THE UNIVERSITY of EDINBURGH
Estates Department

Estates Design Guideline No.14

Landscape Design

Important Note on Estates Design Guidelines, Assets & Standards

These Design Guidelines, Assets and Standards and the associated suite of documents have been produced in order to furnish external design consultants and contractors with guidance on required University standards for inclusion within their proposed project design.

These guidelines are to be used as supplementary information during project design stage, and as such, detail the minimum standards expected from the University Estates Department.

Please note, these guidelines do not absolve the project design team including, sub-consultants and sub-contractors of their legal and contractual obligations under, design liability, statutory regulations and health and safety legislation.

EDG No. 3 Mechanical Engineering Services – Approval Procedure	
Estates Design Guidelines (Assets & Standards) No. 14 Landscape Design Guidelines Lead: Landscape Design Guidelines Working Group	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No. 14 Landscape Design Guidelines – equality check Lead: Landscape Design Guidelines Working Group	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No. 14 Landscape Design Guidelines – check and approval Lead: Head of Maintenance Operations	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No. 14 Landscape Design Guidelines – approval by EMG	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No. 14 Landscape Design Guidelines – approval by Estates Committee	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No. 14 Landscape Design Guidelines – sign off by Duty Holder	Name Signed Off Date

Version Control for Estates Design Guidelines (Assets & Standards) No. 3 Mechanical Engineering Services

Version	Date	Nature of Revision	Author	Approved by	Signed
V 1.0	February 2022	New Guideline	JL		

Contents

1 Introduction

The UoE Design Guidelines (as a whole), have been developed for employees of the UoE, Design Teams, Architects, Engineers, Project Managers, external consultants and contractors. This documentation has been developed to enable Design Teams and Contractors to have a broad understanding of the principles that the University of Edinburgh will require to be adopted for any future developments.

The guide is primarily designed to be used in conjunction with Royal Institute of British Architects (RIBA) stages. The actual extent and scope of the design guide to be incorporated for any future development will be based upon the specific projects requirements.

The UoE Design Guidelines aim to discuss strategic matters and does not provide an exhaustive treatment of statutory or best practice design and compliance requirements; its primary purpose is to establish a starting point for design briefs, support the consultation process and outline existing assets and standards. It is the responsibility of Design Team readers/duty holders to ensure subsequent designs are complete, compliant and able to meet the final approved brief when measured in use.

1.1 Important Notice – Essential Prior Reading

It is essential for readers of this document to first refer to the Guide No 1, entitled Estates Design Guidelines (Assets & Standards) Introduction and Application, which serves to provide the principles and overview with vital information and context that apply to all projects.

1.2 Purpose of the University of Edinburgh Estates Design Guidelines (Assets and Standards)

The purpose of the Estates Guidelines is to act as a briefing document to give designers an overview of the minimum design requirements, constraints and challenges presented by the University of Edinburgh's particular needs. It applies to all new-build, refurbishment, minor works and change of use projects, including property leased by the University, controlling quality in the production of designs, specifications and the subsequent performance of buildings, developed to a consistently high standard and ensuring continuity throughout the University Estate.

The University of Edinburgh encourages innovation; however, all project Design Teams should ensure that their proposed projects have end user considerations and ease of maintenance at its core.

The use of the University of Edinburgh Estates Guidelines, Assets and Standards will not take the place of, or remove, any of the professional responsibility from Design Teams and Contractors to fully comply with the requirements within this document. Given the complex, diverse and growing estate, not all eventualities can be fully defined within this document.

1.3 Interpretation of UoE Estates Design Guidelines, Assets and Standards

The Estates Design Guidelines, Assets and Standards are required to be issued with all project contractual documentation in order to inform project design and construction teams of expected standards to ensure quality continuity across its Estate.

1.4 Glossary of Terms:

1.4.1 Enforced Requirements

The use of the word(s) ‘shall’, ‘are required’, ‘is required’ ‘must’ or ‘will’ denotes a requirement that is non- negotiable and shall be used as the basis for designs, technical submissions and/or activities. If such a statement conflicts with a statutory obligation then a technical submittal shall be issued to the University project representative for liaison with the BSG for their final decision regarding compliance with the documentation.

1.4.2 Requirements Needing Confirmation

The use of the word ‘may’ denotes a negotiable requirement or indication of a solution, where innovation and further calculation, design and discussion may be required to arrive at an optimised solution.

