

# CHAPTER 15

Urban Design Guidelines

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**Aim:** *To create vibrant and bustling towns and villages with a diverse mix of activities where residents can benefit from quality urban living.*

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## 15.1 Background

Through the planning process, local authorities have a key role in relation to the formation of the built environment. The pattern of development over the past few decades differs significantly from the traditional compact urban form of the 20<sup>th</sup> century, being generally low-density suburban type single land use housing on greenfield sites at the edge of towns. Factors such as increased distance from the town centre, low density single land use and layouts based on a non-permeable system of hierarchical roads, have combined to make private transport necessary to access employment, shopping and other facilities resulting in more unsustainable development patterns. This chapter outlines guidelines to support a key element of the core strategy to consolidate urban centres and support the achievement of sustainable towns and villages and should be read in conjunction with relevant guidelines in this area to include:

- *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (Cities, Towns and Villages)*, DoEHLG, (2009).
- *Urban Design Manual; a Best Practice Guide*, DoEHLG, (2009).
- *Government Policy on Architecture 2009–2012*, DoEHLG (2009).

## 15.2 Strategy

The urban design strategy seeks to ensure that:

- Development is based on the concept of consolidating existing town / village cores;
- Sustainable urban expansions are provided where necessary;
- Development of derelict (brownfield) and key infill/gap sites within and in the vicinity of the core areas of towns and villages is prioritised;
- The physical environment and streetscape is enhanced; and
- Vibrant zones of activity are created.

This approach seeks to realise the full potential of the inherent character of Kildare's towns and villages.

## 15.3 The Need for Change

In order to facilitate and promote more sustainable living patterns single-use zones predominately structured by distributor roads may no longer be considered the ideal model for urban development. A return to the more traditional fabric of mixed uses with more consolidated development formed by an urban structure assembled around streets is recommended. This can be achieved through consolidation and by promoting infill opportunities and brown field development. These guidelines also outline key principles for expansion of an urban area where deemed appropriate and overall design considerations which should be taken into account.

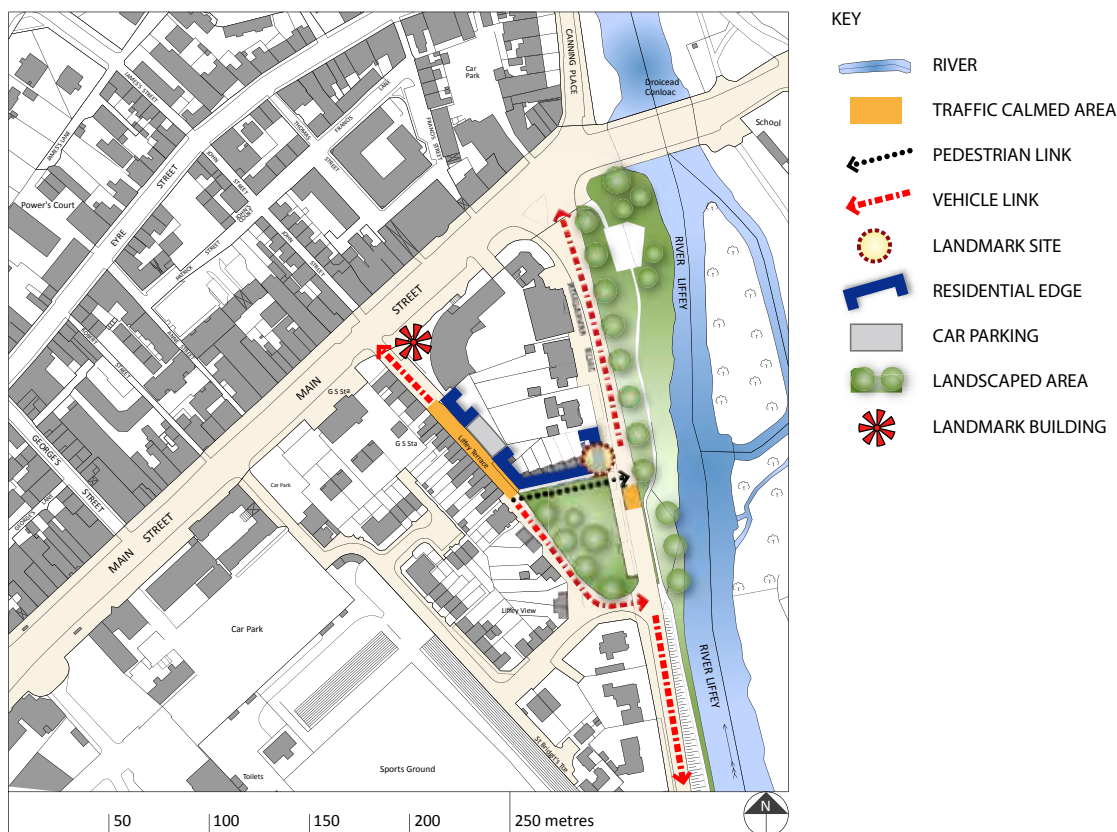


Figure 15.1 Example of Town Centre Infill Site Strategy

## 15.4 Consolidation

Consolidation is necessary to reinforce urban centres as the central hub of activity resulting in vibrant and bustling towns and villages with a diverse mix of activities. Intensifying development within our urban areas can occur by utilising underdeveloped sites within the town centres. These underdeveloped sites include infill, derelict and brownfield sites.

