quality Strategy. The air quality strategy aims to bring together all issues that have an impact on air quality and is the document that has committed South Cambridgeshire District Council to creating this SPD.

The strategy lays out a framework upon which all those affected by poor air quality can build a positive relationship with a common goal of improving air quality without causing significant detriment to any other stakeholder.

2.3 Air Quality Action Plan for Cambridgeshire

South Cambridgeshire District Council declared an Air Quality Management Area (AQMA) for NO_2 in July 2007 based upon monitored and modelled exceedences of the national air quality objective for annual mean NO_2. This is along a stretch of the A14 between Bar Hill and Milton as detailed in Appendix 4B:Plan of South Cambridgeshire's District Council Air Quality Management Area.

Following this, a detailed assessment of PM_{10} along the A14 corridor was completed in December 2007. The detailed assessment identified exceedences of the 24-hour mean objective for PM_{10} and concluded that an AQMA will be required for PM_{10} along the A14 between Bar Hill and Milton. After discussions with DEFRA, it was concluded that the simplest method of doing this will be to modify the existing AQMA for NO_2 to include PM_{10}.

The cause of the exceedences of the annual mean NO_2 objective and the 24-hour mean PM_{10} objective is undoubtedly emissions from traffic along the A14. As a result of the AQMA, the Council has been working closely with Cambridge City Council and Huntingdonshire District Council to produce an Air Quality Action Plan (AQAP). The AQAP brings together a wide range of initiatives and mitigation measures which, when implemented, will help to reduce pollution within the district.

South Cambridgeshire has an area of concern along a stretch of the A14 between Bar Hill and Milton where exceedences of the annual mean objective for nitrogen dioxide and the 24-hour mean objective for PM_{10} appear likely to be a mid-term problem although with the forecast growth in the region, the potential for the exceedences to become long term problems cannot be ignored.

Further Assessment demonstrates that the traffic component for NO_2 at the Bar Hill monitor is 28.1µg/m^3. Heavy Duty Vehicles (HDV - encompassing both heavy good and commercial vehicles) contributions were the highest of the traffic component, reaching 66.2% of the annual measured total.

The traffic component farther East for NO_2 has been calculated as 28.5µg/m^3. HDV contributions were the highest of the traffic component, reaching 55.5% of the annual measured total.

Further assessment of PM_{10} has demonstrated that the traffic component at the Bar Hill monitor is 5.1µg/m^3. HDV contributions were the highest of the traffic component, reaching 12% of the annual measured total.

At the Impington continuous monitor, the traffic contribution to the annual mean PM_{10} has been calculated as 6.7µg/m^3 with HDVs contributing the highest of the traffic component at 14.4% of the total annual mean.

South Cambridgeshire District Council is working with Huntingdonshire District Council and Cambridge City Council to prepare an Air Quality Action Plan. The Districts have completed a table of actions that will have a positive impact upon air quality. These are currently in place or planned for the near future by the County and all District Councils. Some actions are specifically designed to improve air quality, but many of the actions have been initiated to tackle other areas, for example climate change or reducing congestion. They have been arranged into the following themes:

- Managing the network.
- Lowering emissions.
- Strategic Planning.
- Development Control.
- Smarter Travel Choices.
- Raising Awareness.

Each District has produced a list of the 5 single actions, or packages of measures that will in their opinion have the most beneficial impact on air quality in their area.

The 5 priority actions for South Cambridgeshire are:

- Completion and opening of the Cambridgeshire Guided Busway.

- Widening of the A14 carriageway between Fen Drayton and Histon – increasing the number of lanes from 2 to 3 on both eastbound and westbound carriageways should help to alleviate congestion and speed traffic through-flow.

- Re-alignment of the A14 and the construction of a local road, between the M11 and Bar Hill junctions as part of the A14 Improvement Scheme.

- Establish a Freight Quality Partnership – the South Cambridgeshire District Council's Further Assessment of air quality along the A14 has identified HGVs as having the greatest impact on air quality in the district. If improvements in air quality are to be achieved on the A14 between Bar Hill and Milton, it is vital that the Council seeks to give an understanding of local air quality issues to freight operators who may in turn be able to offer invaluable input into reducing emissions from their fleet.

- Embedding the LDF Air Quality Policy in Local Development Documents – this will ensure that air quality is considered at the planning stage and therefore not adversely impacted by new development.

It is envisaged that these 5 actions together can bring about the required reduction in NO_2 and PM_{10} in order to meet the National Objectives. However, it is also the intention of the Council to implement various other air quality mitigation measures to bring about a general improvement in air quality across the district. Some of these mitigation measures (especially those aimed at reducing emissions from road transport) will form a Low Emissions Strategy and such mitigation measures are discussed in Section 8 of this SPD.

2.4 Air Quality Modelling in South Cambridgeshire

In June 2009, Cambridge Environmental Research Consultants (CERC) completed a modelling study and report focusing on the effects on air quality of the major growth proposed in the Cambridge sub-region. The pollutants modelled were NO_2, PM_{10} and $PM_{2.5}$ for various growth scenarios in 2016 compared to baseline scenarios in 2006.

Various modelling studies were carried out to include:

- No development.
- With the proposed Northstowe development.
- With the proposed Hauxton development.
- With the proposed NIAB site development.
- With the proposed Cambridge Southern Fringe development.

The modelling results show that the largest impact potentially leading to exceedences of annual mean NO_2 and PM_{10} objectives in areas adjacent to the A14 is that of the Northstowe development. With this in mind, it is essential that sustainable transport measures are put into place at development proposal stage in order to minimize the impact of the traffic and housing growth.

3.0 National Policy Guidance

The following national planning guidance must be used in order to achieve success when implementing this SPD:

3.1 Planning Policy Statement 1 (PPS1): Delivering Sustainable Development.

Planning and Climate Change sets out how spatial planning should contribute to reducing carbon emissions and stabilizing climate change (mitigation) and take into account the unavoidable consequences (adaptation). The PPS accompanies the Climate Change Bill published in March 2006 which will make the government's long-term goal of a 60% reduction in carbon dioxide emissions by 2050 a legally binding target.

3.2 Planning Policy Statement 6 (PPS6): Planning for Town Centres.

PPS6 sets out the Government's guidance on retail planning policy and planning for town centres.

Its key objective is for town centres to promote their vitality and viability by planning for growth and development of existing centres; and promoting and enhancing existing centres by focusing development in such centres and encouraging a wide range of services in a good environment, accessible by all.

3.3 Planning Policy Guidance 13 (PPG13): Transport.

PPG13 guides the integration of transportation and land use through development process. It is a material consideration in dealing with individual planning applications and appeals. Its main objective is;

"to have a modern, sustainable, safe transportation system which benefits society, the economy and the environment and which actively contributes to social inclusion and everyone's quality of life".

3.4 Planning Policy Statement 23 (PPS23): Planning and Pollution Control

PPS23 applies to England only and advises that the planning system should have a key role when dealing with any development that could either give rise to pollution or be significantly affected by pollution.

Focussing on sustainable development, PPS23 contains advise on pollution control through development control, utilising the various pieces of legislation and guidance available on pollution control.

PPS23 also describes how planning obligations can be used in the provision of financial or monitoring assistance from the developer that will enable South Cambridgeshire District Council to pursue the requirements of its' Air Quality Action Plan.

PPS23 also includes the following important sections:

- Appendix A: Matters for consideration in preparing local development documents and taking decisions on individual planning applications.

- Annex 1: Pollution control, air and water quality.

The government's policy on Climate Change as detailed in the Planning White Paper (May 2007) has now been set out in the supplement to PPS1 (above).

On the 18th June 2009 the Chief Planner at Communities and Local Government wrote to all Chief Planning Officers to advise that the new UK Climate Projections 2009 (UKCP09) was published the same day. The letter is advising on the implications for the planning process. The Defra website and associated links advise on how to access the projections. Although the projections are unlikely to affect the progress on local and regional plan making or decisions on planning applications, local authorities should consider the full possibilities offered by UKCP09.

Other policy guidance includes the Office of the Deputy Prime Minister (ODPM) Planning Circular 05/2005 (circular 05/05) entitled "Planning Obligations". In addition he Community Infrastructure Levy (CIL) which is scheduled to come into being in late 2009 will allow local authorities to levy a charge on development.

4.0 Local Policy

The Local Development Framework (LDF) was adopted in July 2007 and replaces the previous Local Plan, published in 2004. It contains a series of Development Plan Documents (DPD's), which set out visions of the future of South Cambridgeshire and the objectives and targets that must be met in order to achieve that vision.

Local Development Framework Policy NE/16-Emissions is directly linked to air quality. The policy reads:

"1. Development proposals will need to have regard to any emissions arising from the proposed use and seek to minimise those emissions to control any risks arising and prevent any detriment to the local amenity by locating such development appropriately.

2. Where significant increases in emissions covered by nationally prescribed air quality objectives are proposed, the applicant will need to assess the impact on local air quality by undertaking an appropriate modelling exercise to show that the national objectives will still be achieved. Development will not be permitted where it would adversely affect air quality in an Air Quality Management Area."

This policy aims to protect human health and the environment from possible negative effects on air quality caused as a direct result of development and satisfied the requirements of the Regional Spatial Strategy.

In addition to the direct link with air quality emissions, the LDF also contains policies relating to energy efficiency, renewable energy and transport.
Each DPD contains a site specific Area Action Plan for the developments and includes policies that will have a direct impact upon air quality issues, such as sustainable development and cycling and car parking provisions.

5.0 S.106 Planning Obligations (or 'S106 agreements')

Section 106 of the Town and Country Planning Act 1990 allows a Local Planning Authority to enter into a legally-binding agreement or planning obligation with a land developer over a related issue. The obligation is commonly referred to as a 'Section 106 Agreement'.

Such agreements can cover almost any relevant issue and can include sums of money. Possible examples of S106 agreements relating to air quality may include:

- Provision of funding to the Local Planning Authority to allow for the setting up of an air quality monitoring network or station to measure impacts of the development.

- Provision of funding to the Local Planning Authority for the implementation of air quality mitigation measures.

- Financial contributions towards transport infrastructure improvements.

- Financial contributions towards implementation of the Air Quality Action Plan.

- The developer purchases air quality monitoring equipment for monitoring the impacts of the development into future years.

- The developer organises and sets up a community website that allows for air quality impacts to be obtained by the local community.

S106 Agreements can act as a main instrument for placing restrictions on the developers, often requiring them to minimise the impact on the local community and to carry out tasks that will provide community benefits.

ODPM Circular 05/2005 -“Planning Obligations” recognises the important role that planning obligations can perform as part of the planning process. In the context of air quality, they may be used to **mitigate** a development's impact (e.g. through increased public transport provision, the implementation of a low emission strategy, or a financial contribution to provide air quality monitoring).

6.0 Air Quality Assessments

Pre-application discussions are a legitimate and effective way of obtaining informal views on the merits of a development project. It allows the developer to obtain professional advise at an early stage. It is at this stage that requirements for an air quality assessment and the extent and detail of that assessment can be discussed and agreed.

Air quality assessments should be carried out in line with the staged approach detailed in DEFRA statutory guidance LAQM. TG(09). The assessment submitted to the local authority may involve a simple screening exercise or a more detailed modelled study depending upon the size, nature and location of the development. Some developments require an Environmental Statement (ES). If an ES is required, the same level of detail as above should be incorporated within it.

A guidance document entitled “Air Quality – A Guide for Developers”, which will detail what is expected and required from air quality assessments will be produced at a later date. In the meantime please contact Health and Environmental Services for further advice.

7.0 Background to Low Emission Strategies

Low emission strategies provide a package of measures to help mitigate the transport impacts of development. They complement other design and mitigation options, such as travel planning and the provision of public transport infrastructure. Strategies are often secured through a combination of planning conditions and planning obligations. They may incorporate policy measures and/or require financial investments in and contributions to the delivery of low emission transport projects and plans, including strategic monitoring and assessment activities.

Good practice guidance on the use of Low Emission Strategies (LES) has been drawn up by the Low Emissions Strategy Group. This group was formed by the Air Quality Beacon Authorities (Croydon, Greenwich, Sefton and Sheffield Councils) plus the Greater London Authority, Kensington and Chelsea Council, City of London Corporation, Cenex and ARUP.

Some authorities are already making effective use of low emission strategies. The guidance is intended to support wider adoption of the approach, and to encourage the use of both well established and more innovative measures. It is intended for use by local authority planners and those who work closely with them, such as environmental health, transport planning and sustainable development teams.

The main benefit of low emission strategies is to reduce transport emissions by accelerating the uptake of low emission fuels and technologies in and around a new development. It also aims to promote a shift in mode of travel away from cars. The approach may also contribute towards achieving local government performance

targets; provide local economic benefits; help to streamline planning decisions; and contribute to wider sustainable development goals.

8.0 Mitigating Air Quality Impacts

8.1 Traffic Reduction and The Low Emission Strategy

High trip-generating developments should be well served by public transport and walking and cycling routes.

Provision of electric vehicle charging points to promote alternative / low emission vehicle use.

Green travel plans

South Cambridgeshire District Council will encourage the use of Green Travel Plans, submitted with Planning Applications.

PPG13 'Transport' strongly advocates that use of and preparation of Green Travel Plans. Paragraph 18 of PPG13 states '…travel plans should be submitted alongside planning applications which are likely to have significant transport implications…'. A Green Travel Plan should comprise a package of practical measures tailored to the circumstances of individual firms and offices. They should aim to reduce:

- Car use for travel to & from work, and business travel;
- The environmental impact of travel; and
- The need to travel at all for work.

Given that business travel and commuting accounts for approximately 30% of all car miles travelled, and that 70% of all journeys to work are made by car (with 80% of these single occupancy), it is clear that targeting these groups to reduce their travel by car could have a significant impact on improving traffic congestion and in turn improving air quality.

Travel for work plans

New business and enterprise introduced through new developments within the District will be encouraged to join the Cambridge Travel for Work Partnership, of which, South Cambridgeshire District Council is a member. Details of this scheme can be found at: http://www.tfw.org.uk/about.php.

Walking and cycling

In accordance with LDF Policy TR/4, the Council will seek to ensure that developments are located in areas whereby trips to work, home, colleges and schools are short distance and that adequate and safe and convenient walking and cycling routes are made available.

Developers should ensure that there is safe, easy and convenient access to centres and leisure and recreational facilities and services. The Council will seek to encourage the use of walking and cycling routes through publication and information services.

Adequate and secure cycle parking should be provided at developments on every scale and every effort shall be made to encourage non-motorised modes of transport.

Improvement of public transport

Where large developments are located in areas not well served by public transport or cycle / walkways, the Council will seek financial contributions towards implementation of the Air Quality Action and transport infrastructure improvements, in accordance with Circular 05/2005.

Traffic impact assessments / Transport Assessment

In line with LDF Policy TR/3, the Council should ensure that for larger developments, a transport assessment is carried out. The transport assessment should project traffic movements. However, all other planning applications should contain a "Transport Statement" to show that transport mitigation has been considered and that transport impact will be adequately dealt with.

Car parking restrictions

As with LDF Policy TR/2, where developments have good access to public transport or walking and cycling routes, the Council should seek to reduce the amount of available car parking spaces for that development and adequate cycle parking should be made available.

Car parks at commercial premises should have allocated spaces for low emission vehicles and car sharing/car club vehicles.

Rail Freight

One of the main contributing factors to the poor air quality within the AQMA is the movement of freight vehicles along the A14. In accordance with Policy TR/5, the Council will continue to maintain freight interchange facilities and will seek to increase the percentage of freight using the rail links.

Car Clubs

Car clubs are set up for those who only wish to use cars from time-to-time and encourages the use of alternative modes of transport when a car is not needed. Car club cars have designated parking spaces.

There are various car club schemes, the following of which is an example:

- Register with a car club to receive a smartcard and PIN.
- Book your car.
- Swipe your smartcard to gain access to your car and enter your PIN.
- Return the car to its dedicated parking bay when you're finished.

The Council will encourage the use of car clubs within new developments and seek to provide secure parking facilities for car club users.

8.2 Low Polluting Fuels

Encouragement of replacement of high polluting vehicles with alternative, cleaner technologies, such as hybrid fuel cell, electric and hydrogen gas.

Refuelling structure is currently not in place but an important part of the Low Emission Strategy is to seek to install a system of charging points for large developments. Charging points for electric vehicles should be sought at developments on every scale and not just for the larger developments.