1.4.3 Quality

The Design Guide aims to arrive at the University of Edinburgh’s highest design aspirations and standards. It may be that, at the University of Edinburgh’s sole discretion, solutions are value managed and then value engineered during subsequent design iterations. Design Teams and Contractors are encouraged to consider where value management and subsequent value engineering may result in an improved financial performance should funding constraints occur. All mechanical and electrical value management and value engineering exercises carried out shall be forwarded to the BSG for review.

1.4.4 Assets and standards

The Design Guidelines endeavours to set out Assets and Standards that will maximise the benefits realisation for the UoE to achieve its strategic objectives and maximise value for money. This will involve coordinated and optimised planning in conjunction with Procurement, robust asset selection with particular reference to existing legacy assets and standards on the University Estate, for reasons of utilisation and continuity of maintenance, replacement of parts, renewal and ultimate disposal

1.4.5 Currency of Third Party Documents

Where superseded standards and regulatory documents are referred to in the text, the reader shall apply current revisions and amendments to their project. Should there be any ambiguity, the BSG should be contacted for clarity.

1.4.6 Proof

Where the word ‘proof’ is used, e.g. ‘proof is required’, a written report or installation certificate must be produced for approval depending on context.

1.5 Review Design Data Process (RDD)

All proposed designs shall be submitted to the Project Manager and respect Estates Teams and Building Services Group for review and comments, the response will be categorised as follows:

A. Design Team to acknowledge comments and continue to develop the design to the next stage.

B. Design Team to acknowledge comments and update the design in accordance with comments and resubmit for consideration before proceeding to the next stage.

C. Design Team to acknowledge comments and completely review and update the design in accordance to the agreed design principles and resubmit for consideration before proceeding to the next stage.

In addition to the above, the UoE may request specific technical submission to support the RDD and may include the request setting out with proof, e.g. calculations, drawings, etc.

The purpose of the RDD is to ensure designs meet the strategic requirements of the UoE and do not compromise the future operations and maintenance provision. The obligations owed by external architects, consultants and contractors to UoE and their liabilities to UoE is not in any way diminished or otherwise reduced by the RDD.

1.6 The Obligations Owed

By external Design Teams, consultants and contractors to University of Edinburgh and their liabilities to University of Edinburgh is not in any way diminished or otherwise reduced by the approval process. University of Edinburgh is not taking over the roles and duties of the external Design Teams, consultants and contractors who will remain legally responsible for the design and/or works carried out by them or on behalf of their staff, agents, sub-consultants and/or sub-contractors.

1.7 Version control and updates

The Estates Design Guidelines will be reviewed and updated at the end of January in each calendar year. The version number will, using 2018 as an example, move from 2018 V1.0 at the end of January to 2019 V1.0 for the following year.

The UoE Estates respective PM teams will send e-mail notifications to the Directory of current Design Teams and Contractors appointed, following any update or change.

Any updates to the Design Guidelines, which cause significant change to a project design should be discussed with the respective Project Management team and application of the Change Control Process will be required.

Any new items or amended content will be highlighted in yellow to enable identification of changes from previous versions.

1.8 Purpose of UoE Design Guideline No. 14

The purpose of this document is to set out the guidelines and standards that apply to University of Edinburgh (hereby referred to as UoE) Estate and its design requirement for Landscape works. This document will apply to newly constructed buildings and existing buildings which are scheduled to be refurbished. In some cases, this standard exceeds the Building Regulation requirements as it represents good practice in the Higher Education sector.

The Building (Scotland) Regulations set out to ensure that new buildings and works achieve the objectives of the Building (Scotland) Act 2003 in terms of health, safety, welfare, convenience of persons, conservation of fuel, power, sustainable development, and the purpose of this guide will be to provide a standard that is required by the UoE.

This document also seeks to make a link between the Building Regulations and the Equality Act and provides guidance upon how to provide accessible environments through the use of inclusive design. The responsibility for complying with Equality Act 2010 rests with the University Court

This UoE Design Guideline No. 14 is for designers, engineers, specifiers, installers and commissioning and maintenance engineers. It is relevant to all planned and procured works for maintenance, refurbishment and new developments and applies to all the RIBA Stages of Work.