Other factors which can have a significant impact on the image of our towns and villages and the quality of the public domain include:

- Formalising approaches and entrances to our town and village centres in order to create a sense of arrival and departure;
- Promoting and encouraging high quality shopfront design;

- Calming traffic flow and rationalising carparking together with the use of high quality materials; and
- Concentration of uses within the core defined by architectural language and styles which have evolved over time.

### 15.4.1 Infill

Infill development opportunities exist throughout many towns and villages. They provide the opportunity to revitalise existing communities by promoting the development of commercial buildings, public facilities and new homes. Subject to the zoning provisions of each Local Area Plan, retail and commercial uses will be encouraged on the ground floor with offices and living accommodation on the upper floors. Table 15.1 outlines the key principles for infill development.

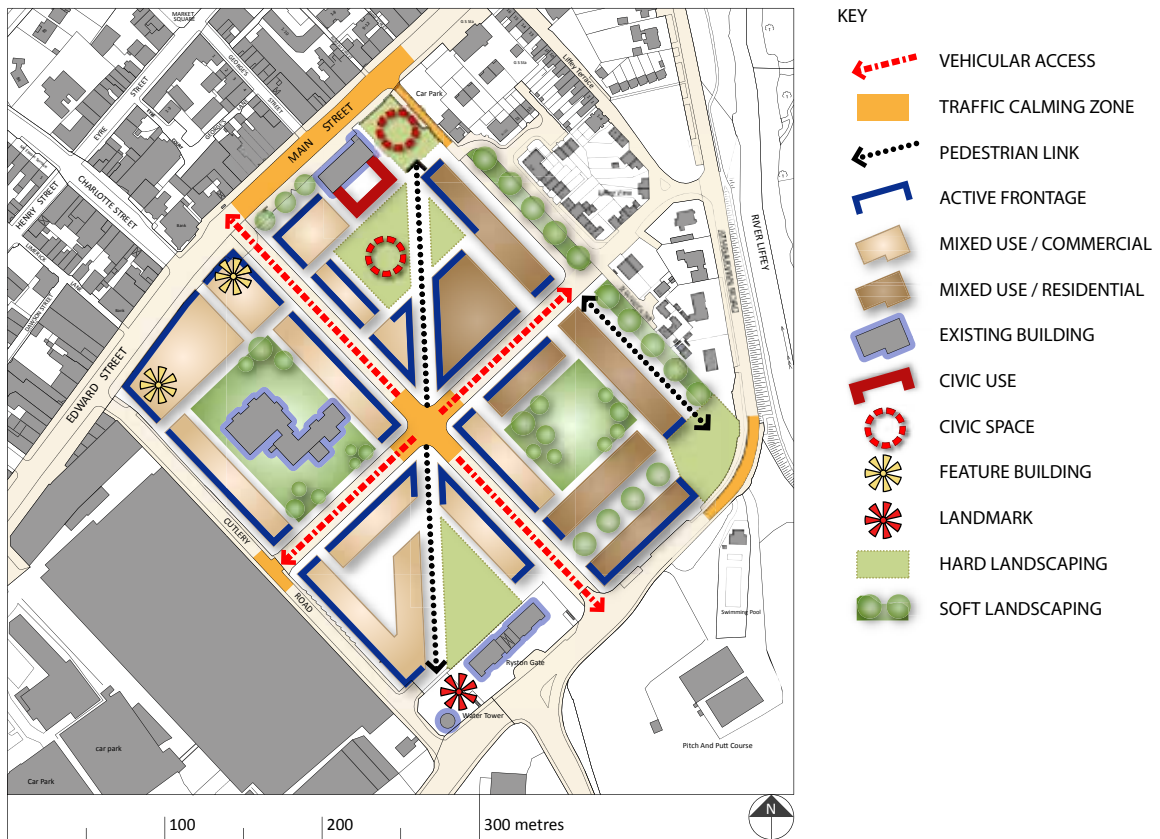
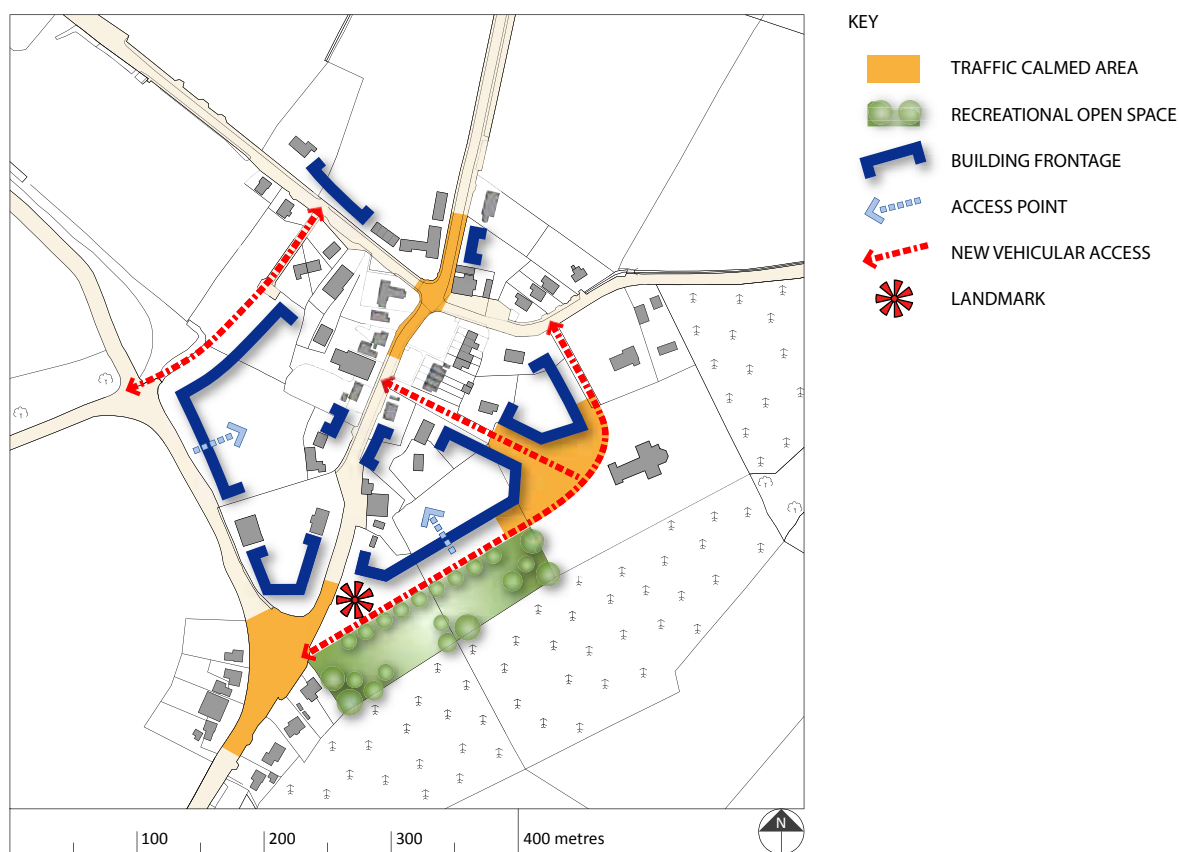