Where electric vehicle charging points are proposed for a development, the developer should be encouraged to provide the energy required from renewable energy such as photovoltaic cells or wind power if it is appropriate to do so and will not cause a detriment to the local amenity.

Existing refuelling stations within the district should be encouraged to provide alternative fuel technologies.

Developers should be encouraged to investigate the possibility of hydrogen fuel cell technologies.

8.3 Building emissions

In addition to reduction of emissions from road transport, improvements in air quality can be achieved within the buildings sector in the following ways:

8.3.1 Energy Efficiency

Design and choice of materials should be to maximize the energy efficiency of the buildings. In addition, plant chosen should be low emission

Standard Assessment Procedure (SAP) rating of new build gives a measure of overall efficiency of domestic building. The higher the SAP rating the more efficient the building. Developers should show that they have obtained the highest possible SAP rating for their development.

In addition, consideration should be given to Part L of the Building Regulations. This gives advice on conservation of fuel and power. The developer should ensure a reduction of pollutants from heating plant (e.g. NOx from gas combustion).

The Air Quality Action Plan contains details of possible mitigation measures for building emissions which will need to be considered for all new developments.

8.3.2 Renewable Energy

Policy NE/3 (Renewable Energy Technologies in New Development) of the Development Control Policies DPD requires the provision of technology for energy to provide at least 10% of predicted energy requirements in all developments greater than 1,000m^2 or 10 dwellings. Developers should select the most feasible and cleanest energy provision technology. It should be noted that there is a separate section on energy from biomass within this SPD (section 8.5, below).

8.3.3 Energy Supply

Combined cooling heat and power (CCHP), combined heat and power (CHP), solar heating and district heating should all be considered and assessed as a potential energy supply within new developments. The efficiency of these forms of energy supply is greater than installation of gas central heating or condensing boilers in individual premises. This is also in line with the LDF Policy NE/3.

8.4 Climate Change

It is important to recognise that any given development may give rise to some negative air quality impacts on a local scale, whilst being neutral or positive at the wider scale. In particular, actions that may be helpful for climate change may be unhelpful for air quality and vice versa. South Cambridgeshire District Council will look favourably at win-win measures, those that will lead to a reduction in both emissions of air quality pollutants as defined within the national air quality strategy and those pollutants that contribute to climate change (global warming).

The topic of air quality and climate change win-win / win-lose / lose-win / lose-lose scenarios is discussed further in the Air Quality Expert Group report on air quality and climate change (AQEG, 2007).

Mitigation measures within a development may not only impact on local air quality but may also aid in the reduction of CO_2 emissions. For example, providing energy to a new town from a local CHP plant will prevent the need to install less efficient heating system s within individual homes.

8.5 Biomass

Generating heat and power from biomass combustion is an attractive idea as it can allow for carbon savings. However, the combustion of biomass results in increased

emissions of pollutants, especially particulate matter and PAH (polycyclic aromatic hydrocarbons, some of which are carcinogenic).

Research in Scotland recently showed that particulate emissions from boilers up to 1MW are around 2 ½ orders of magnitude greater from biomass compared with gas (Scottish Executive, 2006). According to the Biomass Strategy (Defra, 2007) any move away from centrally generated electricity to smaller, locally based plant will inevitably increase emissions in urban areas. In particular, substitution of natural gas with biomass generally leads to increases in emissions of all major pollutants.

London Councils, on behalf of Greater London local authorities, recently commissioned AEA Energy & Environment to undertake a technical review of the potential impacts on air quality of increased wood-fuelled biomass use in London, based on targets to reduce carbon dioxide emissions (AEAT, 2007). Their study showed that the change in emissions resulting from increased biomass combustion in London would be between 2% and 8 % of the 2010 oxides of nitrogen emissions, whereas the change in emissions would be between 25% and 108% of the 2010 PM_{10} emissions.

The draft report from COMEAP (2007), "Long Term Exposure to Air Pollution: Effect on Mortality", suggests that air pollution has a greater effect on mortality in the UK than previously thought, with a 10µg/m^3 increase in fine particles being associated with a 6% increase in risk of death from all-causes. Because there is clear and unequivocal health advice that there is no recognized safe level for exposure to fine particles ($PM_{2.5}$) the current Air Quality Strategy (DEFRA, 2007) requires a 15% reduction in $PM_{2.5}$ in urban areas by 2020.

South Cambridgeshire District Council has a statutory duty to work towards this target, to prevent the deterioration of air quality and to improve air quality. For this reason, the Health Protection team considers that the installation of new biomass boilers is unlikely to be suitable in or adjacent to the Cambridge AQMA, i.e., areas adjacent to or adjoining the A14 between Bar Hill and Milton. Combustion of biomass will always lead to increased emissions locally, in comparison with natural gas. Whilst the additional load from any one biomass boiler might not appear to be very significant, it is contrary to the Exposure Reduction approach for particulate matter outlined in the Defra guidance and it is contrary to our Local Development Framework Policy NE/16.

However, the potential impact might be acceptable if biomass combustion were limited to larger district heating or CHP schemes where it would be cost effective to install effective abatement equipment to reduce the emissions of particulate matter and oxides of nitrogen. Such installations should be located away from the Air Quality Management Area and sensitive receptors where the positive impact of the carbon reduction outweighs the negative impact on air quality.

The choice of appliance (design quality being more important than size), fuel, abatement used, chimney height and locations are crucial. Full details of any

proposed equipment and its emissions performance should be supplied to the Health Protection team for consideration before submission of a planning application. Each application will be considered on a case-by-case basis.

8.6 Cumulative Impacts

It may be the case that the proposed development is within an area of low pollution but due to high growth in the area involving a series of developments, it may be that a significant worsening of air quality occurs.

Where there are many units or parcels of land to be developed by one single developer, that developer must mitigate against worsening air quality at the design stage of the development.

Where unrelated developments exist, it is vital to reduce "background creep". Cumulative air quality assessments will be required in localities where a series of unrelated developments are proposed whereby the cumulative impact of those developments may impact on local air quality. This may result in financial contributions from each of the developers to implement low emissions strategies within their development.

Where the development exceeds 10 units or 1000m^2, the Council will require the submission of an Emission Assessment for the development. The emissions assessment should show a reduction in emissions from all aspects of the development, including transport, buildings and energy provision using a range of low emissions techniques and measures with the greatest decrease in emissions coming from the developments that have the highest emissions although it is expected that developments and development projects of all sizes will contribute to emissions reductions.

The Council will seek to obtain funds from the largest developments that will put towards the Air Quality Action Plan programme.

8.7 Indoor Air Quality

In order to minimize human exposure to pollutants, the design of buildings should be such that any opening windows and/or mechanical ventilation systems should be located on the façade of the buildings that are away from the source of the pollution.

Where buildings are greater than 2 storeys in height, with residential to ground level;, stricter mitigation measures will be required for the residences closer to the ground. Under these circumstances, it is more appropriate to have opening windows and balconies at floors higher up the building.

Public spaces and gardens can be considered as relevant receptor locations and as such, should be screened to determine impacts of air quality within them. Where possible, well considered positioning and orientation of these areas can help to

minimize public exposure. In any circumstances, public spaces or gardens should be located as far from the source of air pollution.

The Council will encourage green (living) roofs and walls as they are known to help reduce air pollution, they also provide a natural cooling system and add additional insulation.

8.8 Construction/ Demolition

Concentrations of fine particles (PM_{10}) are also known to breach national health based objectives and in areas along the A14 between Bar Hill and Milton. The 24-hour mean objective (no more than 35 exceedences of 40µg/m^3 daily per annum) is regularly exceeded significantly. Because of the negative impact of particulate matter on human health – at any concentration in ambient air – exposure reduction has been proposed as the most effective means of improving the health of most people and is now in place as government policy.

Temporary emissions of dust during the construction phase are of concern as they add to the overall exposure to particulate matter of residents, visitors and site-workers.

Dust and smoke should be kept to a minimum and mud spills should be immediately cleaned up. In addition, schemes to minimise the production of airborne dust during the construction period will be required by planning condition. The Council has a methodology which sets out the approach to minimising the impact of the planned phase of redevelopment and growth in South Cambridgeshire based on prevention, suppression and containment; South Cambridgeshire District Council considers this approach to dust issues to be best practice and recommend that developers refer to it.

The Council expects to see an Emissions Control plan for every development submitted with the planning application. The plan and the mitigation measures employed should be proportional to the potential impact. Details of and further advice on how to assess the potential impact are provided in the following: documents:

- BRE document 'Control of Dust from Construction and Demolition Activities' February 2003, ISBN 1 86081 6126.

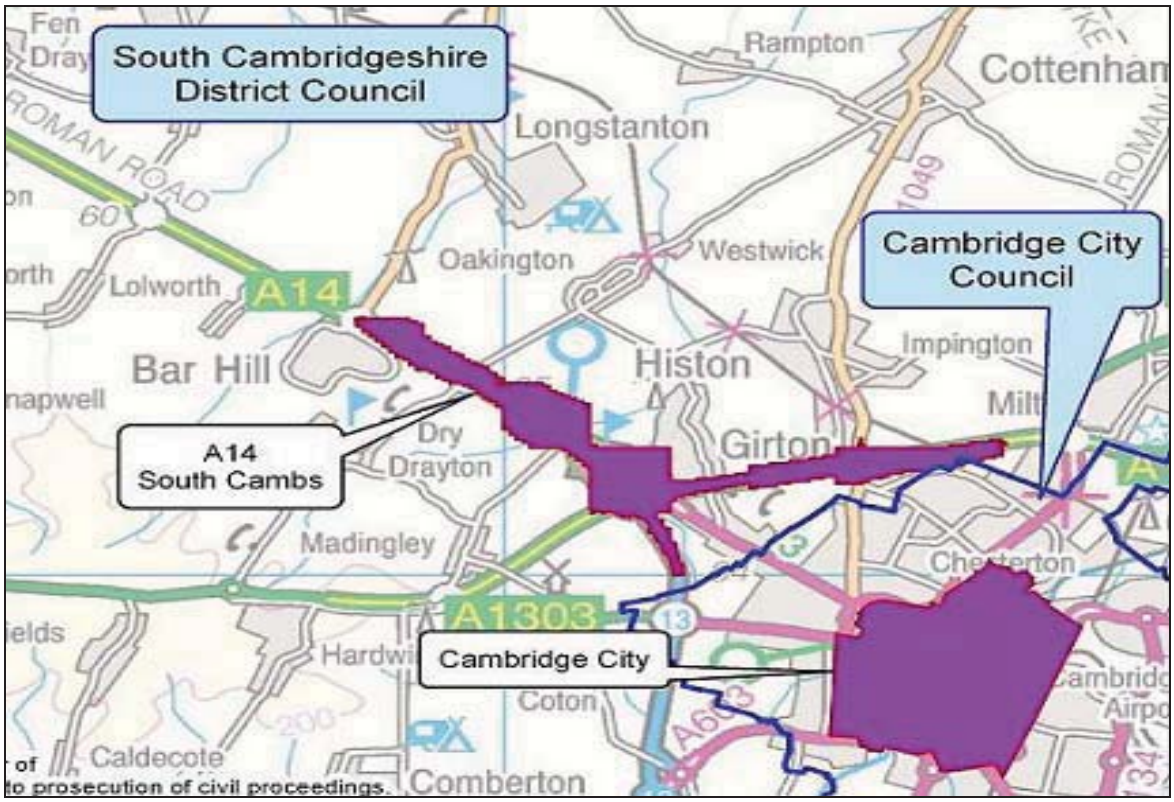
- London Best Practice Guidance: The control of dust and emissions from construction and demolition (November 2006): can be downloaded from: http://www.london.gov.uk/mayor/environment/air_quality/docs/construction-dust-bpg.pdf

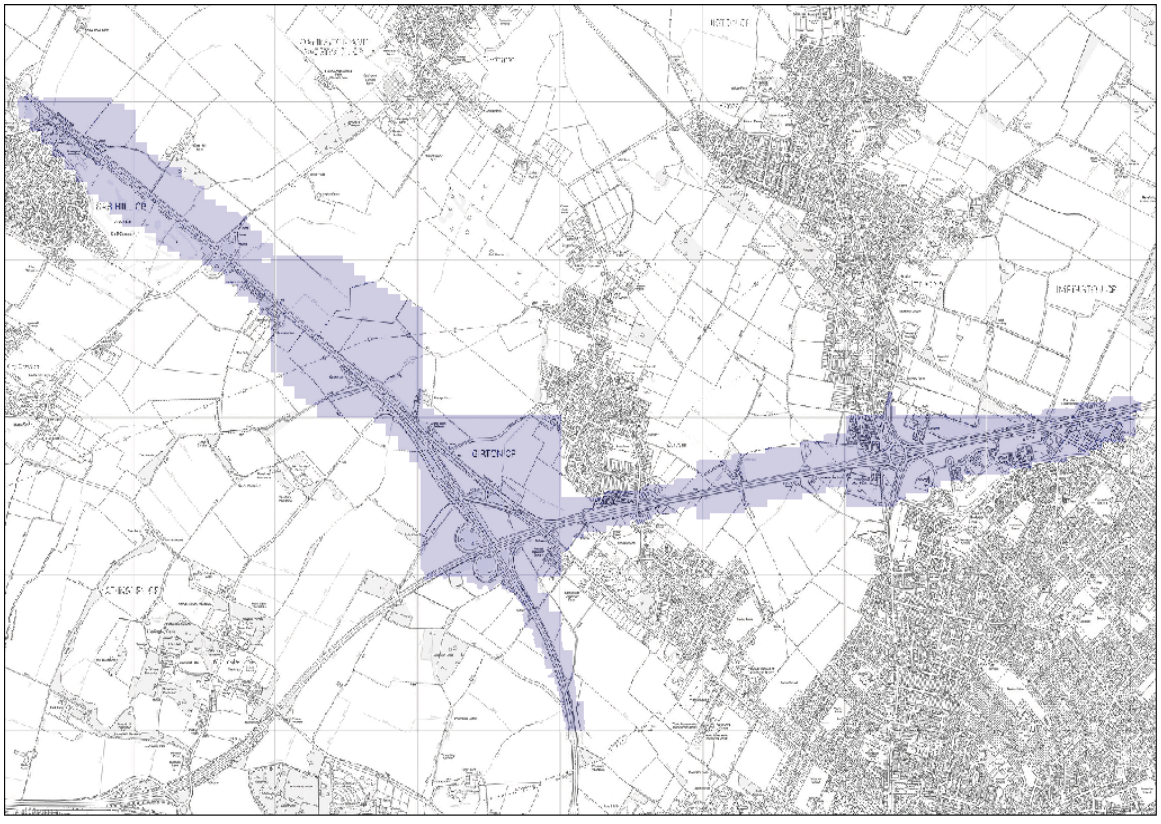
Appendix 4A – National Air Quality Standards and Objectives

Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

Appendix 4B – Plan of South Cambridgeshire District Council Air Quality Management Area





APPENDIX 5

DEVELOPMENT OF POTENTIALLY CONTAMINATED SITES

Full Guidance Notes for Developers

1. Introduction

The purpose of this guide is to assist developers and their advisors to understand and be aware of what information South Cambridgeshire District Council (SCDC) will need to assess an application for planning consent on land which is or may be affected by the presence of contamination. Following this guidance will enable the swift processing of planning applications for potentially contaminated sites.

The guidance aims to indicate the type and extent of the investigation and details required by SCDC to satisfy its statutory responsibilities at the initial planning application stage, for building regulation approval and to deal with environmental health issues that may arise. The Council aims to ensure that good practice is adopted in dealing with land with contamination issues. The presence, or otherwise, of contamination should be identified when planning applications are made, if present it should be characterised, assessed, and addressed under planning permission to prevent harm or pollution, and handled and treated effectively.

Safe, informed decisions are to be made on the basis of full and competent assessments. Developers and their agents will incur the costs of satisfying these requirements and should be assured that the Council has no desire to impose an unreasonable burden. However, the Council does require that contamination issues are dealt with in an appropriate manner and will intervene if there is any failure to comply with planning requirements. Applications will be refused if development is likely to be unsuitable because it may pose threats to health, the community or the environment. Early consultation with the Environmental Health Department is strongly recommended. Every site is different and we are happy to offer advice on a site-specific basis.

