APPROACH PRINCIPLES COLLABORATION DEVELOPMENT

the Kent design guide

making it happen - **landscaping**

overview

This part of making it happen includes advice, guidance and information about landscaping schemes for residential and industrial developments.


landscaping
CYCLISTS
DISMOUNT

General

For work in environmentally sensitive areas, early joint discussions with the local District Planning Authority are essential to achieve good design solutions.

In the most successful developments, a strong landscape concept is developed alongside initial highway and architectural ideas and should:

- recognise local character;
- respond to site conditions;
- contribute as an integral part of the design objectives of the new development and be an integral part of the planning and design process;
- never be used merely to fill in the gaps after all other requirements have been fulfilled;
- seek professional landscape expertise at the early concept stage of a development to give advice on initial surveys, appropriate design, the practical implications of planting, and long-term landscape management;
- have adequate funding arrangements for sustained and sympathetic long-term management;
- consider rejection or retention of trees on sound professional survey work at an early stage; and
- seek to encourage a rich variety of wildlife and nature conservation.

Planning Applications

If a development is subject to an Environmental Impact Assessment as part of a planning application, the assessment may involve proposals but typically includes the following for landscape or ecological mitigation.

The landscape proposals included in such a document should comply with EIA guidelines. These proposals should include:

- a clear and precise description of mitigation measures;
- scaled plans and locations of areas of proposed planting;
- the type of planting, such as woodland, scrub, wooded edge, ornamental groundcover, grass and function of planting such as screening views from housing, dormouse habitat amenity woodland;
- specifications, maintenance and management plans (see page 19);
- protected species scoping studies and detailed ecological surveys
- clear information relating to the existing site and all features to be retained or removed;
- details of all existing landscape and environmental designations;
- details of visual impact and/or zones of visual influence which will influence the planting strategy; and
- schedule of existing trees in accordance with BS 5837 (revised 2005).

Outline planning applications must be submitted with:

- drawings indicating existing vegetation to be retained or removed and the general location and type of new planting – such as woodland transplants, standard trees, wildflower management, or ornamental shrubs; and
- details of proposed species and an idea of planting densities to support the landscape objectives.

Detailed planning applications must be submitted with:

- full planting plans to be agreed before your planning obligations are discharged;
- as much information as possible on the drawings in order to demonstrate the quality and objectives of the planting proposals;
- all existing trees to be retained and the location of tree-protection fencing around them ie: the area around trees in which all access is prohibited;

- existing trees and vegetation to be removed backed up by a condition survey of existing trees in accordance with BS 5837;
- exact location, species, number and size of proposed plants;
- management plans to show the long-term vision for the vegetation;
- plans for the creation and management of wildlife habitats;
- details of boundary treatment such as fences and walls and details of all underground and overhead services, construction access and working compound; and
- existing buildings and proposed buildings, paved areas, street furniture and levels – if not shown on accompanying drawings.

Site Survey

Initial site survey and assessment forms the essential platform of the site planning and design process. For planting this will include areas outside the development site itself and may involve specialist expertise in disciplines such as ecology and hydrology. This information will be necessary in the consideration of suitable planting for Sustainable Urban Drainage (SUDS) and nature conservation.

As a minimum, site assessment must include:

- levels and/or contours;
- orientation;
- existing vegetation including type and quality (and links to vegetation outside the site);
- hydrology and local drainage;
- soils and ground conditions;
- characteristic features and local distinctiveness;
- scoping study which identifies potential habitats and protected species; and
- views in and out and potential visual impact.

The survey must guide the character of the design and the appropriateness of retaining existing features.

Nature Conservation

Existing areas with a rich variety of wildlife may be managed as part of a residential development. New planting should seek to enhance and reconstruct wildlife habitats throughout new developments and link into surrounding ecological networks or corridors. We publish the biodiversity targets for the county – these will help to inform the type of habitats to be developed. Specialist ecological advice may be required during the design process.

The key aim of sustainable development is to avoid the loss of biodiversity and protect important habitats and species.

Environmental Guidance

Issues related to Biodiversity Gain through Development:

- the Kent Biodiversity Action Plan has identified those species and habitats most under threat and set out an agenda for action;
- species helped include otters, dormice, nightingales, great crested newts, silver spotted skipper butterflies and late spider orchids;
- further information can be obtained from our website www.kent.gov.uk/biodiversity or e mail biodiversity@kent.gov.uk;
- building for Nature is an initiative led by SEEDA which aims to promote biodiversity specifically within the construction industry by offering advice, guidance, experience and examples of best practices; and

- the implementation of Sustainable Urban Drainage Systems (SUDS) can provide opportunities for natural areas such as wetlands or vegetated swales. (See pages 20 & 21).

Maintenance of Natural Areas:

- natural areas require specialist maintenance. Their visual characteristics sometimes do not meet resident's expectations. Location must be carefully considered to avoid conflict;
- management of natural open space and wildlife areas must be designed to be compatible with adjacent residential areas; and
- natural areas should be perceived as community facilities, although access to sensitive habitats may be restricted. Buffer zones between residential development and natural habitats can help overcome the conflict.