Figure 15.2 Example of Town Centre Brownfield Site Strategy

### 15.4.2 Brownfield

Previously developed lands often comprising 1970s industrial estates or storage facilities, former religious buildings or military barracks constitute brownfield sites. They are frequently located in or immediately adjacent to town and village centres comprising low density low grade architecture and will be identified as part of the review of Local Area Plans. The intensive use of these lands through new developments presents opportunities to create sustainable urban quarters with a mix of uses creating compact neighbourhoods with pedestrian orientated streets.



**Figure 15.3** Example of Backland Site Strategy

## 15.5 Expansion

The expansion of a town or village may be required in certain circumstances. This generally refers to the development of previously undeveloped land within or adjacent to the urban cores. The primary objective is to ensure that any expansion does not detract from the primacy of main streets as the core urban centre but rather reinforce the activities there. Careful phasing of development may be required in order to integrate the new development into the existing core.

### 15.5.1 Backland

Significant backland areas exist within many towns and villages throughout the county. It generally relates to undeveloped lands behind town centre buildings immediately to the rear of street fronting buildings, what might be considered the back gardens of these buildings. Opportunities exist to develop these plots singly or through an amalgamation of plots.

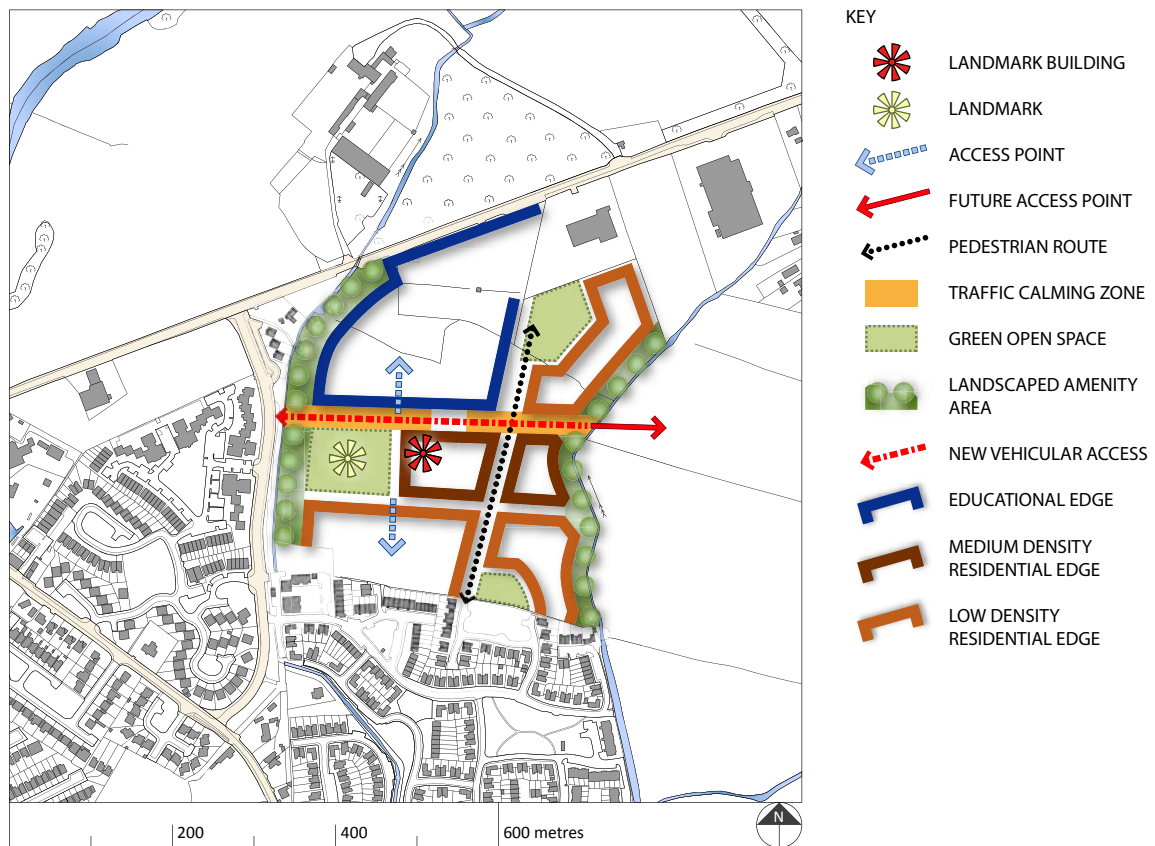


Figure 15.4 Example of Greenfield Site Strategy

### 15.5.2 Greenfield Edge

Development in edge of town / greenfield edge sites will primarily be residential development with supporting community uses and neighbourhood centres. The character of these areas should have less intensity of development providing a transition towards the open countryside. Table 15.1 outlines the key principles for consolidation and expansion areas.



## 15.6 Best Practice

To guide sustainable urban growth and to create a distinctive, enduring environment, the following principles should inform development proposals:

**Character:** A development that creates an identity and character which reinforces locally distinctive patterns of development and landscape.

**Continuity and Enclosure:** Public and private spaces that are clearly distinguished and continuity of street frontages and enclosure of space by the built form is achieved.

**Quality of the Public Realm:** Public spaces and routes that are attractive, safe, uncluttered and work effectively for all in society, including older people and people with mobility impairments.

**Ease of Movement:** Creation of areas which are easy to get to and move through and by putting people before traffic.