Appropriate assessment of potential contamination together with provision for agreed remediation and validation by the Council is now an integral part of the development control process. This will allow contamination risks to be minimised through carefully planned and implemented development. In addition, the Authority will also consult and have regard to comments made by other statutory bodies in respect of contaminated land, principally the Environment Agency.

"Land contamination" is a general term that is taken to refer to 'substances' in on or under the land with potential to cause harm or water pollution. This contrasts with the term "Contaminated Land" which has a precise legal meaning conferred by the Environmental Protection Act 1990 and is only used in specific circumstances where a formal determination has been made.

2. The Planning Procedure

The actual or possible presence of contamination is a material planning consideration. Persons submitting planning applications are expected to declare any knowledge they may have about potential land contamination. In many cases it will be an advantage to determine whether there are likely to be any contamination issues on site before submitting an application for planning consent. This may involve a basic historical land use search and a site walk over. On large-scale developments it could form apart of a pre-application enquiry where any necessary investigations can be determined prior to submitting a planning application.

On any site where there is the potential for contamination to exist, the Development Services and the Environmental Health Department will work together to ensure that the proposed sites are appropriately investigated, managed and, if applicable, remediated. We are mainly concerned with risks to human health and ensuring that the proposed development will be suitable for use. For example land which has a history of use and is the subject of a new development proposal for industrial units may not need the same level of investigation and remediation as a similar site where the proposed end use is houses with gardens. We also consider other matters that may give rise to disturbance during the development such as smoke, noise, odours and dust. We will consult with the Environment Agency where pollution of groundwater of surface water is a possibility.

The procedure for considering land contamination can be outlined as follows:

GROUNDS FOR SUSPECTING CONTAMINATION
↓
DESK TOP STUDY +/- SITE WALKOVER
↓
DEVELOPMENT OF SITE CONCEPTUAL MODEL
↓
SITE INVESTIGATIONS
↓
REMEDIATION STRATEGY
↓
REMEDIATION
↓
DEMONSTRATE SATISFACTORY OUTCOME

At the planning application stage we will consider

Information on contamination:

- Has the site been classified as statutorily contaminated under Environmental Protection Act Part 11A?
- Is the site known or suspected to be in contaminative state?
- Are previous uses likely to have left the site in a contaminated state?
- Does the site require investigation prior to the determination of the application?
- Has the local authority gathered information on the site in meeting the requirements of Part 11A?
- Does the local authority possess any information on the type and extent of contamination?
- Have studies already been undertaken on the site?
- Is the developer in possession of relevant site information on contamination?
- Has the developer thoroughly investigated the site?

At the remediation stage we will consider

Does the site require some form of remediation for its current/proposed use?

Has the developer provided a strategy for the remediation of the site?

If so:

- Is the strategy suitable for the proposed use of the site?
- Have a number of remediation techniques been considered?
- Have suitable standards been employed?
- Does the remediation plan contain arrangements for checking compliance with the standards selected?
- Does the site require to be monitored on completion of the works? If so, what arrangements are proposed / required?

If not:

- Is a remediation strategy required before the application can be determined or can the necessary measures be applied through conditions?

At the post remediation stage we will consider

- Has the development been carried out in accordance with the approved plans?
- Has the developer complied with any planning conditions?
- Has the site been treated in accordance with the remediation plan?
- If required, have post-works monitoring procedures been put in place?

The Developer's Responsibility

When commenting on contaminated land reports and proposed remediation strategies South Cambridgeshire District Council will not accept responsibility for the effectiveness of the design, completion of remediation measures and the safety of future occupiers. At all times this is the responsibility of the developers and their advisors. Developers should therefore fully appreciate the importance of competent professional advice, which must be supported by sufficient professional indemnity insurance.

3. The Site Investigation Procedure

The site investigation procedure will identify the potential for contamination and identify possible areas that may require remedial works in order to make a site suitable for use. The site investigation can be done in phases in order that resources can be targeted at the areas that are most likely to be contaminated. The separate phases may be submitted individually, as separate reports, or as one combined report – i.e. Phase 1, or Phase 1 & 2 followed by a Post Remediation Verification Report.

- The Phase 1 investigation should establish whether there have been any former contaminative uses on the site or adjacent properties which could impact upon the development;
- The Phase 2 investigation should determine the nature, extent and severity of contamination using risk based criteria. It should provide details of remedial options, health and safety issues, potential impacts on the environment and a retailed work plan;
- The Post Remediation Verification Report should provide a summary of remedial works carried out together with relevant documentary evidence and post remediation test results.

The site investigation procedure involves specialist technical knowledge and it is essential that all phases of the site investigation procedure are conducted by competent and experienced people (who should hold recognised and appropriate qualifications). It is essential that developers conduct their site investigations in accordance with current good practice.

Examples of current good practice can be found in the following documents:

- BS 10175:2001 British Standard Institute (2001) Investigation of Potentially Contaminated Sites – Code of Practice, British Standard Institute, London.

- Environment Agency (2001) Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination. R&D Technical Report P5-066/TR. Water Research Centre, Swindon.

- Environment Agency (2000) Technical Aspects of Site Investigation (2 Vols.). Research and Development Technical Report P5-065/TR. Water Research Centre, Swindon.

- Environment Agency (2000) Guidance for the Safe Development of Housing on Land Affected by Contamination. The Stationary Office, London.

3.1 The Phase 1 Investigation Desk Top Studies +/- Walkover

Purpose and scope

The purpose and scope of the Phase One study should be clearly defined. A map of the site should be included showing its location (grid reference and address), as well as plans of the current and planned layouts of the site.
Appraisal of site history

The desktop study should be prepared describing the condition of the land and uses of the site - past and present - and its immediate environment. The aim is to establish whether there have been any contaminative uses of the site or nearby land, and whether they could have adverse impacts on or offsite. All documentary evidence should be referenced and summarised where appropriate.

There are many former land uses that are potentially contaminating and some sites my have had more than one use, either simultaneously or separated in time. Lists of potentially contaminative land uses are available, some of which also have ‘profiles’ indicating the possible activities and contaminants that might have been present. Such understanding is crucial in defining the need for and scope of any subsequent review, investigation and remediation. Experience and consideration of site histories should be used to predict the principal contaminants associated with each particular industry (see Appendix 5A).

A site is evaluated initially by compiling a site history (see Appendix 5B) with a view to determining the possibility of soil and groundwater contamination (including by gases). We expect to be provided with such information in full and may require it in advance of a planning decision or as a condition of a grant of permission.

Assessment of environmental setting

A traceable assessment of the environmental setting should include:

- Information on geology, hydrogeology and hydrology.
- Information from the Environmental Agency on controlled waters, abstractions, pollution incidents, water quality classification, landfill sites within 250m.
- Information on ecosystems, heritage and other interests.

Review of earlier studies

A review of any previous studies, ongoing monitoring, remediation work etc. should be provided for both the site and any adjacent sites.

Reconnaissance

A site walkover should be undertaken confirm the information in the desk-top study, locate and record condition of features and plan further site investigation works (if appropriate). Anecdotal evidence from local interviews may provide additional useful information.

Site conceptual model

A 'site conceptual model' of the site should be produced which provides a clear interpretation of all plausible pollutant linkages at the site. Receptors include humans, controlled waters, wildlife and buildings. Pathways include direct contact, inhalation, off-site migration into watercourses etc. The 'conceptual model' proposed will depend upon the previous site use and proposed development. In some circumstances there may be a large number of plausible pollutant linkages and in others there may only be a small number.

The 'conceptual model' should provide a working description of the relevant physical. Chemical and biological characteristics of the site including;

- Geology, Hydrogeology and Hydrology.
- Ecology.
- Land use – historic, current and proposed (including adjacent land).

- Identifying potential – Sources of contamination, Pathways and Receptors (i.e., significant pollutant linkages).

The conceptual model that is developed as part of the Phase 1 investigation should provide enough detail to determine what will be needed as part of a Phase 2 investigation. Documentary evidence such as historical maps, photographs and former site layouts etc. should be appended to any report to demonstrate how the conceptual model has been produced.

Recommendations for Phase Two (where appropriate)

Aims and objectives for Phase Two of the investigation should be stated. Health and Safety issues should be highlighted.

We recommend that developers consult with us regarding the scope and execution required of Phase One assessments. We will scrutinise their content carefully when submitted.

Failure to demonstrate familiarity with a site's former uses and published information on their potential for contamination during initial review and further assessment will be regarded as a significant failing by a developer or consultant.

3.2 The Phase 2 Investigation

Objectives, scope and execution

If site history or other information indicates that contamination is possible, the developer/site owner should engage an appropriately experienced environmental consultant to undertake further site assessment. We will require that the objectives, scope and execution of such assessments be agreed in advance and the resulting report/s provided in full. The expected contents of such reports are noted in Appendix 5C for reference.

The Phase 2 investigation needs to be based on the 'conceptual site model' produced as part of the Phase 1 study and should further characterise the contamination on the site. Each site is unique and should be dealt with on a site-specific basis.

The Phase 2 investigation may include targeted sampling of suspected 'hot-spots' of contamination or sampling using a statistically valid sampling strategy across the whole site. Every precaution must be taken to ensure that site investigations do not introduce or mobilise contaminants or create new pathways. Any visibly contaminated or odorous material encountered during site investigations should be investigated and the Environmental Health Department informed immediately.

The report should include full descriptions of surface and intrusive ground investigations, an assessment of ground conditions and the implications for contaminated land, the source, distribution and concentration of contaminants. This information should be used to re-evaluate the site conceptual model. Further investigative work may be required.

Quality Assurance Quality Control

Good quality assurance and quality control procedures need to be followed during the collection of soil samples. After the samples have been collected they should be sent for appropriate analytical testing at a laboratory that holds a relevant UKAS accreditation for each contaminant. The quality assurance and quality control data and limits of detection for all tests carried out should be appended along with the results of the chemical analysis to the Phase 2 report.

Whilst many organisations are capable of undertaking some or all parts of a site assessment, the Council will have regard both to the full reports' content and to the authority of compiling organisations, their professional affiliations and demonstrable expertise. Assessments should be complete with sufficient detail to ensure that the assessment processes employed have been rational, ordered and efficient so as to reasonably assess the appropriated impacts of any land contamination present.

Assessing the Risks

Where detailed investigation is required at a site a risk assessment must be performed.

In the first instance the significance of each contaminant may be compared against an appropriate generic assessment criterion, i.e. CLEA guideline value, if one exists. Alternatively, other justifiable criteria may be used (if a CLEA guideline value does not exist) e.g. WHO/Drinking water Guidelines, Environment Agency, Environmental Quality Standards (EQS).

N.B. The use of particular generic assessment criterion must be fully justified.

Following the initial risk assessment against the appropriate guideline values a decision must be taken about the next course of action. This may be to either design a remediation scheme on the basis of the available data or to carry out a more comprehensive site-specific risk assessment using an industry standard model.

Types of risk assessment model

The CLEA model uses probabilistic techniques to assess the risks to human health from a contaminant, taking into account long-term exposure, ground conditions etc. There are a number of other risk assessment tools that have been developed for assessing risk to different receptor groups (e.g. SNIFFER, RBCA, RiscHuman, Landsim). There is a recent update of SNIFFER which takes into account the new

UK guidance from DEFRA. The Environment Agency has developed a site-specific model that assesses the risk posed to groundwater by leaching contaminants. The model is known as CONSIM (Contamination Impact on Groundwater: Simulation by Monte Carlo Method) and models contaminant mobilisation and transport. It is intended for use with commonly available ground investigation data.

It should be noted that not all contaminants may be covered by the above generic guidelines and that some generic guidelines may not always be appropriate for assessing potential risks to human health and the wider environment in the United Kingdom. Some allowance may have to be made to reflect assumptions that were made when the guideline values were derived in order to make them more appropriate for UK conditions.

These models are not appropriate for all circumstances and clear explanation of the choice, type and limitations of any risk assessment model must be submitted to the Council. The risk assessor must justify each of the input parameters and effectively communicate their output to us.

We will require further information where we are not confident about the conclusions reached (for example where an investigation has not been carried out in accordance with current good practice).

3.3 Remediation Options

Selection of options

The Phase 2 investigation may confirm possible pollutant linkages and if so should propose an appropriate remediation (scheme/selection of potential schemes) that will ensure safe redevelopment. The remediation options proposed should be related to the significant pollutant linkages that have been identified and should indicate the receptor(s) being protected.

There may be a number of remediation options, for example:

- To remove or treat soil or groundwater with contaminant levels above certain concentrations.
- To biodegrade hydrocarbons to acceptable levels.
- To block the pathway between the source and a receptor.
- To cap the site, limiting the potential for contact with contaminated soil.

The selection of the remediation strategy should be discussed with the advantages and disadvantages of each option outlined and reasons should be given for the chosen option, or combination of options.

Others factors Continuous monitoring after remediation

It should be noted that the remediation works might also require a waste management licence or mobile plant licence. When designing the remediation strategy, the Phase 2 report should also cover details such as the measures proposed to protect workers and the public and to ensure effective dist control.

On larger or complex sites an off-site impact assessment, monitoring and a risk communication strategy will be needed. Remediation strategies on such sites will need to include consideration and control of impacts during the remediation programme as well as the site situation post remediation.

During remediation works if any unsuspected contamination is identified then the Environmental Health Department should be contacted immediately, in order to discuss a strategy for the treatment or removal of the contaminated material.

We will require that an environmental consultant, or an appropriately qualified project manager, supervise any agreed required remediation of a contaminated site, including the documented identification, handling and fate of contaminating or contaminated material. The appointed persons or organisations will be responsible for the certification of the site remediation work and for its compliance with the agreement remediation plan, the recommendations of the consultant, and the requirements of other regulatory agencies for example the Environment Agency.

We expect that the means for demonstrating compliance to agreed in advance and this would typically require agreement on appropriate means of inspection, testing and quality assurance. Compliance with an agreed remediation or site management will be expected before any planning conditions can be discharged.

3.4 The Post Remediation Verification/Validation Report

It is important that remediation is undertaken in accordance with the proposed remediation strategy, and that accurate documentary evidence is maintained so that it can be summarised as part of a Post Remediation Verification Report. This report should identify actions carried out during the remediation works and methods of validation testing together with documentary records of implementation. This report should summarise the:

- Types of measures – testing (in-situ/lab), monitoring, inspection etc.
- Number of samples/rate of testing/monitoring/locations.
- Supervision during the remediation.

The documentary evidence should include copies of waste transfer notes, photographs and results of chemical analysis of soils/groundwater undertaken during

remediation (including each batch of soils and materials to be tested prior to being brought onto the site, from off-site sources). The Post Remediation Verification Report should be submitted to the Council at the end of any remediation work.

4. Key Points

- It is important to identify the potential for contamination to be present at an earl stage in order that unexpected costs and delays can be avoided later should a potential problem be identified during development works.

- Specialist advice from a suitably qualified consultant is required to assess contaminated land issues.

- The Phase 1 investigation should produce a 'conceptual model' that characterises all plausible pollutant linkages. This will form the basis of any subsequent work undertaken as part of a Phase 2 investigation.

Role of the Environment Agency

The Environment Agency is a statutory consultee in England and Wales under the planning process on the matters for which it has regulatory responsibility. SCDC will consult with the Environment Agency on applications where pollution of surface water or groundwater is involved, or where the water environment might be at risk of pollution as a result of the development. The Environment Agency also provides advice on applications for development close to or on landfill sites and within flood-plain areas.

In addition to the planning permission normally required for new buildings or changes of use, other projects involving contaminated land may also require planning permission and/or Environment Agency approvals if any of the following conditions apply:

- There is on-site disposal of controlled waste;

- There is proposed on-site remedial treatment;

- Engineering works are to be carried out as part of the remedial treatment;

- Treatment is part of a development for which planning permission is required; or

- Ground investigation works are to be carried out.

Part 11A, Environmental Protection Act 1990

Part 11A of the Environmental Protection Act 1990 was brought into force on 1st April 2000. It requires local authorities to identify contaminated land in its area and secure

its remediation. Part 11A provides a narrow definition of contaminated land. To fall within this definition the land, when assessed in the context of its current use must be capable of causing either significant harm or the significant possibility of significant harm to human health and/or to other specified receptors, or pollution of controlled waters or the significant possibility of pollution of controlled waters. Where contaminated land is identified, details of the contamination and any remediation undertaken will be placed on a Public Register. The narrow definition of contaminated land means that the number of sites that will be determined as contaminated land by the Council is likely to be small.