Legislation

It is a legal obligation to identify and protect certain wildlife species and their habitats under European law and the Wildlife and Countryside Act 1981. Planning Consent may be withheld if there are concerns about protected species, even on minor developments.

The following European and national legislation exists to ensure nature conservation is considered along with wider planning considerations:

- the Wildlife and Countryside Act (WCA) (1981) as amended, the Conservation (Natural Habitats etc.);
- Regulations 1994 and the Countryside and Rights of Way Act (2000) protect a number of species and habitats including: reptiles, bats, dormouse, great crested newts, water voles and nesting birds; and
- Planning Policy Statement 9: Biodiversity and Geological Conservation states that the presence of protected species should be considered by planning authorities and they should consider using conditions in planning permissions to safeguard this interest.

The above legislation requires that:

- all protected species must be fully considered and any issues resolved satisfactorily prior to the granting of planning permission including the necessary survey information and details of the mitigation proposals;
- ecological survey work should be dealt with as early as possible but is dependant on the season. It should be noted that the impacts can be direct or indirect such as the fragmentation of habitat and disturbance through noise, light, construction work and changes to natural drainage patterns;
- special measures such as timing of works and translocation of species populations, will be required to mitigate or compensate for the impacts. Licenses are required and must be agreed and granted by English Nature or DEFRA; and
- the whole process - starting from undertaking the appropriate surveys to being able to mobilise construction staff on site, following suitable mitigation measures - can take a few years. It is therefore essential to plan ahead and allow for the early survey work.

Amenity Areas:

- not required for highway purposes, therefore will not be adopted by us. Private arrangements must be put in place for the long-term maintenance of such areas;
- agreement can be reached for engineering or safety reasons, some areas are adopted on condition that commuted sums are paid to with us;
- payments should be based on approximately 20x annual maintenance costs (plus legal charges) to be estimated by us; and
- commuted sums will allow for periodic clearing, replanting and major maintenance operations in excess of day to day maintenance operations for shrub areas.

Maintenance by Residents:

- in residential or commercial developments, the management of the landscape could be funded and undertaken by residents or business associations under legal agreements, as a condition of sale tenancy or by way of licence;
- management arrangements which involve local communities and stakeholders should promote a sense of ownership to ensure the long-term maintenance of open space, including safeguards and insurance against such arrangements collapsing; and
- further dedication of these areas to locally responsible organisations, such as Parish or Town Councils, should be considered together with licences under Section 142 of the Highways Act for locally agreed arrangements, which should be encouraged from the outset.

Case Studies:

New Ash Green

- maintenance by residents where groups of residents either manage a landscape contract or actually do the work themselves.
- adherence to the original design is strictly controlled.

Kings Hill

- a management company has been set up on behalf of the local residents who contribute to landscape maintenance.
- residents pay an agreed fee to the company who then carry out maintenance regimes in accordance with the landscape objectives of the development.

Adoption of Open Space

Lifecycle implications for new landscapes mean that long term maintenance must be ensured before the scheme goes ahead. This approach should lead to a simple adoption process.

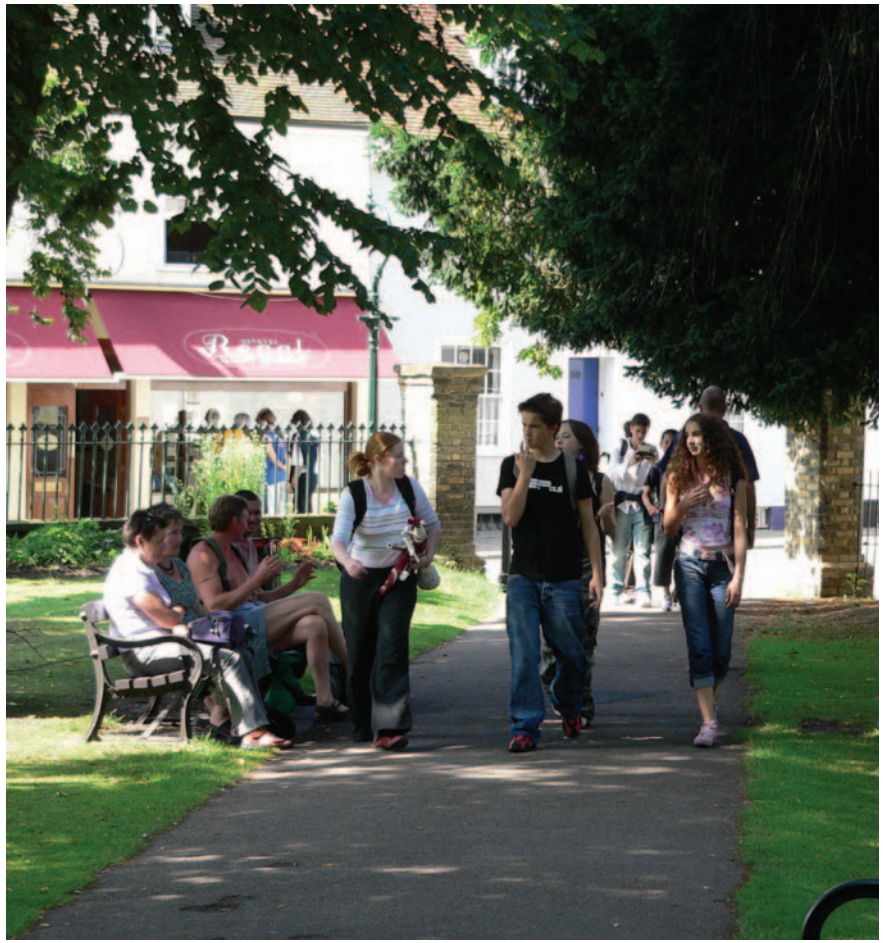
It will be necessary to engage planners, adoption engineers (for highways, lighting and drainage) and the maintaining authority in a development team approach to landscape provision. Landscape schemes must make sense to the users of a particular site who will ultimately support or hinder the fruition of the mature landscape. Sometimes, in addition to the planning requirements, the objectives need to be reinforced by the placement of restrictive covenants and through the serving of Tree Preservation Orders.