**Legibility:** Legible places provided with recognisable routes, intersections and landmarks.

**Adaptability:** Places that can change easily and can respond to changing social, technological and economic conditions.

**Diversity:** The promotion of choice through a mix of compatible developments and uses that work together to ensure a place that responds to local needs as well as providing for a diverse society of different incomes at different stages of their lives.

**Environmental Sustainability:** Enhancing local ecology by promoting biodiversity, by allowing new wildlife habitats to establish and protect existing ones.

**Liveable Environments:** Encouraging walkable environments which facilitate access to public transport in order to reduce reliance on the private cars as well as the provision of a well connected open space network.

**Table 15.1** Guiding Principles for Development in Consolidation and Expansion Areas

### **Infill Development Guiding Principles**

Within these areas proposals shall have regard to the surrounding character, particularly where the proposed development is located on a small plot. In cases where development is located on a large plot or significant infill site, it may be in a position to establish its own character.

Development shall comprise a high quality design, fine grained active frontage blocks continuing the existing building line. Buildings shall provide a strong frontage that delineates spaces.

New buildings should be permanent, timeless and contemporary structures thereby promoting a town with a collection of new and historic buildings, presenting an appropriate mix of building styles.

Streets may be punctuated intermittently by individually designed buildings where a landmark building is required to ensure visual interest and to develop a stimulating streetscape where appropriate.

Development to the rear or adjacent to existing built form shall have regard to amenity of these buildings.

### **Brownfield Development Guiding Principles**

It is envisaged that development should be provided in the form of clearly defined blocks with semi-private enclosed courtyard type open spaces providing car parking, rear access and communal spaces. The landscape design of these spaces should respond to the various needs of the community by providing for active and supervised play in overlooked areas whilst ensuring recreational spaces in quieter areas.

Mixed use buildings / schemes will be encouraged where compliant with the relevant zoning provisions. A mix of housing, community uses and offices shall overlook adjacent streets and landscaped courtyards. In particular apartment developments will be encouraged in the corner sites to enhance these prominent positions and take advantage of dual aspect.