This guide has been prepared to illustrate the approach to landscape design which the University of Edinburgh advocates for new development on its campuses.

The appearance of a proposed development and its relationship to its surroundings are material considerations in determining an application. Landscape design, whether hard or soft, should be as much a subject for consideration as the design of the buildings and the overall aim should be for any development to result in a “benefit” in environmental and landscape terms.

It emphasises the importance of the University providing advance indication of the essential characteristics of an acceptable landscape scheme and stresses the importance of the quality of work and materials in the final product.

The guide has also been prepared in support of the policies contained in the emerging Estates Design Guideline Plan, and having been the subject of consultation with a wide range of interest groups.

The Landscape Design Guidelines aim to raise awareness of what contributes to a well-designed development and they seek to address both process and end product, but it is not intended to be a pattern book. The Guidelines deal with principles and their local application,

leaving scope for individuality and creativity, which will preserve and enhance the local distinctiveness of University of Edinburgh Campuses.

2 Purpose, Design Principles and Landscape Characters

This Design Guidelines for Landscaping have been developed to assist the University of Edinburgh as it seeks to strengthen the physical identity of its campus. They serve as a resource for appointed architects, landscape architects and planners.

2.1 Design Principles and Purpose

Through the application of these guidelines, the design of campus landscapes should:

1. Strengthen the identity and character of the campus
2. Enhance environmental sustainability
3. Foster stewardship of campus buildings and green spaces
4. Promote the exchange of ideas and shared experiences
5. Promote health and well-being.

Landscape guidelines provide design and material standards that reinforce a consistent appearance for open spaces. They promote the desired campus identity and reinforce the characteristics of each campus context. Landscapes designed and maintained to these standards will reinforce design consistency across campus and meet university goals for long-term maintenance, ease of repair, durability, and financial feasibility.

2.2 Background and Definitions

Landscape – What do we mean?

Surroundings make a significant contribution to our quality of life. The word “landscape” does not only mean attractive scenery, but represents a rich historical record of natural features, moulded by human activity over the centuries – it forms the context for our everyday lives and is reflected in our literature, music and painting.

The definition of the word “landscape” in the context of this guide is, therefore, is a broad one. It is not a matter of the plants used just to fill spaces left over after building, or the screening of a development, which offends its surroundings. It is the setting for our daily lives and its design is as important and valuable as the buildings within it.

2.3 Landscape Design in relation to Campus Development and Character

In general, people enjoy the countryside and feel refreshed and relaxed when surrounded by the natural elements of our environment – the hills, rivers, woods and fields, down to the trees, shrubs and flowers in a small garden.

It is well known that an attractively planted landscape can help sell a development. Yet all too often lack of forethought and financial restraints result in barren, neglected environments

with merely a few trees in unintegrated areas of grass, which often then die through lack of ground preparation, ease of maintenance or vandalism.

Time and money spent on the setting, overall design, detailing and planting of a development, in the long term will pay back high dividends. Landscape Architecture can make a design statement, which can turn an ordinary campus development, residential estate, a car park etc. into an attractive asset for the University and surrounding neighbourhood. This can make a constructive contribution to the improvement rather than the destruction of our environment. After all, however much time and trouble is spent on the design of a building itself, it is always the external spaces and overall setting of a development which provides its initial impression and attraction, and all too easily a finely detailed building can be let down by its poorly designed surroundings.

This guidance, therefore, advocates a design process, which follows a logical progression from a site survey, through analysis, to the evolution of a landscape master plan and design details. A plan showing merely plant names with no overall design statement or relationship with its surroundings will not achieve a satisfactory result.

2.4 Summary of Campus Characters

Existing Landscape character types and Site Descriptions on the following campuses:

2.4.1 Central Area

Consists of a number of formal sites around the City centre.

Landscape Character:

George Square Gardens was formally laid out in 1766 and its design is typical of garden-square from this era.

High school yards & Moray House contain a number of landscape features from formal lawns, herbaceous borders and meadow lawns. It must also be note that there a number of matures trees growing on properties in the City Centre which add to the character of the area.

2.4.2 Pollock Halls Accommodation

The first house on the Pollock Halls site was Salisbury Green, originally a three-story mansion built in the latter half of the 18th century by Alexander Scott, an Edinburgh merchant. At the time Salisbury Green was built, it was set in a rustic & remote place with the main road to Peffermill passing close by.