Maintenance by the local District Planning Authority:

- section 9 of the Open Spaces Act 1906 enables amenity areas such as recreation areas and parks to be maintained for the purposes of local amenity;
- arrangements and agreement must be in place prior to planning permission being granted;
- government provides guidance in Circular 1/97 about obligations with regard to planning permission, including the need to contribute towards the costs of development schemes including public open space; and
- local plans should contain details of the requirements that you are obliged to conform with when seeking planning permission.

Other Forms of Funding:

- joint private/public arrangements where local firms agree to pay for sponsorship, with maintenance carried out by local authority or highway employees;
- open space with a critical function, such as forward visibility areas, could be maintained by such groups with appropriate arrangements and licences in place to safeguard engineering concerns;
- insurance issues must be addressed and agreed – such as who can legally maintain areas of planting in, on or above the highway, together with safety issues for carrying out the maintenance; and
- planting must be fully established prior to adoption. in some cases the adopting authority may be willing to accept remedial maintenance of substandard areas, where a commuted payment is paid to cover the costs in the early years. This option is considered to be a last resort and would need to be agreed with the adopting authority.



Service Margins

Statutory Undertakers normally install their plant and apparatus underneath footways and in service margins, but without agreed arrangements this often leads to inevitable maintenance problems, congestion and difficulty in placing new plant and apparatus. The decision as to how underground services are to be routed will have a major bearing on how the core planting in the development grows to maturity, and how it is protected and nurtured long into the future.

Consideration should therefore be given to the following:

- trees and other key structural vegetation in any development needs to remain completely undisturbed in order to thrive long term. Damage by service routes must not compromise environmental objective;
- underground services must be accessible. it is therefore essential that structural plants and trees, which are expected to mature, do not conflict with underground or overhead services in a well planned environment;
- there are species of trees and shrubs and methods of protecting the services from roots which allow design expectations to be met, thus avoiding a sterile service corridor. Planting in constricted circumstances must be seen as a last resort;
- structural planting should be identified in the initial design process along with the service margins, including overhead lines, so that conflict is avoided;
- utilities can be further streamlined to follow co-ordinated multiple service ducts, these may be sited to the rear of developments, or sited under footpaths and paved areas;
- planting or grassing narrow service route corridors must be avoided, especially in high density developments. Well detailed hard surfacing is often more appropriate;
- all other alternatives such as ducting beneath roads or footpaths must be fully considered;
- narrow service margins should be avoided where absolutely necessary. They should not be less than 1.25m wide and must not be considered if less than 6m2 in overall size. They must form a fully integrated and worthwhile part of the residential space, rather than an add-on feature. The plant species needs to be chosen carefully to avoid costly ongoing maintenance costs; and
- the highway boundary or adoptable area must be clearly identifiable on the ground, the form of this delineation should be planned and agreed as part of the overall layout with the adopting authority.

Trees

The following information refers to new trees and existing trees in relation to development, design and construction.

Trees are invaluable for their contribution to the street scene; they also help to mitigate the impact of new developments in rural areas. Trees have unique properties; they define spaces, provide shade and landmark features; most importantly they support ecological interest and wildlife habitats. In addition to providing visual amenity, they can reduce energy costs of nearby buildings, and increase the quality of their setting.

The following points with regard to trees should be considered:

- kent design advocates the retention of existing trees and other vegetation wherever possible. However, where they are proposed to be retained, it is essential that they should have a function within the new development. The long-term implications of their growth and maintenance requirements must be completely understood and provided for;
- trees need to be accommodated as a long-term prospect. It must be recognised that the potential lifespan of many trees (possibly several hundred years) outstrips the design-life of much of today's built environment. Where they are damaged and subsequently decline and die, or where inappropriate design leads to conflict, trees become a constant source of complaint; and
- the removal of a tree, particularly if it is healthy and mature, must be a last resort, carried out only after careful analysis of all other options.