A site that contains contaminants, which in its current use does not have the potential to cause significant harm will fall outside Part 11A. It is government policy that these sites will be dealt with through the planning and development control system as and when they are brought forward for development. In such circumstances the developer must provide the Council with enough information to enable it to decide that the site will be suitable for use. For some sites that are identified as contaminated land under Part 11A, redevelopment of the land may be a cost-effective solution for securing remediation. In such circumstances action taken under the planning regime to ensure that land is suitable for use would also satisfy the Part 11A regime and turn a liability into an asset.

Additional Reference Material

British Standards Institution (2001)- Investigation of Potentially Contaminated Sites – Code of Practice, BS:10175

Environment Agency (2005). Guidance on Requirements for Land Contamination Reports

Environment Agency (2004). Model Procedures for the Management of Land Contamination CLR 11

Environment Agency and NHBC (2008). Guidance for the safe development of housing on land affected by contamination. EA R&D publication 66:2008.

CIRIA (1995) Remedial Treatment for Contaminated Land – Site Investigation and Assessment Vol 111. CIRIA, London.

CIRIA (1995) Methane Investigation Strategies Report 150. CIRIA, London.

CIRIA (1995) Interpreting Measurements of Gas in the Ground, Report 151, CIRIA, London.

CIRIA (1995) Risk Assessment for Methane and Other Gases from the Ground, Report 152, CIRIA London.

CIRIA (2001 Contaminated Land Risk Assessment – A Guide to Good Practice CIRIA London.

CIRIA (2001) Remedial Processes for Contaminated Land CIRIA London.

Department of the Environment (1994) Planning Policy Guidance Note 23, Planning and Pollution Control HMSO, London (under revision).

DoE (1994) Contaminated Land Research (CLR) Reports, London.

DoE Industry Profiles (48) Available from The Stationary Office, London.

Environment Agency (2000) Technical Aspects of site investigation (2 volumes) R&D Technical Report P5-065. Available from Environment Agency R&D Dissemination Centre, WRc, Frankland Road, Swindon, Wilts, SN5 8YF.

Environment Agency (2000) Secondary model procedures for the development of appropriate soil sampling strategies for land contamination R&D Technical Report P5-066. Available from Environment Agency R&D Dissemination Centre, WRc, Frankland Road, Swindon, Wilts, SN5 8YF.

Environment Agency (2002 onwards) New CLR reports including Tax reports, SGV reports, and CLEA, http:www.defra.gov.uk/environment/landliability/pubs.htm

National House Builders Council (1999) NHBC Standards, Land Quality – Managing Ground Conditions. Jan 1999 NHBC, Amersham.

Nathanail, J.F, Bardos R, & Nathanail P, (2001) Contaminated Land Management: Ready Reference. EPP/ Land Quality Press

Scottish Executive (Planning Advice Note 33, Development of Contaminated Land.

Syms, P., Knight, P. (2000) Building Homes on Used Land, RICS Books, London.

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APPENDIX 5A

Examples of Potentially Contaminating Site Uses

- Analysis – laboratory sites.
- Any area where persistent pesticide treatments may have been applied.
- Areas where biological materials have been bred, used or stored.
- Agricultural: fertilisers, garden sprays, pesticides, herbicides, cat and dog dusting powders.
- Battery manufacturers including any site where lead cell accumulators were destroyed for scrap.
- Brake lining manufacturers or repairers.
- Chemical Manufacturers
- Defence works
- Dry cleaning establishments
- Electroplaters
- Fuel depots
- Galvanisers
- Gas works
- Gun clubs
- Industrial cleaners
- Industrial: glues, paints, household cleaners, bleaches, sprays, pool chemical, bitumen, oils and greases, petroleum, petrochemicals, stores.
- Landfills
- Lime burners
- Market gardens, other areas where agricultural chemicals may have been used.
- Metal foundries
- Metal spraying
- Metal treatment, heat treatment, picklers
- Mining and extractive industry
- Patent medicine producers and stores.
- Pest controllers in particular chemical stores and area where vehicle and tanks are washed.
- Petroleum and petrochemical industries
- Pharmaceutical drug manufacturers
- Plasters manufacturers and moulders
- Printers
- Railway yards
- Scrap yards
- Service stations (including mechanical repairers)
- Stock dipping (e.g. sheep, cattle)
- Tanners, curriers and fellmongers
- Transport depots
- Underground storage tanks for fuel, chemical storage and liquid waste
- Warehousing and storing
- Waste storage
- Wood treatment
- Wool hide and skin merchants (e.g. drying, scouring)

Note:
This list is not exhaustive and other potentially contaminating activities must be considered.

APPENDIX 5B

Information for Compiling a Site History

Include in Site History

- proposed, present and past land uses
- processes carried out on site (and location if applicable)
- waste disposal practices and chemical spills
- earthmoving activities, including filling, carried out on site
- site description, and legal identifiers
- past and present land use, zoning per Development Plan

Sources of Information

- past and current owners of the site
- past and current employees of the site and neighbouring sites
- aerial and ground level photographs of the site
- past involvement with Government authorities
- past involvement with consultants
- trade and street directories
- local literature, including street directories
- technical literature, including building and related permits
- local knowledge of residents
- previous land uses
- products manufactured
- raw materials used
- waste produced
- chemical storage and transfer areas
- disposal locations
- product spills and losses
- geological survey maps
- sewer and underground service plans

Site Inspection

Indicators of the possible presence of contaminants are:

- disturbed of discoloured soil
- disturbed or affected vegetation
- presence of chemical containers or holding tanks
- chemical odour
- quality of surface water.

APPENDIX 5C

Contaminated Site Assessment Reports – suggested content/format

Phase 1 – Desk top study

1 Site identification

- Purpose and aims of study
- Scaled map showing position of site relative to sheets and adjoining properties
- Details of surface features and existing structures above and below ground
- Photographs, where appropriate

2 Ownership

- As listed on title documents

3 Party requesting assessment

- Owner or occupier of land (developer)

4 Party conducting assessment

- Environmental consultant

5 Proposed use

- Map of proposed development (if known)
- Type: residential/recreational/industrial

6 History of site (See Appendix B)

- Full history
- Sources of information
- Map (s) detailing past activities

7 Site Inspection – walkover

- Relevant geological factors
- Local topography
- Soil types
- Evidence of possible contamination
- Potentially contaminating features and installations

8 Site Inspection – research

- Information from the Environmental Agency on abstractions, pollution incidents, water quality classification, landfill sites, soil leaching potential, water resource status, current and future use of local groundwater, hydrogeology including depth and distribution of aquifers.
- Information from South Cambridgeshire District Council on former landfill sites, private water supplies, contaminated land, pollution incidents.
- Information from other bodies e.g. BGS, Landmark etc.
- Review of previous studies.

- Preliminary assessment on likely risks and recommendations for intrusive works if appropriate.
- Conceptual site model

Phase 2 study – Intrusive investigations

1 Initial comments

- Review of previous studies

2 Investigations

- Rationale for sampling methodology (e.g. screening knowledge of previous land use)
- Rationale for choice of analytes
- Scaled map of sampling locations
- Methods of investigation (e.g. number of boreholes, depths, pattern)
- Sampling methods, storage, maintenance of sample integrity
- Field measurements, instruments, and methods
- Laboratories used
- Analytes and analytical techniques (including extraction methods)
- Quality assurance methods for specific analytes
- Table of results
- Map displaying significant results
- Borehole log and soil profile (including description of fill)

3 Conclusions

- Discussion of ground conditions, (soil, gas, water, made ground)
- Discussion of soil/gas/water contamination
- Preliminary conclusions (e.g. most significant results, dispersion of contaminants, properties of contaminants that may affect health or environmental risk such as volatility or water solubility)
- Uncertainties relating to conclusions (e.g. adequacy of site characterisation, likelihood of missing significant contamination)
- Changes to site conceptual model from initial study
- Risk assessment, justifying choice of model if used
- Recommendations for further investigations if required
- Recommendations for remediation

APPENDIX 5D

Remediation checklist

1 Objectives

- Define purpose, scope and specific objectives
- Identify receptors to be protected

2 Works outline

- Description of ground conditions
- Type, form and scale of contamination to be remediated
- Methodology
- Site plans
- Phasing of work and timescales

3 Consents, agreements and licences

- Discharge consents, waste management licences required

4 Site management procedures

- Procedures in place to protect site neighbours, environment
- Site management procedures to protect site neighbours, environment and amenity during works, i.e. Health and Safety issues, including site security, dust, noise, odour controls, Control of surface run-off.

5 Variations

- Details of how variations from the approved method statement will be dealt with.

6 Evaluation

- Sampling strategy
- On-site observations
- Chemical analysis
- Remediation standards

APPENDIX 5E:

Validation/verification checklist

1 Summary of Remediation procedures

- Identify who carried out the work
- Detail and justify any changes

2 Substantiate the data

- Post-remediation sampling
- On-site and laboratory testing
- Sampling and monitoring results
- Summary data plots and tables relevant to remediation criteria

3 Confirmation

- Confirmation that remediation objectives have been met
- Recommendations for future maintenance, monitoring and reporting

APPENDIX 6

NOISE - DETAILED DESIGN GUIDANCE

1.0: General Requirements for Noise

2.0: Planning and Noise
2.1: Principles of PPG24

3.0: When is a noise assessment required?
3.1 Planning and design: submission requirements

4.0 Noise Sensitive Development proposed in a noisy environment

5.0: SCDC Outdoor and indoor noise level standards / criteria for Noise Sensitive Development

6.0: Noise sensitive residential development on a site dominated by an existing industrial type noise source only: BS 4142 assessment of acceptability

7.0: Noise Generating Development
7.1 Noise Generating Development Environmental Noise Standard
7.2 Delivering / Securing The Noise Standard for Noisy Development
7.3 Demonstrating Compliance with the Standard

8.0: Achieving acceptable Noise Levels Standards / Criteria
8.1: Sound-conscious urban design concept

9.0 Clubs, Pubs, Bars and Places of Entertainment such as Community Centres and Village Halls

10.0: Vibration

11.0: Sound Insulation: Inside and Between Residential Dwellings

12.0: Sound Insulation between Commercial/Residential Dwellings

13.0: Noise from Air Fields
13.1: Assessment of Air Craft Noise Impact

14.0 Design and Specification for Noise Barriers

15.0 Demolition / Construction Noise and Vibration

Current Noise Standards & References

Further Information / Contacts

Policy & Plans

NOISE: SUPPLEMENTARY DESIGN GUIDE

1.0: General Requirements for Noise

Planning applications for residential and industrial / commercial developments including places of entertainment and all applications where plant and equipment is proposed may need to be submitted with a noise survey and impact assessment prepared by a competent acoustician who should be a member of the Institute of Acoustics.

Essentially, where it is unlikely that residents will be able to keep windows open or sit on/in a balcony / garden without being bothered by one or more external noise sources, such as traffic, industrial / commercial noise or customers of entertainment venues, noise will be a material planning consideration. Under these circumstances a noise survey will be required.

The report should assess the impact of noise as a material planning consideration and give recommendations and specifications of noise mitigation measures / works, where necessary, that are required in order for the development to comply with SCDC's noise design requirements / standards.

When a proposed development or site requires acoustic protection / noise mitigation measures it should be considered at an early design stage.

2.0: Planning and Noise

Planning Pollution Guidance 24: Planning and Noise (PPG24: 1994) guides Local Planning Authorities (LPAs) on the use of their powers to minimise the adverse effects of noise and outlines the considerations taken into account in determining planning applications both for noise-sensitive premises and for those, which generate noise.

PPG24 acknowledges that noise can have a significant effect on the environment and on the quality of life enjoyed by individuals and communities, so its consideration and control is an important part of sustainable development in providing a healthy and quality living environment and is integral to place making.

With higher densities, more mixed-use development, and more demand for late night activities, good acoustic design needs to be actively promoted if noise is not to become a threat to SCDC growth areas and quality of life in new and existing residential areas. Environmental Health Officers and/or acousticians should be involved at an early stage.

Noise can be a material consideration in the determination of planning applications and the planning system is tasked with guiding development to the most appropriate locations.

2.1: Principles of PPG24

The underlying principles of PPG24 advocate the use of the planning system to ensure that, wherever practicable:

- New noise-sensitive developments are separated from major sources of noise such as road, rail and air transport and certain types of industrial development having regard to both the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future.

- New development involving noisy activities that have the potential to generate noise should, if possible, be sited away from noise-sensitive land uses.

PPG24 considers that housing, hospitals and schools should generally be regarded as noise-sensitive development.

Planning balances various competing environmental, social and economic needs and where it is not possible to achieve separation of incompatible land uses, for example noise sensitive development from noisy activities, local planning authorities should consider whether it is practicable to control or reduce noise levels by careful urban design, or to mitigate the impact of noise, through the use of conditions or planning obligations.

3.0: When is a noise assessment required?

As part of the 1App planning application procedure, SCDC local requirements require the submission of noise information / assessment if it is considered a determining factor. It is not always obvious when and what level of noise information is required and government guidance recommends that the local planning authority LPA should not require a level of detail to be provided that is unreasonable or disproportionate to the scale of the application.

To ensure a smooth passage through the planning system, even when a full environmental assessment is not mandatory, proposals for developments on noisy sites, or sites which generate noise should take account of noise.

3.1 Planning and design: submission requirements

The recommended sequence of stages in the planning and early design stages of noise sensitive development in a noisy area or a noisy development is as follows:

a. Consult with the Environmental Protection Section of Health & Environmental Services of the local authority to discuss the local area, any existing or envisaged noise issues and the need for and type of noise assessment that may be necessary.

b. Visit the proposed development location and carry out a site walk over, to assess the site and current noise climate. Identify any significant noise and vibration sources that exist and consider any envisaged / future noise that could have an impact on the proposed noise sensitive development and or identify existing noise sensitive receptors that could be adversely affected by a noisy development.

c. If noise impact is likely to occur? undertake a full representative noise assessment of the existing noise environment by measuring and or estimating / predicting noise levels in accordance with PPG24 and report the impact of noise. The remit of any noise assessment should be agreed in principle with the environmental health service of the local planning authority.

d. Evaluate layout options.

e. Determine noise criteria and limits for internal noise levels for noise sensitive development / building(s) having regard to the specific standards required by the LPA.

f. Determine noise criteria and limits for external spaces in and around the building(s) for example private amenity spaces such as gardens or balconies, common amenity areas, public open spaces having regard to the specific noise standards required by the LPA.

g. Determine environmental noise criteria and limits for noisy development (building(s), operational noise and or plant) having regard to the specific standards required by the LPA.

h. Consider whether noise mitigation measures can be designed into the development to achieve an acceptable noise environment for noise sensitive development and or mitigate noisy development that may have an adverse impact on existing noise sensitive premises, this can be considered sound conscious urban design.

i. Consider internal sound insulation requirements for noise sensitive development.

j. Consider the sound insulation of the building envelope / fabric for noise sensitive development and a noise insulation / attenuation scheme for noisy development to achieve the specific noise standards required by the LPA, but only after considering measures that can be implemented by noise conscious urban design.

k. Submit a noise assessment with the application reporting the influence / impact of noise with recommendations and noise insulation / mitigation measures to ensure an adequate level of protection against noise to meet the

Council's recommended outdoor and indoor noise levels and other noise standards.

The following table of questions may help assist in undertaking a simple desktop assessment to analyse the issues and constraints. However it is essential that applicants visit the development site prior to undertaking this task to establish site conditions and noise sources.

Potential Noise Constraint	Constraint affects Site
Noise sensitive development (housing for example) proposed close to a busy/noisy highway, railway, or near an airport or aerodrome?	Y/N
Noise sensitive development (housing for example) proposed close to an existing noise source on an adjacent site (i.e. noisy factory or plant attached to a building)?	Y/N
Does the development proposed include noisy operations or plant and is there a noise sensitive development on adjoining sites i.e. housing, schools etc?	Y/N
Potential Noise Constraint	Constraint affects Site
Will the development require noisy construction techniques to be used e.g. piling, use of generators, concrete breaking, etc?	Y/N

Will the building be used and operated at anytime between 23.00 and 07.00 including vehicles for deliveries and collections?	Y/N
Is it unlikely that residents will be able to keep windows open or sit on/in a balcony/garden without being bothered by one or more external noise sources, such as traffic, industrial /commercial noise or customers of entertainment venues?	Y/N

If any of the questions are answered as yes then a further detailed noise assessment will be required. At this stage it is often cost effective to engage the services of an acoustic consultant.