Pocket parks shall be incorporated into the layout to provide playgrounds, amenity for residents and green links between larger parks and the open countryside.

Good public lighting shall be provided to the edge of openspace, cycleways and pedestrian routes.

### **Other Guiding Principles Applicable to Infill and Brownfield**

Quality public realm shall be achieved using a high standard of quality finishes and treatments.

The design and layout shall incorporate the principles of passive surveillance to encourage a community atmosphere and to discourage anti-social behaviour, by overlooked open space, cycleways and pedestrian routes. Therefore reducing the need for CCTV technology.

Private and public areas should be clearly delineated. Private areas should be protected from undue overlooking and public areas easily accessible and overlooked.



Table 15.1 continued

### Backland Development Guiding Principles

Access arrangements should be organised to avoid any adverse disruption to the appearance of the streetscape. An inner relief road may be required in certain circumstances. Care needs to be taken so that it does not create a 'second main street' threatening the viability of the existing town centre.

To facilitate integration linkages between the existing street and the backlands should be explored along which development can occur.

Development shall comprise active frontages at ground floor level with mixed use developments / schemes including community uses as maybe defined by the relevant zoning provisions.

The built form shall comprise of buildings following a perimeter block/courtyard form, with a quality public realm.

Pocket parks shall be incorporated into the layout to provide playgrounds, amenity for residents and green links between larger parks and the open countryside.

Good public lighting shall be provided to the edge of openspace, cycleways and pedestrian routes

Private and public areas shall be delineated. Private areas shall be protected from undue overlooking with accessible overlooked public areas.

Development to the rear or adjacent to existing built form shall have regard to amenity of these buildings.

### Greenfield Edge Development Guiding Principles

Development shall be of low intensity providing a transition to the countryside.

It shall generally be block structure and comprise a mix of house types. Apartments will not normally be permitted. Housing facing open countryside or addressing parkland may have the ability to absorb larger type houses.

A broader variety of boundary treatments and the potential for direct vehicular access to dwellings should create a different character to other types of development within urban centres.

Small pocket parks and more local areas of open space should be creatively incorporated into housing layouts which should be overlooked in order to promote natural surveillance. These series of open spaces encourage integrated use and participation amongst the community and in particular should provide for playgrounds, amenity space for residents and green links.

Community facilities and neighbourhood centres and public transport linkages should be provided within an easy walking distance 400m of any residential unit.

Quality public realm shall be achieved using a high standard of quality finishes and treatments

Good public lighting shall be provided to the edge of openspace, cycleways and pedestrian routes

### Other Guiding Principles Applicable to Backland and Greenfield

The design and layout shall incorporate the principles of passive surveillance to encourage a community atmosphere and to discourage anti-social behaviour, by overlooked openspace, cycleways and pedestrian routes. Therefore reducing the need for CCTV technology.

Buildings shall be positioned to provide transparency and glimpses of the public spaces defined by them.

## 15.7 Detailed Urban Design Considerations

The following sub-section outlines detailed urban design considerations:

### 15.7.1 Scale / Mass / Composition

A building's size should be relative to its surroundings. Scale is therefore one of the key elements in the design consideration for new buildings.

Scale, mass or bulk essentially refers to the size of the plot, average storey height and also the manner in which the façade is articulated. If these aspects of a building's design are excessively large when compared to adjoining buildings along a street, then the scale of the building is likely to be out of place on the streetscape. Exceptions may be permitted in the following circumstances:

- If it is a building of major public significance.
- If the nature of the use demands such a building and if the location is suitable for such a building.
- The degree to which it can contribute to the economic vitality of the town centre.

### 15.7.2 Key Buildings

Gateway and landmark buildings can emphasise the urban identity of a place. Their purpose is to provide a signal of a significant place either in terms of movement or use. These buildings have the potential to act as important landmarks and should therefore address the significance of the site.

Suitable locations for these buildings include important street corners or junctions, corner sites, the end of vistas and gateways, local centres and the edges of public squares. They ensure visual interest and develop a stimulating streetscape and should only occur at these locations.

In such instances, it may be appropriate to increase building heights so as to provide greater emphasis on the building, but there will also be a greater expectation of design quality and architectural treatment. The significance of these buildings does not always need to be expressed in terms of height. Differentiation in building materials and form can also convey their importance.

### 15.7.3 Corner Sites

Corners shall be reinforced by buildings which address both street frontages. These buildings shall be designed with windows and where appropriate, entrance ways onto both streets.

Various options can be explored e.g. an increase or stepping up in building height, a round corner, a stepped back corner (for example, to create a civic space), or a simple splayed corner. Such buildings shall be designed to an exceptional standard on all elevations.



Figure 15.5 Example of Corner Building



**Figure 15.6** Traditional building line and roofline typical throughout Co. Kildare.

#### 15.7.4 Building Line

Building lines are created by the position of the building frontage along the street edge. This is important as the position of the building line determines the width of the street, therefore influencing the sense of enclosure created.

In towns and villages throughout Kildare, building lines generally are continuous but not rigidly straight. They tend to be more organic in nature, staggering at certain intervals, adding significantly to the character of the street and sense of enclosure.