Trees and Construction

In line with the standard guidance (BS.5837 - Guide for Trees in relation to Construction 1991), a sensible and informed approach must be undertaken and include full details of all existing trees and shrubs, including size, age and condition, service information and drainage in relation to trees.

Tree surveys must be carried out by a professional to assess the existing trees and their condition. This will help determine which trees are the most suitable to retain within a development. Trees adjacent to the site or those that will be affected by works, such as those along points of access, must be included. A tree survey will be ineffectual if it is carried out retrospectively.

Common causes of damage to the rooting area of trees during the construction process include:

- trench digging;
- adding surfaces that are not porous thus reducing drainage;
- soil compaction from plant vehicles;
- soil pollution from badly stored substances such as diesel;
- physical damage to branches and bark by machinery;
- fire;
- removal of certain trees that can leave existing trees exposed; and
- changes to local water availability.

If trees are damaged during construction it is usually impossible for remedial action to repair or save trees. To retain trees in a constrained or changed environment, especially the most vulnerable species, is impractical.

To prevent damage to existing trees which leaves them in unstable conditions, the following must be adhered to:

- protective fencing must be erected. Distances should be calculated in relation to the tree species and size. Special protection for retained trees prior to and during the whole of the construction phase in accordance with BS 5837 must be provided. Rooting area typically spreads beyond the crown spread;

- proposed ground level changes and routes of underground infrastructure must be known to fully assess the impact on trees. These must be shown on any planning submissions and any subsequent construction drawings; and
- schemes must ensure that all trees at maturity will not dominate buildings, impede windows or obstruct roads, leading to concerns about safety and requests to prune or fell. It must be remembered that existing mature trees will continue to grow. Enough space must be provided to allow them to achieve their mature natural form, or if a new tree, a species must be chosen to fit the space available.

Guidance

BS 5837: Trees in Relation to Construction (updated version of the document published in 2005) is available from Her Majesty's Stationery Office and gives comprehensive and practical recommendations on design criteria for trees covering:

- tree surveys and assessment;
- assessing existing trees;
- tree roots;
- location and growth of trees; and
- protective fencing for trees on construction sites.

National Joint Utilities Group (NJUG) Publication No:10 - Guidelines for the planning, installation and maintenance of utility services in proximity to trees is available direct from the National Joint Utilities Group, 30 Millbank, London, SW1P 4RD, or can be downloaded as a PDF document from their website.

The following subjects are discussed in NJUG10:

- how to avoid damage to trees (trench type & design, backfilling);
- additional precautions near trees;
- special considerations when planning services;
- precautions when repairing existing services;
- avoiding chemical damage to trees;
- above-ground services; and
- legislation and other guidance (statutory framework, other guidelines).

The National House Builders Council (NHBC) "Building near Trees" document is available direct from the National House Builders Council and gives advice on the water demand and mature height of trees.

Arboricultural Practice Note 1 – Driveways close to trees
Leaflet No 11 – Trees: Excavations and Highway Maintenance

Proposed New Trees

New trees must be accommodated in the design of external spaces where they are appropriate in terms of landscape character, or townscape.

The following points must be considered:

- spaces for new trees must be positively designed into the new development as part of the core landscaping;
- spaces must not be infringed by roads, services or other infrastructure, so the planting can be maintained in perpetuity; and
- appropriate space must also be allowed for new planting around existing mature trees in order to provide a natural succession of trees or woodland and to compensate for future predicted tree loss. This can give a new development an established look.

Trees are of particular importance in housing and road layout, but must be located with nearby buildings and highways in mind. At the outset, certain characteristics of trees need to be recognized, including:

- growth of roots and branches;
- seasonal habits (dropping leaves or fruit, providing shade); and
- maintenance requirements.

There must be no reason for a tree to be subsequently taken out because it has overgrown its site or the leaf-fall or shade characteristics are unsuitable.

Issues to consider include:

- species of limes are particularly unacceptable in parking, seating and play areas due to Honey Dew;
- varieties of cherry can be more prone to surface roots and accordingly must not be used near paving;
- thorny trees must not be positioned near walkways;
- fruiting trees can be used near walkways;
- horsechestnuts (conkers) cause problems near roads, car parks and heavily used pedestrian areas;
- birch trees have light foliage, providing a reduced impact on light reduction and leaf fall; and
- some tree species, such as lime, cherry and elm, produce suckers as basal growth. These must be avoided where this characteristic could cause problems either physically or visually.

Residents often find trees intimidating. In addition to ensuring the appropriate spatial relationship of trees to buildings, the acceptance of trees by local residents and other site-users must be secured by either stakeholder engagement or education.

Trees and space

When planting new trees, you must make sure that there is enough area with good growing conditions to provide for the root system of the mature size of the tree species planted. Good growing conditions mean good access to water, air and nutrients.

Where trees are required, but there is some concern about the availability of space, the species and the restricted height or spread must be considered.

To create an impact in the space set aside for a future mature tree, more than one tree may be planted initially, then thinned to select the best specimen to grow on to full size.