There are two main scenarios that are likely to arise when noise will require assessment:

a) Firstly, noise sensitive development proposed in a noisy environment.

This includes the introduction of new noise sensitive development such as new residential dwellings, schools and hospitals into or locating near to an existing noisy environment:

Existing environmental noise sources are likely to be road, rail traffic, aircraft, commercial / industrial and or agricultural related and existing building services

plants or equipment. One or a combination of the aforementioned noise sources may dominate the noise. An assessment of the impact of existing noise on occupiers of the proposed developments will be required.

b) Secondly, new development which generates noise:

Introducing noisy development near to existing noise sensitive premises, such as residential.

Applications for development that have the potential to generate noise are likely to be commercial / industrial and agricultural uses with associated process equipment and or building services plant of one description or another, usually air-conditioning / ventilation equipment. In addition, noise associated with vehicular movements to a development for example deliveries / collections or a significant increase in general traffic movements off site outside the development site can also have an impact on residents. Applications associated with pubs, clubs and places of entertainment will also require careful consideration. An assessment of the impact of noise from these developments on existing residential occupiers as a result of these proposed developments will be required.

4.0 Noise Sensitive (Residential) Development proposed in a noisy environment

When considering a site for residential development that is likely to be exposed to noise from existing sources, the suitability of the site for development should be assessed in accordance with the principles of Planning Policy Guidance Note 24: Planning and Noise: 1994, (PPG24), and BS 8233: 1999: Sound Insulation and Noise Reduction for Buildings - Code of Practice.

The approach of PPG24 is to assess sites according to various Noise Exposure Categories (NECs). The approach is set out in Annex 1 of PPG24 “Planning and Noise” (September 1994). This SPD guidance takes account of PPG24 and local circumstances. When assessing a proposal for residential development exposed to existing environmental noise, the SCDC Environmental Protection Section will use Table 1 to determine which of the four Noise Exposure Categories (NECs) A to D the proposed development site falls into, taking account of both day and night-time noise levels.

Category A, represents the circumstances in which noise is unlikely to be a determining factor, while Category D relates to the situation in which development should normally be refused. Categories B and C, deal with situations where noise mitigation measures may make development acceptable.

Values in Table 1 refer to average free-field noise levels determined for an open site at the position of the proposed dwellings, situated away from any existing buildings. Noise levels should be determined at a height of 1.2m to 1.5m above ground level at the position of the proposed dwelling. Noise levels at upper or lower floor levels

should also be established if significant differences in noise exposure are anticipated at different floor levels.

In accordance with paragraph of PPG24 where the average is on the boundary between NEC's B and C, it will be for the local planning authority to determine the more appropriate NEC for the proposal. Where existing buildings, bunds or screens affect sites, specific advice should be sought from the Council's Environmental Protection Section.

Table 1: NEC's For New Dwellings Near Existing Noise Sources

Noise Levels[0] Corresponding to the Noise Exposure Categories (NEC) for New Dwellings L_{AeqT} dB Near Existing Noise Sources						
	Times	**Existing Noise Source**				**Advice on treatment of residential planning applications in areas of each NEC**
		road traffic	**rail traffic**	**air traffic**	**mixed sources[3]**	
A	07.00-23.00 23.00-7.00[1]	<55 <45	<55 <45	<57 <48	<55 <45	**Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level**
B	07.00-23.00 23.00-7.00[1]	55 – 63 45 - 57	55 - 66 45 - 59	57 - 66 48 - 57	55 - 63 45 - 57	**Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels in Table 2**
C	07.00- 3.00 23.00-7.00[1]	63 - 72 57 - 66	66 - 74 59 - 66	66 - 72 57 - 66	63 - 72 57 - 66	**Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise to meet the Council's recommended**

						outdoor and indoor noise levels in Table 2
D	07.00-23.00 23.00- 7.00[1]	>72 >66	>74 >66	>72 >66	>72 >66	**Planning permission should normally be refused**

Notes

[0]**Noise levels**: the noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representative of typical conditions at the position of the proposed dwellings.

[1]**Night-time noise levels (23.00 - 07.00)**: sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq'8h}$ (except where the $L_{Aeq'8h}$ already puts the site in NEC D).

[2]**Aircraft noise**: daytime values accord with the contour values adopted by the Department for Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.

[3]**Mixed sources**: this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.

Adapted from PPG24: Planning & Noise

The categorization of a site into a residential NEC should only be viewed a first step that determines in principle the suitability of the site for development. It can be seen that the noise level ranges used to determine each respective NEC are broad and should be interpreted carefully. It should be noted that some of the figures used to determine the various noise levels are based on World Health Organisation (WHO) research findings that have been superseded by revised guidance with lower noise levels in the order of 5dB(A) less.

Sites falling into NEC C and D shall be subject to early discussion with the Environmental Protection Section within Health & Environmental Services. The guidance in PPG24 is such that sites should normally be refused planning permission on noise grounds. Only in exceptional and justified circumstances will development be permitted on NEC D and only when acceptable internal and external noise standards can be achieved.

5.0: SCDC Outdoor and indoor noise level standards / criteria for Noise Sensitive Development- Residential

Following the PPG24 NEC procedure the suitability of the site for noise sensitive development will be determined in principle. The next step will be to consider any noise reduction / mitigation measures that can be designed into the proposals and or a noise insulation scheme to buildings as necessary to meet the Council's recommended outdoor and indoor noise levels to ensure an adequate level of protections against noise.

SCDC will expect any noise sensitive residential development to achieve the noise level criteria detailed in Table 2 below, which are based on BS 8233: 1999: Sound Insulation and Noise Reduction for Buildings - Code of Practice.

BS 8233 provides information on the design of buildings to have internal acoustic environments appropriate to their functions. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics for non-critical situations. These criteria and limits are primarily intended to guide the design of new or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise level.

The planning application and any associated noise assessment shall include recommendations and proposals to achieve the noise criteria detailed.

Table 2: Noise standards for noise sensitive development: external noise affecting new housing, hostels and hotels

Area	Noise Criteria
External Private Amenity Areas e.g. gardens & balconies and Communal Gardens	Levels should be as low as practicable and not greater than 50dB $L_{Aeq,T}$
Bedrooms	Not greater than 30dB $L_{Aeq,T}$ 2300 – 0700 hrs No single peak noise events greater than 45 dB $L_{Amax(fast)}$ 2300 – 0700 hrs
Living rooms & dining rooms	Not greater than 35dB L_{AeqT}.
Kitchens/bathrooms/utility rooms	Not greater than 45dB $L_{Aeq,T}$

These recommended levels are derived from Table 5 of BS 8233 'Sound Insulation and Noise Reduction for Buildings Code of Practice'.

Note 1: At BS 8233: 1999, at paragraph 7.6.1.2 it is stated – "…As well as protection for buildings, barriers or bunds should be considered to protect the gardens. In gardens and balconies etc., it is desirable that the steady noise level does not exceed 50 dB $L_{Aeq,T}$ and 55 dB $L_{Aeq,T}$ should be regarded as the upper limit". SCDC aspires to the achieving the lower limit, as this is likely to result in moderate annoyance.

Note 2: Internal building services noise generated from ventilation systems and lifts etc should meet the same criteria as specified above.

Note 3: Time Base T for $L_{Aeq,T}$ should be appropriate for the circumstances, typically 1 hour day and 5 minutes at night and in agreement with LPA

Note 4: PPG24 and BS 8233 makes it clear than the above recommended absolute noise levels should only be used for anonymous / relatively benign noise, that is, noise not attributable to or has no correlation with any particular site or premises e.g. diffuse transport

related noise. For dominant industrial noise consideration should also be given to BS 4142 and relative noise impact.

Note 5: due regard may also have to be given to the emerging WHO document Night Noise Guidelines for Europe 2009 which recommned night time external noise levels

The revised approved document E of the Building Regulations came into force in July 2003. One of the consequences is that new and refurbished schools will have to meet strict standards for noise levels, insulation and room acoustics. These standards are set at Section 1 of the DfES Building Bulletin 93, "Acoustic Design of Schools", February 2003. Building Control Officers of Local Authorities will have responsibility to ensure that the standards are complied with. A liaison will take place between Environmental Health and Building Control at SCDC for the purpose of ensuring that classrooms are adequately insulated against transportation noise sources. Noise from schools to surrounding areas is still controlled under planning legislation.

6.0: Noise sensitive residential development on a site dominated by an existing industrial type noise source only: BS 4142 assessment of acceptability

It should be noted that the concept of Noise Exposure Categories (NEC's) in PPG24 is only applicable for new noise sensitive development such as residential near transport related noise sources that dominate the ambient noise level including a mixed noise site where industrial noise is present but not dominant.

PPG24 states that "NEC noise levels should not be used for assessing the impact of industrial noise on proposed residential development because the nature of this type of noise, and local circumstances, may necessitate individual assessment".

Annex 3 paragraph 19 of PPG24 advises that for residential exposed to noise dominated by an industrial type source the recommended method of determining noise acceptability is to use BS 4142 1997: Method for rating industrial noise affecting mixed residential and industrial areas.

Due to its variable character, industrial noise is not straightforward and is difficult to assess in the context of its impact on amenity and mitigate to an acceptable level.

In the case of an existing noise source it is paramount that noise is carefully considered to avoid a future scenario were statutory noise nuisance action for loss of use and enjoyment of their property can be taken by future residents, against an existing established business generating noise. There is no defence that the noise producer was there first and this could lead to serious conflict and at worst could be to the detriment of the business and its economic viability.

The standard itself offers no test of acceptability, in determining whether a proposed site is suitable for residential development when near an existing industrial type noise source. PPG24 only infers that that the "likelihood of complaints" assessment

method, which is predictable to a degree using BS 4142, should be the basis of acceptability for new noise sensitive residential premises when industrial type noise is dominant. Whilst a useful guide, BS 4142 should not be solely relied upon to accurately establish the impact of industrial development in terms of noise. The likelihood of complaints does not necessarily equate to protection of amenity or to ensure the provision of a quality living environment, in planning terms.

The standard takes a relative assessment approach to noise and uses comparisons between the measured background levels of a location in the absence of a noisy industrial type activity / process and the anticipated noise levels from the proposed or existing activities, to ascertain a 'rating level to gauge "the likelihood of complaints". The BS 4142 assessment method suggests that, in general:

- an increase in 10dB or more indicates that complaints are likely
- a difference of 5dB is likely to be of marginal significance,

Any noticeable acoustic features such as, tonal or impulsive characteristics are likely to increase the likelihood of complaints and this is taken into account by the 'rating level' defined in BS 4142, a 5dB correction penalty is added. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day, evening, night and weekend) chosen to suit the hours of operation of the proposed development.

As stated, BS 4142 offers no test of acceptability in terms of suitability of a site for noise sensitive development. In the absence of such guidance SCDC will use the following rating levels in relation to existing background noise levels to categorise the site into equivalent NECs, at an appropriate location for proposed residential buildings:

- an increase in 10dB or more indicates that noise complaints are likely: the site should be placed in NEC D, that is **"Planning permission should normally be refused"**

- an increase between 5 to 10dB indicates that noise impact is significant: the site should be placed in NEC C, that is **"Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise"**

- a difference of 1 to 5dB indicates that noise impact is likely to be of marginal significance: the site should be placed in NEC B, that is "**Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protections against noise** to meet the Council's recommended outdoor and indoor noise levels

- - 10dB or more - complaints unlikely: the site should be placed in NEC A

If industrial noise contains dominant tonal frequencies, these should be given special consideration as difficult to measure, assess and mitigate.

In applying BS 4142 due to the relative noise methodology employed the significance of absolute noise levels detailed in BS 8233 should not be ignored and SCDC outdoor and indoor noise level standards / criteria for noise sensitive development will also need to be considered. SCDC will expect the higher standard of protection to be provided. In particular the noise impact of operational noise on proposed external amenity areas such as gardens and balconies and the number and peak noise incidents / levels such as LAmax, require very careful consideration.

Where the predictive BS 4142 assessment indicates that complaints from occupiers of new residential dwellings would be likely as a result of noise from existing industrial/commercial noise sources, the application is likely to be refused. Locating noise sensitive development near existing noisy is particularly problematic if noise is a issue as the options to mitigate noise can be limited. The applicant would need to otherwise demonstrate that they are in negotiation with the owners of the industrial/commercial facilities to control and reduce noise sufficiently such that complaints are unlikely.

The control of existing industrial / commercial is not straightforward as it is not possible to impose conditions requiring noise mitigation measures off site outside the development / application site which is not in the control of the applicant. In such cases section 106 planning obligation may be with the owners of noise sources off-site to secure noise mitigation measures but this will require very careful consideration, as there is no guarantee that measures will be implemented.

7.0: Noise Generating Development

Applications for development that have the potential to generate noise (noisy development) such as commercial / industrial and agricultural uses with associated process equipment and or building services plant of one description or another, usually air-conditioning / ventilation equipment and in particular when they have the potential to have an impact on existing noise sensitive development and or tranquil areas require careful consideration. Such applications may need to be submitted with a noise assessment.

It is important to emphasise that single pieces of plant such as air conditioning units and air source heat pumps irrespective of whether they are industrial commercial or domestic may also need to be assessed for their noise impact.

The concept of Noise Exposure Categories (NEC's) in PPG24 is only applicable for new noise sensitive development. For new noisy development PPG24 recommends the use BS 4142 1997: Method for rating industrial noise affecting mixed residential and industrial areas.

7.1 Noise Generating Development Environmental Noise Standard / Criterion

Notwithstanding the fact that PPG24 recommends the use BS 4142 1997, all noisy development will need to be controlled in order to protect existing residential amenity and limit creeping background noise levels. The Environmental Protection Section of Health & Environmental Services will only recommend approval of a planning application for noisy development when it can be demonstrated that the following standard can be achieved:

the noise level from the operational end use including building noise breakout, processes and all powered plant, vents and equipment, that may operate collectively and having regard to a worst case operational scenario- that is the rating level as defined in BS 4142 (operating under full capacity / power / load), shall not increase / raise the existing concurrent lowest measured representative background level dB $L_{A90',1hr}$ (L_{90}) during the day between 0700 to 2300 hrs and the existing lowest background level dB $L_{A90',5mins}$ (L_{90}) during night time between 2300 to 0700 hrs, at the boundary of the premises subject to this application (or if not practicable at a measurement reference position / or positions in agreement with the LPA) by more than 3dB and having particular regard to location of noise sensitive premises. Noticeable acoustic features and in particular tonal / impulsive noise frequencies should be eliminated or at least considered in any assessment and should carry an additional 5 dB(A) correction. This is to guard against any creeping background noise in the area and to protect the amenity of the area, preventing unreasonable noise disturbance to other premises.

Nothwithstanding that the fact that the purposes of the standard is to protect amenity and limit cumulative creeping background noise levels, it is acknowledged that in exceptional circumstances and in particluar where residential may be a long distance away from the application site, the 3dB limit increase at the boundary of premises subject to the application could be relaxed to an alternative appropriate position / distance in agreement with LPA or as an agreed boundary noise limit. This will will depend on local circumstances, whether adjacent land is in the ownership of the applicant, the character of the area and when such a relaxation can be fully justifiifed by the applicant.

7.2 Delivering / Securing The Noise Standard for Noisy Development

This environmental noise standard could be secured in a number of ways, such as the imposition of a condition requiring the full implementation of an acceptable noise assessment that has been submitted with a planning application and which details

noise mitigation measures / recommendations that can achieve SCDC noise standard for noisy development.

In the absence of an acceptable noise assessment the approval of a planning application for noisy development will only be recommended if Environmental Health conclude that the SCDC noise standard for noisy development can be readily and reasonably achieved.

If detailed noise predictions or noise assessment for noisy development is not provided the 1App planning application should at least include a design environmental noise criterion to be achieved at the boundary of the site, to mitigate the impact of noise on existing noise sensitive premises to an acceptable level. In such cases a condition may be imposed requiring a noise insulation scheme for buildings, processes and plant / equipment which demonstrates that SCDC noisy standard for noisy development can be achieved, to be submitted in writing for approval by the local planning authority and any approved scheme shall be implement prior to the commencement of use.