Generally, existing and established building lines should be maintained. Building lines may be relaxed to accentuate an important building or place or where important areas of public or civic space are required. Existing building lines may also be relaxed where innovative design solutions can demonstrate that the design will positively enhance the streetscape.

#### 15.7.5 Roofline

The scale of buildings and their rooflines have a direct influence on the skyline. Roof tops of traditional buildings are generally constructed of slate and contain features such as chimneys which add visual interest and variety to the skyline. In many contemporary buildings, roofs tend to be flat, where this type of roof occurs on a building with a long façade it can result in monotony. In such cases the monotony can be relieved by variations in building height at appropriate locations (i.e. stepping up heights at the corners or at the centre of a symmetrical building). Regard should be had to the following:

- Rooflines should respond to the articulation of the rest of the façade so that the building can be read from the bottom to the top.
- The roofline should acknowledge the rhythm, harmony and scale of the entire street frontage.
- Materials should be chosen for their compatibility with the existing roof tops of towns in the county, i.e., dark grey slate.
- Machine and mechanical plant rooms should be designed as an integral part of the building and should not appear as a disruption of the roof line

### **15.7.6 Perimeter Block**

Residential layouts should generally utilise the perimeter block principle, as a departure from more recent cul-de-sac type layouts. This will increase pedestrian permeability and legibility of a new development area and will help to define streets and public spaces.

### **15.7.7 Courtyard Buildings**

Courtyards can occur primarily in town centre developments. They should be treated as semi-public/private space and their use is to provide:

- A communal outdoor space;
- A threshold space prior to access to the rear of properties; and
- A location for secure cycle and car parking.

These spaces must be safe environments that are policed by natural surveillance from the individual properties; it is therefore imperative that dead corners that may be hidden from view are avoided.

Priority should be given to pedestrian movement as it is intended that these areas will provide informal play for small children. Courtyards should therefore be treated as shared surfaces. Courtyard developments should be orientated to maximise daylight. Seating shall also be provided and orientated to capture the sunshine, this will allow casual residential users to engage with courtyard activities. Small areas of ornamental planting and patches of lawn shall be discouraged.

### **15.7.8 Building Type and Height**

In order to conserve and develop the vitality of urban cores, a mix of uses and a healthy balance of economic, residential, cultural and recreational activity should be maintained. By increasing the amount of services and amenities within urban centres, the provision of a wide range of local jobs will be encouraged. It is therefore imperative that urban centres provide a diverse range of activities and uses. Development should be designed for a diverse community which encourages sustainable living and reinforces neighbourhood values.

Residential development should provide a variety of house types to accommodate a good mix of household types – including first time buyers, single people, families, empty nesters and the elderly in order to ensure a social mix and balance is achieved.

Height determines the impact of development on views, vistas and the skyline. Building height shall generally be considered in terms of the extent and location of the site.

### **15.7.9 Neighbourhood Centres**

Local or neighbourhood centres, where appropriate, may typically include services and facilities such as shops, pub, post office, crèche, doctors surgery, health centre, community centre, civic space, park, playground, primary school as well as some local services and/or employment uses and should comply as appropriate with the relevant provisions of Chapter 9 Retail.

Local / neighbourhood centres should generally be located within five minutes walking distance (400–500m) of significant residential development schemes.

### **15.7.10 Car Parking**

Parking standards are set out in Section 19.6.6 of Chapter 19. Regard shall be had to the following in relation to the location and layout of car parking areas:

- Car parking should generally be sited within established site boundaries in such a manner as to ensure minimal injury to the amenity of adjoining premises.
- In town centres parking spaces should be located behind buildings or underground wherever possible, to encourage the continuity of streetscapes.
- Landscaping and tree planting must be provided to counteract the appearance of parking areas.
- Where on-street parking is proposed properly marked car parking spaces shall be provided with regular tree planting and a high standard of kerbing

and paving. Generally not more than five perpendicular or two parallel car parking spaces shall be provided between trees.

- Where surface car parking is required it should be designed to be overlooked and therefore comply with the principles of passive surveillance and should not dominate the street frontage.
- Cycle parking facilities shall be conveniently located, secure, easy to use, adequately lit and well posted. Weather protected facilities should be considered where appropriate. In addition, parking should be placed within a populated, well-supervised area, and monitored by CCTV where possible.

### 15.7.11 Protection of the Existing Environment

All development proposals immediately adjoining existing development shall provide for the protection of existing residential amenities and shall have particular regard to minimising overlooking and visual intrusion. Kildare County Council places significance on the existing heritage fabric of the towns and villages within the county. These represent key heritage and cultural assets for Kildare and include protected structures of special architectural, historical and cultural interest.

### 15.7.12 Building Language and Finishes

Good modern architecture and design should prevail throughout developments. There should be consistency in materials, colour, proportions, roof pitches, building detail, street/ route surfaces, planting and street furniture within a development.