Regular pruning or maintenance issues also need to be considered. Hard-pruned trees are not inherently characteristics of rural Kent; however, if formation pruning is required for a particular visual effect or situation, then financial provision must be allowed in the commuted sum to allow for the additional work.

Conflicts with Roots

Concerns sometimes arise over the conflict between tree roots and buildings, footways, services and infrastructure. Tree roots rarely cause damage to buildings or services, unless they are very close or are growing in shrinkable clay soils. However, to avoid all possible future conflicts, it is sensible to site new buildings, services and highways that allow room for the maximum future growth of all parts of the tree structure.

Root spread

Many factors can affect root spread. Roots often extend for a radius wider than the tree height. It must be expected that tree roots will grow out beyond the spread of the tree's branches and may grow down to at least 2m in depth, but typically will be concentrated in the top 600mm of the soil.

All development plans must provide enough completely undisturbed growing space for the roots of existing and new trees – failure to do this is the most common mistake in design. It is advisable to seek help from a professional source before designing the planting.

Tree Function

Roots provide the unseen support system for the tree, both structurally, anchoring the tree to prevent it falling, and by absorbing nutrients and moisture from the soil which are transported through the trunk and into the crown. The combination of carbohydrate produced from the leaves and absorbed oxygen produce food energy for growth. The transportation system for the water is situated just under the bark in the xylem vessels. Therefore, any damage to the bark will reduce the vitality of the tree through reduced water uptake. Without healthy roots, trees will not flourish and may become unstable.

Damage to footways, footpaths and service margins

As they mature, the natural growth and expansion of the trunk and the main roots adjacent to the tree can lift or crack paved surfaces and damage adjacent walls. Sufficient space must be allowed for this type of growth around all trees.

Tree roots will grow in the direction of least resistance and where they will have the best access to water, air and nutrients. If soil conditions are poor, the roots are likely to grow towards better conditions or are more likely to produce surface roots.

Condensation, humidity and high temperatures that form beneath thin, non-porous surfaces and the similar conditions around underground services, may allow roots to thrive. They may grow into sandy bedding material where pipes are laid or into pipes that are already leaking. However, tree roots do not break into sound pipes in search of water.

Good and bad practice

Managing conditions for tree roots

The recommended course of action in planting and retaining trees is always to provide enough space for their long-term growing requirements. Occasionally there may be a requirement for tree planting where site conditions are constrained. In these cases, or where there are other concerns, the growing conditions around a tree can be managed to encourage root development away from structures or to reduce potential damage while still allowing enough overall space to sustain the chosen species.

The following must be considered:

- construct footways and footpaths from robust flexible material with hand excavation in the rooting area and consider the use of porous surfacing. It is often the kerb edge and concrete foundations that causes more damage than the actual surfacing material. However, acceptance of long term disturbance may be necessary;
- allowance of a minimum 1m radius around boles of new trees. Further opening to accommodate future growth can be accommodated by concentric rings of paving or specially designed tree grilles which can be progressively lifted;
- soil amelioration must be provided in areas where it will be acceptable for roots to grow. This involves backfilling to the full depth and range of the expected root-growth area with a free-draining, nutrient rich, proprietary soil mix;
- structural soil - proprietary soil mix, sometimes called 'tree sand' provides a structural base for footways and footpaths as well as a growing medium for roots within the sub-base around trees in paved areas. The material is designed to encourage root growth beneath the footways and footpaths, with the aim of reducing the development of surface-roots. It works on the premise that roots will not grow to the surface if they have adequate nutrients, air and moisture in the soil under the footways and footpaths;
- prevention of surface water run-off ensure roots are not damaged by chemical leachate such as unsuitable herbicides or road salt. Do not direct surface water run-off into individual tree pits as this may produce water-logged conditions and will concentrate any pollutants. However, adequate moisture should be ensured by maintaining a porous surface and/or irrigation over the root zone; and
- root barriers can provide a physical barrier to root growth. They are currently available as; Plastic membranes (some with ridges to divert root growth downwards), Membranes with chemical growth inhibitors and Concrete rings. Non-porous barriers beneath the footways and footpaths may attract condensation and therefore root growth. Ideally they need to be UV resistant and it is important that they are continuous with no gaps. They need to be positioned to the full depth of the growing medium or viable subsoil. Over-reliance on root barriers must be avoided. Where roots are restricted by root barriers, the long term anchorage of the tree may be compromised. This situation must be avoided for those trees which are large at maturity. Square shaped pits are preferred as corners encourage roots to grow down and out as opposed to growing round and round as in a circular pit.