In addition to being applied to purely industrial sites and cases where industrial plant machinery is in use, the standard should also be applied to the following scenarios:

- Premises where there are manoeuvring lorries, which are loaded or unloaded by forklift trucks (or tailgate).
- Premises where there are manoeuvring lorries on which an on board refrigeration plant is run or charges.
- Extract ventilation plant at restaurants.
- Development with mechanical services plant and other equipment.
- Loaders, dumpers and haulage vehicles etc operating in yards handling building materials or at waste disposal sites etc.
- Waste Disposal / Transfer Sites, including Material Recovery Facilities (MRF).
- Non residential uses expect when residential includes renewable energy plant and equipment.

It should be noted that the advice given is mainly for noise from industrial and commercial developments, the most common type of planning application likely to be received. PPG24 offers further detailed guidance on the assessment of noise from different sources such as noise from road traffic, railways, aircraft, military aerodromes, helicopters and heliports, recreational and sporting activities and landfill waste disposal sites.

The use of BS 4142 for a noise assessment should be agreed in principle with an officer of the Environmental Protection Section of Health & Environmental Services.

The noisy development standard will also guard against any creeping background noise in the area whilst safeguarding the health and amenity of residential occupiers in the area, preventing unreasonable noise disturbance to other premises.

7.3 Demonstrating Compliance with The Noise Standard for Noisy Development

To demonstrate that this requirement is achievable and can be complied with, it is recommended that the agent/applicant submits a noise assessment survey / report in accordance with the principles of BS4142: 1997 “Method for rating industrial noise affecting mixed residential and industrial areas” or similar. In addition, to validate / verify any measured noise rating levels, noise levels should be collectively predicted at the boundary of the site having regard to neighbouring residential premises.

Such a survey / report should include: a large scale plan of the site in relation to neighbouring noise sensitive premises with noise sources and measurement / prediction points marked on plan; a list of noise sources; details of proposed noise sources / type of plant such as: number, location, sound power levels, noise frequency spectrums, noise directionality of plant, noise levels from duct intake or discharge points; potential building noise breakout, details of noise mitigation measures (attenuation details of any proposed noise insulation of building envelope, enclosures, silencers or barriers); description / details of full noise calculation procedures; collective predicted noise levels at noise sensitive receptors internal / external, background noise levels at a representative sample of noise sensitive locations (background L_{90}) and hours of operation for end use. Any report shall include raw measurement data so that conclusions may be thoroughly evaluated and calculations checked. Any ventilation system with associated ducting should have anti vibration mountings.

Octave and third-octave band noise frequency spectrums

It should be noted that BS4142 and in particular the use of an overall broadband dB(A) rating level may not adequately assess the impact of acoustic features such as tonal, low frequency noise and impulsive noise. Consideration may also need to be given to any adverse increase in background octave and third-octave band noise frequency spectrums due to a specific noise source.

When considering any proposal for noisy development such as industrial, commercial or recreational development, the Council may also take into account any increase in road traffic noise and vehicular movements that might arise as a result of such development and the difficulties in controlling noise both on and off site from vehicles. The Council may seek, by condition or agreement with the developer, to minimise traffic noise from the proposed development.

Where planning permission is granted for any business use or development in a particularly sensitive location near to noise-sensitive development, the Council may seek to restrict that use to office accommodation only (Use Class B1(a)).

8.0: Achieving acceptable Noise Levels Standards / Criteria

Mitigation of the effects of noise can be achieved by:

i. control at the source (measures to reduce noise emissions at source such a quiet plant, noise insulation of buildings, plant enclosures or quiet road surfaces and or noise barriers/ earth bunds);

ii. control of the transmission path (adequate distance separation, building location, form and orientation, screening / noise barriers);

iii. control of noise at receiver (internal planning such as non habitable rooms providing a buffer, orientation of noise sensitive rooms and balconies and gardens way from noise by barrier dwelling blocks, single aspect courtyards schemes and staggered terraces, careful fenestration, noise insulation scheme for the building envelope of noise sensitive buildings and also buildings generating noise, reduced external amenity, acoustic ventilation)

iv. by controls over the operations that generate the noise (such as controls over the hours of operation, deliveries / collections, reduced traffic speeds).

The applicant is encouraged consult the LPA at an early stage about the possible use of such measures and whether they are desirable or achievable, as this may enable the incorporation of such noise mitigation measures into the design of the proposal before it is formally submitted for determination. Noise mitigation measures integrated into the overall design of the development should be first in a hierarchy of noise mitigation measures. The control of the noise at the receiver in terms of noise insulation of the building envelope shall be a last resort and the final line of defence against adverse external noise. SCDC would advocate the use of sound conscious urban design as an integral part of any the master planning stage.

8.1: Sound-conscious urban design concept

The concept of sound conscious urban design is emerging. Its value to and in spatial planning and urban design is recognised and discussed at length in various sections of the Mayor of London document “Sounder City, The Mayor’s Ambient Noise Strategy, Mayor of London, March 2004”.

Urban designers should not just abate or mitigate noise, as a negative afterthought, but work consciously with sound as a positive element of good design. It is acknowledged that sound quality can contribute to defining a place and place making.

Action to influence 'design for noise' has tended to focus either on overall policy guidelines (e.g. Planning Policy Guidance Note No. 24) or the detail of building acoustics and noise control standards or specifications.

The Mayor's Ambient Noise Strategy provides some useful advice on Sound-conscious urban design and the following practical noise reduction issues / measures are viewed as relevant to design in SCDC:

- **Façade continuity and 'quiet side'** - Buildings can be designed not only to protect their occupants, but to screen other areas from noise. High density development following traditional street blocks can reduce noise on the 'quiet side' by 10 to 20 dB(A).

- **Spaces between buildings** - Although enclosed spaces can often be tranquil, tightly-enclosed spaces can also 'trap' sound, including from poorly designed, installed or maintained ventilation plant, waste facilities, vehicle manoeuvring, neighbours, or aircraft. The balance of advantage between contained and more open layouts will depend on the relative contributions of different noise sources. In noisy areas, acoustic absorbency within 'courtyard' areas should normally be maximised, especially from dense vegetation and soft ground. Rooftop planting may be useful on lower level roofs. In quieter spaces, sound reflection can help people sense where they are. Paving design should consider noise not just from road vehicles, but trolleys, and, particularly over or near bedrooms, footfall. 'Solar pergolas' with photovoltaic panels, could modify sound propagation.

- **Side streets and 'side on' buildings** - Orienting blocks, terraces or streets of housing at right angles rather than parallel to a road or railway reduces façade noise levels, but means that both sides of a building can be equally noisy, and noise can spread. Staggering of units in terraces, projecting service cores, wing walls or fins, and other 'self-protecting' design can screen façades and openings. For side streets, diffusing façades, and cantilevered or bridging 'gateway' development (with absorptive soffits) can reduce propagation. Architectural noise barriers, transparent screens, or end-of-row infill development could be considered.

- **Façade reflectivity** - Multiple reflections between opposing, acoustically hard building surfaces increases noise levels, particularly in 'urban street canyons'. Façades at the wrong angle can reflect sound into quiet areas, as can curved and outward sloping buildings. Sound absorbing panels, deep acoustic profiling, 'absorptive banners' and other elements should be considered. A wider choice of acoustically absorptive materials needs to be developed, ideally using recycled materials. In compact urban environments, making barrier surfaces more absorptive is generally preferable to inclining them to reflect sound upwards.

- **Noise and height** - High buildings, with less shielding from other buildings, may receive noise from a wider area. Stepping-back of upper floors, canopies and other projections can offer screening. Acoustic balconies, with high imperforate parapets and absorptive linings to the soffit of any projection above, can reduce noise at a window by 5 dB. The predictive capabilities of noise models need to be improved, for both towers and 'urban canyons'.

- **Dual façades and window design** - Conservation policies will need to be balanced with the noise and energy benefits of innovative design, including design of window surrounds to offer screening, secondary glazed façades and photovoltaic exterior secondary glazing.

- **Shallow floor plates, ventilation and cooling** - Growing demand for air handling, cooling and other plant can increase the risk of 'a creeping ambient noise level'. Much recent prime UK office development has been air-conditioned, with large floorplates. Sealed environments are suited to the noisiest locations, but plant can create noise. More continental European-style shallower floorplates should be sought, with greater use of natural ventilation. Such development is well suited to mixed-use areas, avoiding the risk of noise from air-conditioning plant. Noise from mechanical plant can also be reduced with 'borehole cooling'. Any fans and vents on the 'quiet side' should be well silenced and/or screened, with regular maintenance. Visually attractive ways of incorporating vents on street frontages should be considered, such as in 'banner' light features. Where more sustainable alternatives cannot be achieved, effective ways need to be secured to control noise from mechanical plant throughout operational life. This applies especially to growing numbers of small 'bolt-on' cooling or air handling units in dense, mixed use areas.

- **Vehicle access and parking** - Car free developments could reduce the need for hard paving, as well as noise sources. Waste storage and collection should be located away and/or screened from noise sensitive uses. Car parking and service areas should be screened, enclosed, or buffered with less sensitive uses. Enclosed car parks and bays should be designed to minimise sound reverberation and breakout. Lockable gates to residential courtyards at night can reduce disturbance from vehicles and on-street revellers, especially in mixed-use areas, while avoiding the sort of exclusion associated with the 24- hour gated enclave.

- **Maintenance and cleaning** - Quiet equipment and processes should be specified (e.g. raking, sweeping and local composting, rather than leaf blowing and carting away).

- **Features of soundscape interest** - Many sounds may be positive or negative depending on context (e.g. active water, wind in trees or rushes, loose surfaces, gratings, reverberant spaces).

- **Balancing needs** - Passive solar design, in which homes need to face roughly south, may make it difficult to create a 'quiet side'. Noise screening could increase shading. More linking of buildings to reduce noise propagation may mean accepting some change in local character, although visual monotony can be avoided by set-backs and many other design features. Very long or deep 'urban canyons' may inhibit dispersion of air pollutants. The balance between noise reduction and other needs should be struck on a place-specific basis, taking account of potential changes in noise sources, and in competing needs, over the lifetime of the development.

Reference / Source: "Sounder City, The Mayor's Ambient Noise Strategy, Mayor of London, March 2004", downloadable from:
http://www.london.gov.uk/mayor/strategies/noise/docs/noise_strategy_all.pdf

Applicants should be aware that the granting of planning permission and compliance with any conditions attached, will not necessarily protect them from legal action brought by either a Local Authority or private citizens under Part III of the Environment Protection Act 1990, or subsequent legislation, for creating a statutory nuisance from noise, dust fumes or smell.

8.2: Ventilation requirements and Noise Insulation of Noise Sensitive Premises:

Ideally, SCDC internal levels should be achieved even when future occupiers open windows. However on some potentially noisy sites, windows may need to be double glazed or fitted with secondary glazed units and tightly closed.

The Building Regulations Approved Document F 2006 (ADF 2006): Ventilation requires that habitable rooms in dwellings have background ventilation, based on the number of bedrooms or total internal floor area, and purge (formerly rapid) ventilation in each habitable room of a minimum of 4 air changes per hour per room directly to the outside.

If achieving internal noise levels rely on keeping openable windows closed, then external windows will need to be sealed shut and not openable, unless background and rapid ventilation (purging) and cooling can be provided by alternative means, for example during hot summer days / nights, without the need to open external windows.

It should be noted that this approach will only be considered when the external noise causing the potential adverse impact is an anonymous noise such as road traffic. Such a compromise will not be permitted when the external noise is dominated by industrial, trade or business type uses, as this may result in statutory noise nuisance legal enforecement action been taken against the noise maker, an unaccetable situation for all.

ADF 2006, also states that in noisy areas it may be appropriate to use either sound-attenuating background ventilators or mechanical ventilations solutions, depending on noise level and any planning conditions.

Opening windows can compromise the noise insulation standard / scheme required. This sometimes means that certain traditional building elements can no longer be relied on as a means of rapid ventilation such as windows, patio door and or Juliet Balconies. Simple trickle vents and or acoustically treated airbricks that provide only background ventilation may not be acceptable.

Passive stack ventilation and or mechanical forced ventilation units, incorporating fans are available for insertion in external walls may be required. However, ducted systems with intakes on the quiet side of the building may be required in very noisy situations, or where appearance rules out through-the-wall fans.

All schemes for ventilation shall comply with Approved Document F Building Regulations (refer to BRE Information Paper IP4/99:"Ventilators: Ventilation and Acoustic Effectiveness" (Oct 1999) and should conform to the acoustic requirements of the Noise Insulation Regulations 1975.

9.0: Clubs, Pubs, Bars and Places of Entertainment such as Community Centres and Village Halls

With regard to such uses advice contained within paragraph 20 of PPG24 is as follows:

'Commercial developments such as fast food restaurants, discos, night clubs and public houses pose particular difficulties, not least because associated activities are often at their peak in the evening and late at night. Local planning authorities will wish to bear in mind not only the noise that is generated within the premises but also the attendant problems of noise that may be made by customers in the vicinity. The disturbance that can be caused by traffic and associated car parking should not be underestimated'.

All proposals for development of these types, including where proposed activities on-site are likely to result in a development being a venue for patrons with the potential to generate noise, shall be required to submit an assessment. This should include a prediction of the potential noise impact to occupiers of surrounding and structurally attached residential properties, including other noise sensitive uses, such as schools and nursing homes.

The premises should be constructed with adequate provision for sound insulation and effective acoustically treated ventilation to ensure that music noise and the general 'hubbub' created by patrons does not materially impact on the amenity of surrounding occupiers. As part of any noise insulation scheme consideration should be given to the installation of "noise limiter" to restrict the volume of noise generated

Every business / organisation should assess the potential for noise problems in relation to their particular premises and activities, having regard to neighbouring premises. Further advice regarding the control of noise from licensed and/or similar premises, is contained in the following booklets/documents:

- *Licensed Property: Noise Control, Effective Management of Noise Levels from Licensed Premises,* available from the British Beer & Pub Association (BBPA), Market Towers, 1 Nine Elms Lane, London, SW8 5NQ, telephone: 020 7627 9191, facsimile: 020 7627 9123, website: www.beerandpub.com

- *Good Practice Guide on the Control of Noise from Pubs and Clubs (March 2003),* available from the Institute of Acoustics**,** 77A St Peter's Street, St Albans, Hertfordshire, AL1 3BN (01727 848195)

- Defra document, *"Noise from Pubs and Clubs (Phase II)",* Contract No. NANR 163, Final Report May 2006: downloadable from: http://www.defra.gov.uk/environment/quality/noise/research/pubs-clubs/phase2/pubsclubs-phase2.pdf

10.0: Vibration

Significant vibration within SCDC (apart from temporary construction works) is most likely to be generated by surface trains running on railway tracks throughout the district. Additional sources could include industrial premises with specific processess / equipment such as presses and gilloutines generating ground borne vibration at nearby sensitive premises. Ideally, track form and wheel/rail interface would be in the optimum condition to minimise vibration generation. Road traffic is unlikely to generate any significant vibration where the road-wearing surface is in reasonable repair. A vibration assessment should be undertaken where surface railways, are within 75m to 100m of a proposed development site. The Environmental Protection Section within Health & Environmental Services can advise and give guidance on particular sites.

Any site affected by vibration will require an assessment of the impacts of that vibration. Vibration acceleration ($m/sec^2 rms$) shall be measured at foundation level in each of the three orthogonal directions x, y and z.

The Vibration Dose Values (VDV) should be calculated and assessed from the measured acceleration levels in accordance with BS6472-1: 2008: Guide to evaluation of human exposure to vibration in buildings part 1: Vibration sources other than blasting. For residential development, the VDV ($m/s^{1.75}$) should not exceed those in Table 3 below, abstracted from Table 1 of BS 6472-1:2008(revised).

Table 3: Residential Development Vibration Dose Values (m/sec 1.75)

07:00 – 23:00 16 hour day	23:00-07:00 8 hour night
0.2 to 0.4	0.1 to 0.2
Note: For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16 h day.	