Certain principles will apply in relation to materials and finishes for a development as follows:

- In general, finishes and materials should be of a high quality nature and should be used in a consistent and restrained manner.
- Where possible natural materials should be used including wood, stone, slate etc. The use of native Irish material should be maximised.
- Materials and finishes should as far as possible reflect an Irish vernacular and, where appropriate and feasible, a Kildare vernacular.
- Use of non-natural materials such as clay pantiles will be permitted in limited circumstances where it is considered that such use contributes to the overall design quality of the scheme.
- Use of uPVC window frames and doors etc. shall in general be avoided unless a particular and specific case can be made for their use. This is in the interests of sustainable development and to help to promote the use of natural and native materials and more environmentally friendly materials.
- In cases where it can be demonstrated that the design of a building is of an exceptional nature and particularly in the case of gateway and landmark buildings, consideration will be given to the use of modern materials in the context of a modern design approach to such buildings.
- External wall finishes may include render, dry dash and brick. Timber cladding will be considered in exceptional circumstances and shall be assessed at planning application stage on a case by case basis as follows:
  - In all cases, details of the type of timber proposed and the reason for using timber as part of the development scheme shall be demonstrated as part of the planning application. In the case of apartment and mixed use development schemes and in addition to the above, a maintenance agreement shall be put in place which shall provide for regular maintenance and cleaning of the timber finishes and replacement as appropriate.
  - The use of colour should form part of any design proposal, however this should have regard to the traditional use of colour in the Irish context.
  - In general, the design of schemes should focus on having a commonality of approach in terms of particular housing areas with a clearly different approach between housing areas.
  - In addition, there should also be an overall and consistent design paradigm for the entire scheme.
  - All walking and cycling routes should be overlooked where feasible by adjoining uses to ensure passive surveillance.

## 15.8 Overall Layout Design Considerations

Understanding the context and the potential of a site through a detailed site analysis will inform the design process for future development proposals. The urban structure shall consist of a framework of routes and spaces that provide connectivity within a development as well as to existing and planned routes in adjoining developments.

Design considerations should include:

- Recognisable routes, intersections and key buildings should be provided to help people find their way around.
- Priority should be given to pedestrians and cyclists by providing routes that are direct, safe and secure.
- Streets should be designed and well lit to give control to pedestrians and therefore encourage pedestrian activity.
- Attractive and successful outdoor areas should provide a quality public realm which is essential to providing each area with its own individual identity.
- Passive supervision of the public realm which is the most effective means of preventing anti-social behaviour.
- Buildings should be orientated to maximise privacy where appropriate and elements such as planting and boundary treatment used to maximum effect.
- Residential layouts should where appropriate utilise the perimeter block principle as a departure from more recent cul-de sac type layouts.
- All housing should at a minimum be dual aspect and designed so that greatest advantage is taken of southwest orientation.
- Development should be designed for a diverse community which will encourage sustainable living and reinforce neighbourhood values.

### 15.8.1 Permeability

Central to the vitality of any urban centre is its network of pedestrian paths and routes. A fine grained network is critical to the creation of a human scale environment attractive and accessible for the pedestrian. All new development should provide a fully permeable and recognisable interconnecting network of streets. Permeability within town and village centres must be protected and where possible improved. Any new development should open up new routes as part of the development.

### 15.8.2 Legibility

All new development should provide:

- Recognisable routes which provide a coherent and easily read pattern of streets, lanes, squares, urban rooms and green spaces.
- Intersections and landmark buildings which are provided to help people find their way around and aid orientation.
- Main routes should be distinguished by exploiting vistas, key buildings and landmarks.
- The activities and functions of the places should be made visible, thus bringing a sense of liveliness to places.

### 15.8.3 Streetscape

The streetscape should be characterised by quality buildings and a high standard of finishes and treatments such as paving, landscaping and street furniture, therefore creating an environment with a definite sense of place.

All streets/roads, walking/cycling routes and public spaces should be overlooked by adjoining accommodation to ensure passive surveillance to diminish the need for CCTV technology. The creation of observed public spaces and route ways should not reduce or detract from the private nature of other spaces and buildings.



### 15.8.4 Public Space

To create vibrant bustling towns and villages and to integrate new development into the backland areas the provision of a network of public spaces should be explored. These spaces should be designed to vary in size and use providing for children's play, kick about spaces, passive recreation and landscaped and planted areas to serve the entire community. Public spaces should be linked through high quality pedestrian and cycle routes combined with views and vistas and should be overlooked by adjoining accommodation to ensure passive surveillance.

### 15.8.5 Transportation Network

Development must emphasise permeability for all modes of transport and should be designed on the basis of the following considerations:

- Pedestrians and cyclists
- Public transport
- Access for emergency vehicles
- Efficient circulation of local traffic
- Externalising non local traffic

### 15.8.6 Cycling and Pedestrian Linkages

Cycling and pedestrian linkages are necessary to promote integration and sustainable development patterns. New development should seek to achieve:

- Convenient and prominent pedestrian access points in terms of signage, lighting and gradients;
- A pattern of footpaths/pavements, which allows easy permeability; a choice of routes filtering through the area;
- Routes from houses to local facilities, including shops, schools and bus stops, shall be as direct and pleasant avoiding steep slopes or steps/kerbs where possible;
- Utilising green open space networks for longer distance walks; and
- Providing dedicated pedestrian routes along green corridors.