The tree will have room to grow, but consideration needs to be given to the maintenance of the surrouning area and its visual effect, including:

- Trenchless construction - Where trenches have to be constructed in a rooting zone, consideration must be given to using trenchless construction techniques;
- Above ground construction - No dig construction may be an option where there is conflict with existing roots, this involves the protection of any surface roots by membranes and sandy materials and the construction of a permeable paving without causing undue compaction. The solution may be appropriate for very lightly trafficked or pedestrian areas. (See Arboricultural Practice Note 1 – 1996 Driveways close to Trees); and

- where roots are already lifting surfacing and may be causing unacceptable hazards, one form of treatment is to carefully lift the existing surface, prune the roots and resurface. Standard guidance exists on the careful lifting and replacement of surfacing around tree roots, professional specialist advice must always be sought and the action supervised on site. Branches may be pruned to reduce the demand for growth on the roots. Root pruning is never an ideal course of action as the disturbance may cause the tree to decline, die or become unstable. When the roots recover, they will grow back to cause problems in the future. Crown reduction or thinning may lead to an overall increase in leaf area and an increase in water demand, a regular pruning regime may then need to be instigated as a result.

Trees and Clay Soils

It should not be assumed that all trees growing close to buildings will be potentially hazardous; however, the potential problem of trees and structures on shrinkable clay soils is well known. Trees taking moisture out of these soils exaggerate soil shrinkage. Conversely the removal of large trees from clay soils can cause the ground to swell ('heave'), also leading to structural displacement where foundations are not adequate for the conditions.

Not all of the clay soils in Kent will be susceptible to shrinkage – local advice must always be sought on the physical properties of soils; detailed site assessments by qualified professionals will be required to assess the need for action.

Foundations

Where structures are proposed in close proximity to trees, potential problems on shrinkable clay can be overcome by construction designed to withstand the ground movement. Advice on the design of foundations on clay soils is available in NHBC standard - Buildings Near Trees.

Impact of tree removal

Current opinion considers that between one year and several years may elapse before it is 'safe' to build on shrinkable clay where trees have been removed and where 'heave' is anticipated. There are no exact methods of determining the time required before construction can be carried out; conditions should be regularly monitored until the soil swell has stabilised. Specialist geogrid reinforcement methods may be an option if time is short, however these should be designed by specialists.

Species

Mature trees have the greatest impact on shrinkable clay. The most problematic trees are generally those regarded as high water demanders, such as Poplar Populus spp, Willow Salix spp and Oak Quercus spp. Due to the variable factors involved, there is no 'rule of thumb' that can be safely stated. It is therefore essential to seek professional advice about the impact of all trees and on the soil conditions, which will vary from site to site. Further advice can be found in the NHBC standard - Buildings Near Trees and Building Research Establishment Digest 298.

Reference

DfT Consultation on Draft Guidance on Highways Works and Trees 'Roots and Routes' 1999.

A review of tree root conflicts with sidewalks, curbs, and road, - Published in 2003 by T.B. Randrup, E.G. McPherson, L.R. Costello.

Low Rise Building Foundations: the influence of trees in clay soils. Building Research Establishment Digest 298 (contact: enquiries@bre.co.uk).

Chapter 4 Of The National House Builders Council (NHBC) "Building near Trees" (available from the NHBC).

NJUG's Publication No.10 "Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees" which was produced in collaboration with the arboricultural profession and the Department of Environment, Food and Rural Affairs (DEFRA).

Appropriate Species, Planting Techniques and Topsoil

Planting can be either native, naturalistic or ornamental. There is a balance to be sought and planting proposals must demonstrate a clear response to the conditions and nature of the site and the impact of the development. But there will also be situations where ornamental or non-native species may be more appropriate - such as in an urban square.

Soils, orientation, local character and other growing conditions will always directly affect the choice of plants, whether natural or ornamental and will be instrumental in the long term success of a planting scheme.

Natural regeneration is a technique which can be used in the creation of natural landscapes, and can be used in conjunction with standard planting schemes. It must not be seen as a low-cost alternative. On-going monitoring and management will be needed to encourage the desired species whilst removing invasive types. Grasslands, wetlands and woodlands are types of vegetation which may be implemented by natural regeneration.

Where naturalistic vegetation is planted, the seed or stock must be of local provenance. It must be in a position where local residents or site users may perceive an 'unmaintained' area.

Plant Selection

There are a number of factors which must be considered regarding the appropriate selection of any plant material. These factors include the following:

1 Design:

size , form , colour, texture, fruit, flowers, seasonal variation , shade casting , local character, wildlife potential , native / exotic, noise absorption , availability, formal and informal .

2 Maintenance:

thorns, spikes etc, pruning, human toxicity / allergies etc, longevity, leaf / fruit flower or leaf fall, pest harbouring(aphids etc), rate of establishment, ground covering ability and suckers/runners.

3 Tolerance:

cold , exposure, drought, water logging, herbicides, disease, pollution, shade / sun, soil quality / depth, road salt, trampling, vandalism, alkaline or acidic soils

4 Building/Construction:

stability, water uptake, root vigour and depth, leaf fall and decomposition, branch strength and cost

In order to make the right choice all of the above factors need to be taken into consideration in order to achieve a satisfactory landscape environment. It is therefore essential to employ experienced personnel who can marry both design skills and horticultural knowledge, with a detailed understanding of the long term maintenance implications resulting from the planting proposals.

If you are able to plant in stages as a scheme progresses, then the first phases achieve an early maturity which can frequently help in marketing the remainder of the development.