The VDVs given in Table 3 are for in-property levels of exposure. Measurements made on an undeveloped site may not allow for transfer functions from the ground into foundations, normally taken as a multiplication factor of 0.5. In addition, amplification of vertical vibration magnitudes in suspended floors, due to resonance, may increase vertical vibration magnitude by a factor of 2 but this will be dependant on type of floor construction, span and depth. Where a site has existing buildings, vibration should, if possible, be measured on the foundations, ground beams or pile caps. Measurements made within existing buildings need to be corrected to derive VDV which would apply to the new buildings on the same site.

Human response to vibration varies with the duration of exposure, the magnitude of the acceleration and the frequency. Where VDV exceed those of Table 3, proposals shall be submitted to mitigate vibration to acceptable levels such as suitable vibration resilient foundation design.

Re-radiated noise, as a result of vibration from adjacent railways and other sources, should be given careful consideration within habitable residential rooms.

All building services plant and equipment such as air conditioning and air handling plant can generate vibration, which in turn can re-radiate as noise within buildings. All services and equipment plant shall be supported on proprietary anti-vibration mounts.

The content of a vibration assessment report shall follow the format suggested in Annex A (informative) of BS 6472-1:2008.

11.0: Sound Insulation: Inside and Between Residential Dwellings

The requirements of Approved Document E: *Resistance to the Passage of Sound* of the Building Regulations are deemed adequate for the sound insulation transmission loss between floors and walls of adjoining residential dwellings. No planning conditions are necessary as they are part of Building Regulations. A defect in workmanship during the installation of sound insulation systems is primarily the cause of complaints both in conversions and new builds from subsequent occupiers. The modern fashion for hard floor surface finishes such as hardwood floors make the necessity for adequate impact sound insulation in floors in apartment blocks essential. The requirements of Approved Document E with regard to impact sound insulation apply to the constructed floor without carpet and underlay.

However it should be noted that The Code for Sustainable Homes includes sound insualtion under the Health and Wellbeing category. There is an opportunity to be awarded an extra 4 credits for achieving higher standards of sound insulation than required by Approved Document E of the Building Regulations.

Adequate site control of the installation of sound insulation systems is important. Ideally specialist operatives approved by the system supplier / designer would undertake installation.

12.0: Sound Insulation between Commercial/Residential Dwellings

The requirements of Approved Document E of the Building Regulations specify sound insulation transmission loss between the floors and walls of adjoining dwellings. The requirements of Approved Document E may not be adequate where commercial use adjoins or attaches to residential use.

If an application proposes a situation where residential use and commercial use will share a separating floor or wall an assessment of the required sound insulation performance of the floor or wall, should be submitted together with construction details of any proposed sound insulation scheme.

13.0: Noise from Air Fields

South Cambridgeshire has a long association with flying. Consequently there are a number of established aerodromes and smaller airfields in the district. The Council acknowledges that aviation contributes to national, regional and local economies and a number of industries established on local airfields are important in that context. At the same time airfields can raise difficult environmental issues. These need careful consideration to strike the right balance between a number of different interests that can be in conflict. In particular, noise resulting from flying activities has been a source of complaints in the past and is still a very sensitive issue in some areas of the district.

There are two larger airfields in the district. Firstly, on the eastern edge of the City, Cambridge Airport (Marshall's) lies predominantly within South Cambridgeshire. The airport is a base for general aviation including charter flights to Europe, business and recreational flying, flying instruction and aircraft repair. As a prestigious firm bidding for major contracts, Marshall's is a significant local employer. The District Council is represented on the Cambridge Airport Liaison Consultative Committee. Secondly, Duxford, to the south of Cambridge, forms part of the Imperial War Museum and is a site of national and international importance, depicting the history of twentieth century conflict. The Council is represented on the Duxford Airfield Management Liaison Committee.

There are a further seven smaller aerodromes and airfields in South Cambridgeshire. Three of these are licensed by the Civil Aviation Authority (Bourn; Fowlmere; and

Little Gransden), while four are unlicensed airfields / airstrips (Gransden Lodge Gliding Site; Little Shelford; Top Farm, Croydon; and Willingham).

Some of these sites operate within strict specific limits imposed by planning permissions. Others have established use rights affording operators with various degrees of potential scope for increasing flying or other associated activities without incurring any need for additional on-site infrastructure in the form of buildings, engineering operations or material changes of use.

In view of the variety of airfields within the district, the range of operating and planning regimes under which they are administered, and the differences in their local geographical circumstances and relationships, it is not possible to devise detailed prescriptive policies that can be applied to all sites with equal precision or fairness. **Policy TR6 "Aviation Related Development Proposals**" of the LDF is intended to provide a flexible framework within which any individual proposal can be considered in the light of all the particular local circumstances.

Most of the smaller airfields/airstrips operate on a small scale and are located in very rural, generally tranquil, areas at some distance from major elements of the transport infrastructure. The principal function of these facilities is, in the broadest sense, 'recreational'. The Council do not consider it appropriate that this situation should change. It is therefore unlikely that planning permissions will be granted for any activities that would have that effect.

13.1 Assessment of Air Craft Noise Impact

Aircraft noise will usually be assessed in terms of the daytime noise exposure index (LAeq, 16h) supplemented as appropriate by other considerations such as the maximum noise level of individual events. It may also be necessary to adopt acceptability criteria for the noise exposure level appropriate to local circumstances, for example to account for public perception of increased annoyance where local background noise conditions are unusually low or where flying activities are already experienced from the use of other local airfields.

PPG24, Annex 3, Paragraph 7 states:

Using forecast contours, it should be possible to determine approximately which areas are likely to fall within the different noise exposure categories. For small aerodromes local planning authorities **should not rely solely on Leq where this is based on less than about 30 movements a day**. Local planning authorities should also be aware that in some circumstances the public perceive general aircraft noise levels as more disturbing than similar levels around major airports.

To give a more representative indication of impact it is recommended that forecast aircraft noise contours for L_{eq} levels, are generated using appropriate modeling software such a the Integrated Noise Model (INM) or the UK Civil Aircraft Noise Contour Model (ANCON) or similar. This would provide for a more comprehensive

assessment and should be used to indicate the size of area and the likely number of residential premises / number of future residents who may be affected by aircraft noise.

Other factors relevant to a judgement as to whether or not a development would give rise to an unacceptable amount of noise could be (a) the type and weight of aircraft to be operated from the airfield, (b) the total number of proposed movements in and out of the airfield, (c) the type of aircraft activities proposed including any touch and go movements or circuit training, (d) the proposed total number of daily movements, and (e) the proposed hours of operation. Where necessary or appropriate, conditions may be imposed to cover these and any other essential matters. In certain cases such conditions may allow for a limited number of exceptions above the imposed restriction.

It will be helpful in the determination of planning applications if the promoters of any proposal are able to demonstrate the existence (or proposed existence) of a local liaison committee comprising representatives of a suitable range of interested local bodies. The completion of a Section 106 planning obligation may be an appropriate way of demonstrating this commitment.

Certain types of flying activity may result in a different level or type of potential impact from that caused by conventional modern aeroplanes taking part in 'normal' flights. Such disturbance may often (but not always) be more severe. In all such cases, particularly those quoted as examples in the policy, the Council will require applicants to state whether their proposals are intended to provide for these kinds of activities and, if so, to describe their intended scale. In appropriate cases the degree of any nuisance arising from proposed flying activities may be assessed (a) by the use of on-site demonstrations or (b) by the imposition of a temporary permission to give a reasonable 'trial run' during which a careful programme of monitoring will be undertaken.

14.0: Design and Specification for Noise Barriers

Barriers may be made of many different materials ranging from brick, metal, earth and timber etc. Mainland Europe, in contrast to the UK, has developed over this past 30 years, a substantial market for high performance and aesthetic durable noise barriers. There has been a much stronger approach than in the UK to find truly environmental solutions to noise.

Until recently in the UK, barriers were mostly constructed of timber and there was an assumption that basic timber fences could be used as adequate barriers against traffic and other noise sources, for example imperforate 19mm close boarded fences. Such simple designs have been proved to be mostly ineffective, particularly where noise with significant low frequency content is present, due to inadequate account being taken of the density of different species of timber, leading to selection of timbers which warped, with gaps widening under hot weather conditions. In addition

there was a lack of in-adequate testing of the timber barrier sections before they were erected.

There are regulations requiring correct specifications for noise barriers, based on certified laboratory tested acoustic performance, to ensure that effective long lasting barriers are built, that significantly reduce noise levels and public complaint.

The following guidance must be considered where barriers need to be erected to mitigate against noise transmission:

Appearance and life expectancy of proposed barrier

- Highways Agency document, HA 65/94: A Design Guide for Environmental Barriers – guidance on installation with regard to the appearance of the noise barrier in the environment.

- Highways Agency document, HA 66/95, Environmental Barriers, Technical Requirements – requirement to build barriers for 20 years low maintenance and a 40-year operational life. Downloadable from: http://www.standardsforhighways.co.uk/dmrb/vol10/section5.htm.

Testing of the airborne sound insulation of the proposed barrier and also sound absorptive performance where appropriate

BSEN 1793 Parts 1, 2 and 3

- Test to be carried out in a nationally accredited laboratory with a sample panel of the proposed barrier, mounted in the window between two adjoining reverberant rooms, the sample to include the post and the exact fixings and sealants to be used on site.

- Detail report to be submitted on the test conditions, fixings, component sizes and densities.

- Not less than category B insulation to be achieved.

- Not less than category A3 absorption to be achieved and A4 where the barrier is high and in a reverberant location.

- *BS EN 1793-1:1998 Title: "Road traffic noise reducing devices. Test method for determining the acoustic performance. Intrinsic characteristics of sound absorption".*

- *BS EN 1793-2:1998: Title: "Road traffic noise reducing devices. Test method for determining the acoustic performance. Intrinsic characteristics of airborne sound insulation".*

- *BS EN 1793-3:1998: Title: "Road traffic noise reducing devices. Test method for determining the acoustic performance. Normalized traffic noise spectrum".*

- *BS CEN/TS 1793-5:2003: Title: "Road traffic noise reducing devices. Test method for determining the acoustic performance. Intrinsic characteristics. In situ values of sound reflection and airborne sound insulation".*

(Adapted from London Borough of Ealing: SPG 10: Noise and Vibration)

15.0: Demolition / Construction Noise and Vibration

In some circumstances the disturbance from construction activity on development sites can cause nuisance to nearby residents. It is not possible to provide detailed guidance for determining whether or not noise will constitute a problem in a particular situation. However a number of factors are likely to affect considerations of the acceptability of site noise and the degree of control necessary. These include site location, existing ambient noise levels, the duration of site operations, hours of work, the attitude and competence of the site operator and the particular characteristics of the noise itself.

Where the District Council considers that it is important to restrict construction activity on a particular site in order to minimise disturbance, noise and pollution from that site, the District Council, on the advice of the Environmental Protection Section of Health & Environmental Services, will impose a condition on the planning consent which limits the hours of working. These will be:

08.00 - 17.30 Mondays to Fridays
08.00 - 13.00 Saturdays
and not at all on Sundays or Bank Holidays.

The District Council will apply this condition where the problems of noise construction on a site are anticipated to be so severe that significant disturbance is likely to nearby residents.

For larger development a Construction Management Plan may be required by condition.

Construction should be carried out in accordance with the following guidance / standards which advocate the use of best practical means to mitigate noise impact:

- BS 5228: 2009: Code of practice for noise and vibration control on construction and open sites – Part 1 and 2.

- BS 5228- Part 2:2009: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

The Building Research Establishment has published 5 pollution control guides on the control of particles, vapour and noise from construction sites. These advise on pre-project planning, site preparation, haulage, storage of materials and site operations.

The sections are as follows:

- Part 1: pre-project planning and effective management. ISBN1 86081 6541.
- Part 2: site preparation, demolition, earthworks and landscaping. ISBN 1 86081 655X.
- Part 3: haulage routes, vehicles and plant. ISBN 1 86081 6568.
- Part 4: materials handling, storage, stockpiles, spillage and disposal. ISBN 1 86081 6576.
- Part 5: fabrication processes and internal and external finishes ISBN 1 86081 6584.

Current Noise Standards & References

1. BS 8233: 1999: Sound Insulation and Noise Reduction for Buildings - Code of Practice.
2. British Standard BS 5228: 2009: Code of practice for noise and vibration control on construction and open sites – Part 1 and 2.
3. British Standard BS 5228- Part 2:2009: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.
4. BS 7445: 2003 Part 1 and 1991 Part 2 and 3 'Description and measurement of environmental noise'.
5. Update of Noise Database for Prediction of Noise on Construction and Open Sites, Department for Environment, Food and Rural Affairs. 2005.
6. Control of Pollution Act – Part III Noise. HMSO.1974.
7. British Standard BS 6472 Guide to Evaluation of Human Exposure to Vibration in Buildings. Part 1: Vibration sources other than Blasting. 2008.
8. Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 HA 213/08 Noise and Vibration. 2008.
9. Planning Policy Guidance PPG24: Planning and Noise. Department of the Environment, Transport and the Regions. 1994.
10. Noise Insulation Regulations. Statutory Intruments No. 1763. Building and Buildings. HMSO. ISBN 0 11 051763. 1975.
11. International Standard IEC 61672 Electracoustics – Sound level meters. 2003.
12. International Standard IEC 60942 Electracoustics – Sound calibrators. 2003.
13. World Health Organisation (2000) 'Guidelines for Community Noise'.
14. The Building Regulations 2000. 'The Building Regulations. Resistance to the passage of sound'. Approved Document E (2003).
15. Department for Education and Science, 'Building Bulletin (BB) 93'.
16. Department of Transport /Welsh Office (1988) 'Calculation of Road Traffic Noise (CRTN)'.

17. Department of Transport, Calculation of Railway Noise 1995.
18. Department of Transport, Railway Noise and Insulation of Dwellings 1991.
19. Code of Practice on Environmental Noise Control at Concerts : 1995.
20. Institute of Acoustics / Institute of Environmental Management and Assessment (2005) 'Guidelines on Noise Impact Assessment'.
21. Noise and Vibration Control for HCVA, Guide B5. CIBSE. 2002 (now part of 'Heating, Ventilating, Air Conditioning and Refrigeration Guide B. CIBSE. 2005).
22. Noise and Vibration Control – Guide B5. CIBSE. 2002.
23. Sound Control of Homes. Building Research Association and Construction Industry Research Association (BRE/CIRIA). 1993.
24. Guidelines for Environmental Assessment of Road Traffic: 2002 Institute of Acoustics / Institute of Environmental Management and Assessment (IOA/IEMA).
25. Integrated Pollution Prevention and Control (IPPC), Horizontal Guidance for Noise, Part 2 – Noise Assessment and Control -IPPC H3 (part 2). Environment Agency.
26. Minerals Policy Statement 2(MPS2): Controlling and Mitigating the Environmental Effects of Mineral Extraction in England, Annex 2, Noise. ODPM.

Further Information / Contacts

- SCDC Health and Environmental Services 03450 450 063

- Department for Environment Food & Rural Affairs (Defra), Customer Contact Unit, Eastbury House, 30 - 34 Albert Embankment, London, SE1 7TL, Telephone: **08459 33 55 77,** Email: **helpline@defra.gsi.gov.uk**

- Association of Noise Consultants (ANC), 105 St Peter's Street, St Albans, Hertfordshire, AL1 3EJ, Tel: +44 (0)1727 896092, Fax: +44 (0)1727 896026, Email: anc@kingstonsmith.co.uk

- Institute of Acoustics, 77A St Peter's Street, St Albans, Hertfordshire, AL1 3BN Tel: 01727 848195, Email: http://www.ioa.org.uk/

- The Chartered Institution of Building Services Engineers (CIBSE), 222 Balham High Road, Balham London SW12 9BS, Tel 020 8675 5211 Fax 020 8675 5449 Email: http://www.cibse.org/

- Environmental Protection UK, 44 Grand Parade, Brighton, East Sussex, BN2 9QA, Tel: 01273 878770, Fax: 01273 606626, Email: admin@environmental-protection.org.uk

Policy & Plans

National Policy

- PPG24 'Planning and Noise': which sets out the Government's policies on noise (and vibration) related planning issues.

- PPS1 Delivering Sustainable Development
  Maintain and improve the local environment and mitigate effects of declining environmental quality.