For a cycle network to be successful it should be continuous and convenient with appropriate trip-end provision.

### 15.8.7 Street Hierarchy

A network of high quality, attractive streets comprising of a high standard of quality finishes and treatments such as paving and landscaping, to create an environment with a definite sense of place should be achieved. All development should include a hierarchy of streets designed to recognise the needs of pedestrians and cyclists and therefore encourage healthy activity. This can be achieved by paying close attention to the design of street surfaces and planting which should be integrated with passive traffic calming measures such as changes in road colour, planting, narrowing of streets or other forms of traffic calming.

The purpose of any proposed network is to adequately serve the maximum extent of development whilst discouraging unnecessary through-traffic.

**Boulevards** – Access roads should be provided in the form of spacious, tree-lined boulevards to provide a safe environment for pedestrians and cyclists with associated cycle lanes, footpaths and verges fronted by buildings. Boulevards will comprise a high quality public realm, planted with appropriate native species.



**Figure 15.7** Boulevard



**Neighbourhood Streets** – The majority of circulation routes within new developments should be provided by neighbourhood streets. The design of the neighbourhood street shall vary according to the density of the area it is in, and this largely affects the distribution of parking and kerb alignment. In most urban areas where the density is at its highest, the neighbourhood street will have a carriageway width of between 5m and 5.5m and shall maintain a constant road width and continuous kerb edge. They will have dedicated 2m minimum footpaths either side and 1.5m wide grass verges. Cyclists will use the road surface. On – street parking should be provided on both sides of the street.



Figure 15.8 Neighbourhood Street

Where the density is medium the road width will be maintained as above but the parking will be provided on one side only and staggered along the length of the street.



**Figure 15.9** Neighbourhood Street

Where the built density decreases away from the urban area, the street design will largely be less formal in character as appropriate at the edges of a built up area. Streets may be characterised by a variable kerb alignment and road width.



Figure 15.10 Neighbourhood Street

**Mews / Shared Surface Streets** – Shared surface streets may occur where the character is most urban, typically in the town centres. These streets should be designed as shared level surfaces, where pedestrians and cyclists have equal priority with vehicles, therefore having the advantage of providing sufficient space for large vehicles to approach close to buildings without giving the impression of a ‘tarmac prairie’. These streets must have building frontages on both sides.



**Figure 15.11** Shared Surface Street



Figure 15.12 Swales at Upton, Northhampton, UK

### 15.8.8 Storm Water Run-off

Permeable surfaces (gravel, turf and structurally reinforced turf, 'grass-crete', trees and shrubbed areas etc.) should be used to aid water runoff wherever possible.

Porous pavements give trees the rooting space they need to grow to full size and in the void spaces within these surfaces, naturally occurring micro-organisms digest car oils and the oil ceases to exist as a pollutant.

Rainwater infiltration through the pavement into underlying soil reduces stormwater volumes and restores natural subsurface flow paths.

### 15.8.9 Sustainable Urban Drainage Systems (SuDS)

SuDS should be an important part of the drainage infrastructure of a development. The system should provide the major structuring element of landscape and it is important that all development considers the relationship with SuDS as an element of drainage infrastructure as well as a leisure and visual amenity.

The use of 'swales' should be explored as part of SuDS to retain and discharge water. Swales should be linked and have a storage and infiltration function and mainly convey runoff to shallow storage wetlands



Figure 15.13 Swales at Upton, Northhampton, UK

appropriately located. Swales located throughout the development lands should also provide the underlying basis of the landscape structure of new development and form part of a cohesive urban structure, integrated with both the streets and built form.

SuDS should be planted utilising indigenous species that can withstand both dry and very wet conditions. A similar landscape treatment will be utilised across the system so that it reads as a single network.

The system should be capable of accommodating all storm events. Designers should be mindful that future surface water drainage systems should have regard to the natural drainage of the area. The development of an appropriate management regime is also critical in the avoidance of future problems. Figures 15.12–15.14 show how swales may be incorporated into the landscape and could provide developments with a sense of place.

There can be a perception that SuDS components, especially ponds and wetlands pose some public safety risks. With careful design these perceived risks to public safety can be reduced. If ponds are properly designed with shallow side slopes, shallow shelving edges and strategically placed barrier vegetation they are at least as safe as many other watercourses, ponds and lakes that are unfenced in parks, country parks and similar locations.



**Figure 15.14** Swales at Upton, Northhampton, UK

It is good practice to undertake a safety audit or risk assessment of a SuDS scheme before the design is finalised to ensure that risks to maintenance workers and the public (especially children) have been designed out as far as possible.

Designs to implement sustainable urban drainage systems to manage surface water and flooding within developments shall be identified. Details of maintenance agreements should be agreed with the planning authority in writing prior to commencement of development.