Planting Sizes

The following considerations must be taken into account regarding planting sizes:

- trees in particular are available in a variety of sizes. The standard nursery method of specification is circumference 1m above the ground (known as girth);
- the smallest tree planting size is 0.5 m high, used for naturalistic effect;
- girth range in trees is 6 - 60cm. Height range is 2 – 8m high. The largest trees are more difficult to establish and must only be used to produce essential and immediate effect; and
- a mix off different planting sizes for each scheme is necessary to respond to different design objectives.

Structural Planting

Areas of structural planting must be identified at the earliest stage of the development design to ensure there is sufficient free space from underground or overhead services.

The following considerations must be taken into account:

- the design must allow for species to reach their full potential and long term proposition without causing conflict;
- structural planting in some circumstances may mean a formal avenue; and
- in the selection of plant material, it is often desirable to decide upon a theme of species or group of species suitable for use within built up areas, these are likely to be influenced by the development's association with its surrounding environment. Native species can soften rural development, providing a less harsh edge between the built up area and the countryside. In the case of infill development, non native species may be more appropriate.

Shrub Planting

A vast range of shrubs are available, often promoting `kaleidoscopic' schemes which can upset any form of design stability. Sizes of shrub species vary enormously and generally need a greater degree of day to day maintenance than trees, and may need completely replacing after a period of time.

Larger and more structural elements of shrub planting work with tree planting, to link building groups together and define overall spaces. Residents may supplement structural elements of the design with the `busy' personal activity associated with the average British garden. Your planting may be the subject of a planning condition and is seen as essential to ensuring the development works. Clear landscape objectives will make this approval process easier.

Shrub Planting Guidelines

In order to achieve successful establishment and long term maintenance of shrubs, consideration must be given to the following:

- availability - readily available for initial supply and replacements following future disturbance by the Statutory Undertakers or us;
- establishment - quick establishment needs to provide immediate effect and reduce maintenance costs;
- root systems - must not interfere with underground services or adjoining surfaces;
- shrubs planted in visability areas must not exceed 600mm in height.
- hardiness - resistant to frost damage and trampling;
- use of appropriate species adjacent to highways - many species will be killed by continued exposure to salt;
- visual qualities - to provide all year round effect preferably with seasonal variation;
- avoidance of species that are known to be short lived;
- avoidance of species that are known to need excessive watering maintenance and pruning; and
- shrubs with severe prickles must not be positioned where they can catch passers-by or in service margins.

Trees

Trees must be specified by a landscape or arboricultural professional, there is a huge variety and they must be chosen to fit individual site conditions.

Hedges

Hedges can be a characteristic feature in some environments and can be used to great visual effect especially where space is limited. Species must be chosen to keep the inherent and costly maintenance to a minimum.

Climbers

Climbing plants can add colour and texture in limited spaces. Carefully chosen species can avoid onerous maintenance liabilities. Alternatively, vigorous species in the correct location can provide rapid impact and softening of hard forms.

Trees and hedges can be used to define space, in particular they are effective way of defining the boundaries of public and private realms. They can be used to give enclosure to public space and emphasise important views. In rural settings trees and hedges, when mature, can help new buildings and infrastructure blend in with the existing landscape. Climbers can be used where space is limited to help soften the appearance of buildings or structures.

Topsoil

Topsoil is the fundamental basis of all successful planting schemes and the following guidance should be adhered to:

- topsoil should be supplied or retained and cared for on site in accordance with British Standard 3882 and remain isolated from construction activities to avoid the irreversible damage of compaction and contamination;
- topsoil should be specified to premium quality according to the British Standard at a depth of 100mm for grass areas and a minimum of 300mm for planted areas as a guide after settlement. Effectiveness of topsoil depths are totally dependant on the nature of the material below. If a naturally occurring sub soil exists, which has not been compacted through construction processes, then topsoil depths stated above will suffice;
- in situations where there may be construction layers or hard compacted materials then the situation must be reviewed by a landscape professional and advice taken;
- tree pits may need to be locally dug to a greater depth to suit a particular size of tree dependant on the individual site conditions; and
- tree pits should be excavated to be 200mm bigger than the root ball of the tree, the sides and base of the pit must be thoroughly forked to break up compaction and pits must be back filled with premium grade topsoil.

Specification, Maintenance and Management Plans

The success or failure of a good landscape scheme will depend upon the quality of the plant material, and on the standard of planting and aftercare which should run seamlessly into the long term management of the site.

In addition to the information submitted to the District Planning Authority, a planting specification must be included with the submission. Where plant material is to be adopted by us, it is vital that the standard of implementation is agreed prior to the completion of negotiations.

There are obvious benefits in considering adoption of public spaces at the earliest possible stage in the design process. For us, it is essential that any open space to be adopted should fulfil a need (for example, sightlines, drainage provision, services, screening, nature conservation, habitat creation, amenity). If the view is taken that every space is designed with a purpose, then it makes sense to define this function on the planning submission along with the design. This can then be reflected in the management plan.