Local Policy

SCDC Local Development Framework Development Control Policies (DPD) July 2007 relevant policies:

- **Policy DP/1 (1):**
  Consistent with principles of sustainable development
  Limit adverse impacts on environment
  l. Ensure no unacceptable adverse impact on land, air and water

- **Policy DP/3: Development Criteria**
  Para 2.Planning Permission will not be granted where the proposed development would have an unacceptable adverse impact:
  n. from undue environmental disturbance such as noise, lighting, vibration, odour, noxious emissions or dust

- **Policy DP/6: Construction Methods**
  Para 2.Haul roads located, designed and landscaped in such a way to avoid any noise, smell, dust…., or other adverse impacts on existing residents and businesses…
  3. Storage compounds, plant or machinery must be located, designed and used to avoid noise, smell, dust, …

- **7. Natural Environment Objectives:**
  NE/e: To protect and improve ambient noise environment
  NE / 15 (1) Noise Pollution
  NE/15 (2): Consideration will be given to the increase in road traffic that may arise due to development and conditions or Section 106 agreements may be used to minimise such noise.

- **Policy TR/3: Mitigating travel Impact:**
  new developments to mitigate their travel impact, including their environmental impact, such as noise, pollution and impact on amenity and health

- **Policy TR/6 Aviation-Related Development Proposals**

APPENDIX 7

LIGHT POLLUTION

In a predominantly rural environment such as South Cambridgeshire, the impact of lighting associated with development can have an adverse impact upon both the surrounding landscape and residents of surrounding properties. In certain circumstances lighting is critical in terms of public safety and security but in others, the amount of light emitted only serves to create a form of pollution either through windows of bedrooms. In such cases, the District Council will seek to reduce the amount of pollution, particularly in the context of new development where lighting is required for the road system or security lighting for remote developments.

Therefore it is necessary to try to find a balance between the need for lighting and the negative implications associated with it. Lighting in itself may not need planning permission but the Council will use planning powers where appropriate to manage the effects of lighting to achieve the objective of this part of the SPD which is to reduce excessive, intrusive and unnecessary lighting in both rural and urban areas.

Problems of glare, (the uncomfortable brightness of a light source when viewed against a dark background), and light trespass, (the spilling of light beyond the boundary of the property on which the source is located), are other forms of light pollution. Such light pollution is a waste of electricity and therefore increases energy consumption and emissions.

Designers are advised to have regard to the type of location in designing lighting proposals and devising techniques for limiting light pollution and its impacts.

PLANNING POLICY

PPS23 Planning and Pollution identifies lighting as both a consideration in the preparation of any development plan documents and as a material consideration in deciding if planning applications are given planning permission or not. A third Annex on ‘planning and light pollution’ will be produced in due course.

East of England Plan May 2008

POLICY ENV7: Quality in the Built Environment
Local Development Documents should require new development to be of high quality which complements the distinctive character and best qualities of the local area and promotes urban renaissance and regeneration.

New development should reduce pollution, including emissions, noise and light pollution.

South Cambridgeshire Development Control Policies DPD, July 2007

POLICY DP/3 Development Criteria

2. Planning permission will not be granted where the proposed development would have an unacceptable adverse impact:

   n. From undue environmental disturbance such as noise, lighting, vibration, odour, noxious emissions or dust;

LIGHTING POLICY NE/14 Lighting Proposals

1. Development proposals which include external lighting should ensure that:
   a. The proposed lighting scheme is the minimum required for reasons of public safety and security;
   b. There is no light spillage above the horizontal;
   c. There is no unacceptable adverse impact on neighbouring or nearby properties or on the surrounding countryside;
   d. There is no dazzling or distraction to road users including cyclists, equestrians and pedestrians;
   e. Road and footway lighting meets the District and County Councils' adopted standards.

Conditions may be attached to lighting schemes. These might include the following:

- Specify the colour and height of lighting columns/brackets – to ensure harmony with its setting;
- Limit the use of lighting schemes to identified users and specify the type of screening vegetation – to ensure minimal impact on neighbouring amenities;
- Specify the lighting position and angle of illumination – to reduce glare;
- Specify the type of lighting – to reduce sky glow and guarantee harmony with its setting;
- Limit hours of operation and lighting levels - to manage both energy consumption, light trespass and the duration of lighting impacts and associated activities;
- Review the impacts after installation – to ensure that both the human and ecological impacts are minimal;
- Review future maintenance and post installation checks – to ensure that all lighting corresponds to the original design and approval.
- Submission of details of any external lighting of the site such as street lighting, floodlighting, security lighting including layout plan with beam orientation, full isolux contour maps and a schedule of equipment in the

design (luminaire type, mounting height, aiming angles and luminaire profiles, angle of glare) for approval.

Health and Environmental Services can give further general advice but it should be noted that they can only advise on the potential for light trespass to be detrimental to the amenity of or cause a statutory nuisance to residential premises. They will not be able to advise on the issue of "sky glow" or general lighting schemes / standards.

Additional Guidance on Lighting should be referenced as follows:

- Institute of Lighting Engineers (2005) 'Guidance Notes for the Reduction of Obtrusive Light'.

- DEFRA (2001) 'Lighting in the Countryside: Towards Good Practice'.

- BS 5489 (2003) 'Code of Practice for the Design of Road Lighting – Part 1: Lighting of Roads and Public Amenity Areas'.

- BS EN 13201 (2003) Road Lighting – Part 2: Performance Requirements.

- Light Pollution Leaflet, Environmental Protection UK downloadable from: http://www.environmental-protection.org.uk/assets/library/documents/Light_Pollution_booklet_Jan08.pdf

Technical lighting standards

The following bodies have published a number of guides containing standards relevant to lighting:

- The British Standards Institution (BSI) www.bsi-global.com;
- The Chartered Institution of Building Services Engineers (CIBSE) www.cibse.org;
- The International Commission on Illumination (CIE) www.cie.co.at;
- The Department for Transport (DFT) www.dft.gov.uk
- The European Committee for Standardisation www.cenorm.be; and;
- The Institute of Lighting Engineers (ILE) www.ile.org.uk.

APPENDIX 8

DESIGN CRITERIA FOR NEW AND ALTERED FOOD PREMISES

Food Hygiene: A guide for Businesses

The most important food hygiene regulations for your business are:

- Regulation (EC) No. 852/2004 on the hygiene of foodstuffs.
- The Food Hygiene (England) Regulations 2006 (as amended).

These set out the basic hygiene requirements for all aspects of your business, from your premises and facilities to the personal hygiene of your staff.

Registering your business

You must register your business premises with South Cambridgeshire District Council if you have not registered with us already. If you are going to open new business premises, you should register within 28 days before opening. If you use premises in more than one place, you need to register all of them. You must also:

- Make sure South Cambridgeshire District Council always has up-to-date information about your premises.
- Tell us if what you do in your business changes significantly.

Your premises

Your premises include all of the rooms or buildings you use in your business.

General requirements

You must keep your premises clean and maintained in good repair and condition.

The layout, design, construction, site and size of your premises must:

- Allow adequate maintenance, cleaning and/or disinfection.
- Avoid or minimise air-borne contamination (i.e. contamination carried in the air).
- Provide enough working space for you to carry out all tasks hygienically.
- Protect against the build-up of dirt, contact with toxic materials, shedding of particles into food and forming of condensation or mould on surfaces.

- Allow good food hygiene practices, including protection against contamination and, in particular, pest control.
- Provide, where necessary, suitable conditions for handling and storing food while keeping it at appropriate temperatures, designed to allow those temperatures to be monitored and, where necessary, recorded.

If you are choosing new premises or making changes to premises you already have, it's a good idea to ask Health & Environmental Services for advice.

Handwashing facilities and toilets

- You must have an adequate number of flush lavatories, connected to an effective drainage system.
- Toilets must not open directly into rooms where you handle food.
- You must have an adequate number of washbasins, suitably located and used only for cleaning hands.
- Washbasins for cleaning hands must have hot and cold running water, and materials for cleaning hands and for hygienic drying.
- Where necessary, you should have a separate sink for washing food.

Ventilation

- You must have enough ventilation, either natural (e.g. opening windows or vents) or mechanical (e.g. extractor fans).
- Ventilation systems must be constructed to allow access to clean or replace filters and other parts.
- Toilets must have enough ventilation, either natural or mechanical.

Other requirements

- You must have adequate lighting, either natural (daylight) and/or artificial (electric light).
- Drainage facilities must be adequate for the purpose intended. They must be designed and constructed to avoid the risk of contamination.
- You must provide adequate facilities for staff to change their clothes, where necessary.
- You must not store cleaning chemicals and disinfectants in areas where food is handled.

Rooms where food is prepared, treated or processed

There are special requirements for rooms where you prepare, treat or process food. These do not include dining rooms. The design and layout of the room must allow good food hygiene practices, including protection against contamination between and during tasks.

Floors

- Floor surfaces must be maintained in a sound condition and be easy to clean and, where necessary, to disinfect.

- This means that floor surfaces need to be made of materials that are impervious (i.e. do not allow fluid to pass through), non-absorbent, washable and non-toxic, unless you can satisfy your local authority that other materials are appropriate.

- Where appropriate, floors must allow adequate surface drainage.

Walls

- Wall surfaces must be maintained in a sound condition and be easy to clean and, where necessary, to disinfect.

- This means that wall surfaces need to be made of materials that are impervious (i.e. do not allow fluid to pass through), non-absorbent, washable and non-toxic, and must be smooth up to a height appropriate for the work you do, unless you can satisfy Health & Environmental Services that other materials are appropriate.

Ceilings

- Ceilings (or, where there are no ceilings, the interior surface of the roof) and overhead fixtures must be constructed and finished in a way that prevents dirt from building up and reduces condensation, the growth of undesirable mould and the shedding of particles.

Windows

- Windows and other openings must be constructed to prevent dirt from building up.

- Windows and other openings (e.g. doors) that can be opened onto the outside must be fitted, where necessary, with insect-proof screens that can be easily removed for cleaning.

- Where open windows would cause contamination, windows must remain closed and fixed while you are producing food.

Doors

- Doors must be easy to clean and, where necessary, to disinfect.

- This means that the surface of doors needs to be smooth and non-absorbent, unless you can satisfy Health & Environmental Services that other materials are appropriate.

Surfaces

- Surfaces (including surfaces of equipment) in areas where food is handled, particularly those that are touched by food, must be maintained in a sound condition and be easy to clean and, where necessary, to disinfect.
- This means that surfaces need to be made of materials that are smooth, washable, corrosion-resistant and non-toxic, unless you can satisfy your local authority that other materials are appropriate.

Washing equipment and food

- You must have adequate facilities, where necessary, for cleaning, disinfecting and storing utensils and equipment. These facilities need to be made of corrosion-resistant materials, be easy to clean and have an adequate supply of hot and cold water.

- You must have adequate facilities, where necessary, for washing food. Every sink (or other facilities) for washing food must have an adequate supply of hot and/or cold water. The water must be 'potable' (drinking quality). These facilities must be kept clean and, where necessary, disinfected.

Food waste

You must have adequate facilities for storing and disposing of food waste and other rubbish. Stores for waste must be designed and managed in a way that enables them to be kept clean and, where necessary, free of animals and pests.

Water supply

- You must have an adequate supply of 'potable' (drinking quality) water, which is to be used whenever necessary to ensure that foods are not contaminated.

- Where 'non-potable' water (i.e. not of drinking quality) is used in your business, for example for fire control, steam production, refrigeration and other similar purposes, it must circulate in a separate, identified system. It must not connect with, or be able to get into, the systems for 'potable' (drinking quality) water.

Movable and temporary premises

The requirements for movable and/or temporary premises, are different to those explained for fixed workplaces.

Movable and/or temporary premises include marquees, market stalls, mobile vans, vending machines and people's homes where food is regularly prepared to be sold or given to the public. Premises and vending machines must be positioned, designed, constructed and kept clean and maintained in good repair and condition in a way that avoids the risk of contamination, particularly from animals and pests, as far as reasonably practical.

Where necessary:

- You must have appropriate facilities to maintain adequate personal hygiene, including facilities to wash and dry hands hygienically, hygienic toilet facilities and changing facilities.

- Surfaces that are touched by food must be in a sound condition and be easy to clean and, where necessary, to disinfect. This means that they need to be made of materials that are smooth, washable, corrosion-resistant and non-toxic, unless you can satisfy Health & Environmental Services that other materials are appropriate.

- You must have adequate facilities for the cleaning and, where necessary, disinfecting of working utensils and equipment.

- If you wash or clean foods as part of your business, then you must have adequate facilities to do this hygienically.

- You must have an adequate supply of hot and/or cold water that is 'potable' (drinking quality).

- You must have adequate arrangements and/or facilities to store and dispose of hygienically any hazardous and/or inedible substances, and waste (whether liquid or solid).

- You must have adequate facilities and/or arrangements for keeping food at suitable temperatures and monitoring these.

- You must place foods in a way that avoids the risk of contamination as far as reasonably practical.

Toilet provision in premises where members of the public visit

Health & Environmental Services refers to British Standard BS6465: Part 1: 1994 'Code of practice for scale of provision, selection and installation of sanitary appliances' to determine the adequacy of toilet provision for premises where members of the public visit.

APPENDIX 9

HISTORIC BUILDINGS & BUILDING REGULATIONS

Although not exhaustive, the specific parts of the Building Regulations that are often negotiated between Building Control and the Design and Conservation team teams generally include:

Part A: Structural Safety
- Support of retained walls.
- Basements and excavations.
- Underpinning.

Part B: Fire Safety
- Proposed change of use of a building.
- Proposed introduction of a second floor.
- Proposed subdivision of a building into separate units.
- Roofs covered in combustible materials e.g. thatch and wood shingles.
- Combustible materials on boundaries e.g. weatherboard and exposed timbers.

Part C: Resistance to contaminants and moisture
- Proposed installation of dpcs and dpms.
- Proposed change of use of a building.

Part E: Resistance to sound
- Proposed change of use of a building.
- Proposed subdivision of a building into separate units.

Part F: Ventilation
- Installation of kitchens and bathrooms.
- Proposed change of use of a building.
- Proposed subdivision of a building into separate units.

Part G: Hygiene
- Installation of an industrial or commercial kitchen.
- Flues and vents.

Part H: Drainage and waste disposal
- Changes to positions of kitchens or bathrooms.
- Proposed vent pipes.
- Involving features such as historic floors, panelling or decorative plaster ceilings.

Part J: Heat producing appliances
- Positions of boilers, flues and vents.

Part K: Protection from falling

- Alterations to Listed buildings, including historic staircases or railings.
- Proposed external staircases.

Part L: Conservation of fuel and power

- Insulation in Listed buildings.
- Double glazing.

Part M: Access to and Use of Buildings – including Disability Access and Disability Discrimination Act.

- Ramps, handrails, lifts.
- Internal alterations to Listed buildings.
- Change of use of buildings.
- Buildings open to the public.
- Public buildings.

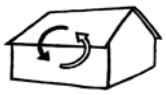
Compliance with the regulations can be shown in a variety of ways and the regulations allow for a measure of reasonable flexibility and sensitivity when working with historic buildings.

Negotiations will be expected to balance the aims of the regulations, such as safety, sustainability, health and longevity with reasonable measures which also take into account the special qualities of heritage assets as a finite resource with embodied energy and inherent proof of longevity.

APPENDIX 10

REQUISITE ENERGY STATEMENT CALCULATIONS

1. Building Emissions



Use class:	Individual calculations should be submitted for each use class		
Fuels	**Electricity**	**Gas**	**Other (extra columns as reqd.**
kWh/m^2/annum			
Proposed floor area (m^2)			
Total kWh/annum			
kWh conversion factor to CO_2			
Total kg CO_2/annum	+	+	= A
10% kgCO_2/annum	B		
N.B. for reserved matters and full applications, carbon emission data should be generated from precise SAP/SBEM calculations			

2. Other on site energy uses (A reasonable estimate covering such items as communal area heating and lighting. For non-residential buildings estimated process loads must also be included

Total kg CO_2/annum	C	
10% kgCO_2/annum	D	
Ref. to where your breakdown of sources and calculations may be found:		

3. Totals

Total development on site CO_2 emissions	A	+	C
10% kgCO_2/annum for whole development	B	+	D

4. Renewable energy technology assessment

Please provide an options assessment to fulfil the 10% on site renewable energy requirement and justification of the option(s) selected (including how this will be successfully integrated into the full design and access proposals for the development).

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