Examples of these 'tagged' design objectives include:

- amenity planting – ornamental to provide floral interest;
- structure planting – to provide visual backdrop to housing areas;
- local meeting point – to be kept open for security reasons;
- sightlines – to be kept below 0.6m;
- traffic calming – to be kept pruned to achieve visual constriction;
- screening to factory - to be left to achieve maturity; and
- ecological mitigation – to create a mix of shrubs and groundcover for dormouse habitat.

Having clarified the landscape scheme with the design objectives, it is a simple step to complete the process and explain 'how' these objectives are to be sustained. This is known as the management plan.

The management plan provides a review of the costs and the practicality of future landscape maintenance, and must provide sufficient information to assess the suitability of the scheme in terms of short, medium and long-term financial considerations. Local stakeholders such as Parish or Town Councils and Community Groups must be encouraged to contribute to management plans and agree their objectives, together with the rights and responsibilities of all parties.

Agreements may then be secured with all parties who will be responsible for the future management of the landscape areas and how it will be financed.

Adoption of open space is easily achieved if all parties with an interest in the future management of the scheme have been consulted throughout the design process.

Landscape areas without a defined purpose must always be designed out of the scheme, such as left-over spaces filled with plants or grass, which are rarely valued and cause problems in securing adoption.

All parties need to recognise that a landscape scheme will no longer be just a planting plan, but a document that is capable of transfer through the lifetime of the development. As such, it must be capable of change within the parameters of the design objectives.

Water, drainage and SUDS

Surface water drainage methods that take account of quantity, quality and amenity issues are collectively referred to as Sustainable Urban Drainage Systems (SUDS). These systems are more sustainable than conventional drainage methods because they:

- manage run-off flow rates, reducing the impact of urbanisation on flooding.
- protect or enhance water quality;
- can be sympathetic to the environmental setting and the needs of the local community;
- provide a habitat for wildlife in urban watercourses;
- can provide opportunities for more varied planting and open space;
- encourage natural groundwater recharge (where appropriate); and
- may enable cost savings to be made in the construction of surface water drainage systems.

Some SUDS features will be large-scale with a far-reaching impact on the visual and physical characteristics of the landscape. The range of options means that active decisions have to be made that balance the most appropriate solution for the site conditions with the wishes of different stakeholders.

SUDS involve such landscape features as:

- pervious pavements – porous blocks, porous bound aggregate, porous asphalt, gravel and 'grasscrete' type surfacing;
- swale collectors and buffer strips, soakaways, filtration strips, trenches and filtration basins;
- wet and dry basins, and settlement basins; and
- constructed wetlands, wet detention ponds, vegetated swales and vegetated balancing ponds.

Mainly because of their large scale and their effect on the wider landscape, such features are difficult to retrofit and should be part of the initial overall landscape design. Initial surveys will need to explore the potential of the landscape to accept SUDS features.

An effective SUDS scheme may incorporate a network of swales, filtration strips and small wet detention ponds, plus porous surfaces. In an urban area, they could form a constructed wetland.

Planting in Conjunction with SUDS:

- opportunities for new planting will exist in vegetated swales, buffer zones and constructed wetlands. These will be able to contribute to new wetland corridors which will ultimately link with existing natural riparian catchment areas;
- planting in swales will need to withstand both wet and dry conditions, and the sub-surface construction which allows horizontal sub-surface flow. Vegetation types such as willow or alder carr or grasslands may be suitable; and
- constructed wetlands should foster locally characteristic species. In both cases, the management of natural regeneration may be an appropriate technique for implementing the planting (see below).

It should be noted that the above features are usually large-scale and are carefully calculated to take the drainage from a defined area. It is not acceptable to drain large surfaces into tree-pits or shrub borders as these areas will become water logged and the vegetation is likely to fail.

Filtration strips typically have gravel or grass surfaces. Opportunities may exist for species-rich grassland to be implemented in these zones.

Limitations:

- limitations to planting within SUDS occur where basins are constructed with liners and where inspection chambers, sediment and debris traps need to be accessed and regularly maintained;
- the presence of aquifers or groundwater will require the separation of run-off and construction with liners to prevent contamination – tree planting is unlikely to be suitable in these areas unless early planning can facilitate planting by special design;
- sewage filtration systems such as reed beds are becoming more widespread. The form of these basins, however, may be constrained by the technical considerations of levels, waterflow and a regular layout of filtration pipes. In short, they are lined, flat and square and do not appear as natural features in the landscape. In a naturalistic landscape, it is suggested that peripheral areas could be planted to break down the straight lines. At Bluewater shopping development the surrounding bank side vegetation effectively merges with the hard edges. The regular form of the reedbed may be appropriate in an urban situation; and
- security issues concerning children accessing lagoons or ponds often leads to unsightly security fences. Early design consideration may allow the use of shallow margins and planting to avoid excessive fencing.

References

Sustainable Drainage, a review of published material on the performance of various SUDS components - Prepared for the Environment Agency by Professor CJ Pratt, Coventry University, updated Feb 2004. www.ciria.org