During the 1914 – 1918 war, St Leonard’s Hall was used as a Red Cross hospital. Later it became a girl’s school named St Trinneans. Ronald Searle, the cartoonist, had a niece who attended the school and it is said that visits to see her gave him the inspiration for his St Trinians cartoons.

After the 1914-18 war Sir Donald Pollock bought the estate and later gave it to the University for development as student residential accommodation.

The first phase of the present student residential accommodation was completed in 1963, namely Holland House & Fraser Court. In 1970, the site hosted the Commonwealth Games.

The largest Accommodation Facility to be built by the University in nearly 40 years Work began on this site in July 2001 on Chancellors Court and it is, completed in October 2003, the whole site now provides 2500 bed spaces.

Landscape Character:

There has been considerable tree and Shrub planting carried out at Pollock Halls over the decades the site has an exceptional collection plants and early mature trees. The shrub planting and general soft landscaping is of a very high standard.

2.4.3 Kings Buildings

In 1919, in the aftermath of the 1914-18 War saw the purchase of West Mains Farm, as part of a major proposed expansion in the University Campus. The whole site has an area of 115 acres, around 90 acres were turned over for the development of the King's Buildings campus and the remainder leased out as a golf course. On 6 July 1920, King George V laid the foundation of the first new building, for the Department of Chemistry (now called the Joseph Black Building).

Landscape Character:

The campus is located on the edge of a significant greenbelt zone at the south side of Edinburgh. The adjacent Green Belt area including Craigmillar Park Golf Course and the Braid Hills provides a high quality landscape setting and open southern vistas.

This provides opportunities to reinforce the landscaping character of the edge of the site, and improve the environment within the site.

2.4.4 Easter Bush

In 2011, the Royal (DICK) School of Veterinary Studies moved to new premises on the Easter Bush campus. Princess Royal, Chancellor of Edinburgh University officially opened the campus, on 27 September 2011.

Landscape Character:

The landscape character of the area local to the Easter Bush Campus is strongly influenced by the meeting of two distinct geographies – the lowland river valley of the North Esk, and the range of hills that forms the Pentlands, a prominent hill range visible throughout the surrounding area.

The Easter Bush Campus is sited at the foot of the Pentland Hills, on the southeast side, on a relatively flat site. The campus itself, has a slight downwards slope from west to east with a level change of approximately 20m across the entire site.

Despite the scale of some of the building on the campus (see Section 3 – Built Form), because of the surrounding topography and tree planting, the campus has limited impact on the skyline. It can be seen from the A702 when approaching from both the north and the south, and from vantage points on the Pentland Hills.

3 Survey and Analysis: Prior to proposed development

3.1 Survey and Analysis: The site setting in the landscape

The following considerations should be taken into account concerning the overall setting of any new development.

The site should not be considered in isolation, but should be seen in relation to the character of the surrounding landscape and relevant Local Authorities Biodiversity Action Plans.

3.1.1 What is Biodiversity?

According to the Convention on Biodiversity (1992), "Biological diversity" means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Biodiversity is actually all of the living things that surround us.

The Scottish Executive places Scottish Biodiversity as a key priority and has recently published a Scottish Biodiversity Strategy which aims to conserve and enhance biodiversity for the health, enjoyment and well-being of the people of Scotland.

- https://www.ed.ac.uk/estates/waste-recycling/biodiversity

Existing Survey Information:

- Bio Diversity Action plan for the City of Edinburgh: http://www.edinburgh.gov.uk/downloads/download/77/edinburgh_biodiversity_action_plan
- Bio Diversity Action plan for Mid – Lothian: https://www.midlothian.gov.uk/downloads/file/584/midlothian_local_biodiversity_action_plan

Partners:

- Edinburgh Living Landscapes: https://edinburghlivinglandscape.org.uk/
- Scottish Wildlife trust: https://scottishwildlifetrust.org.uk/

Before any design work begins, the site must be fully surveyed, analysed and comprehensively understood. Each site has its own opportunities and limitations and a design responsive to its setting cannot be developed without taking into account all these constraints.

3.1.2 Views of the Site

Many sites are visible from some distance away. The site should be surveyed, viewed and photographed from all significant viewpoints. The impact and appearance of the development on the landscape should be considered first at this distance. From here, broad requirements for a landscape framework and the overall form and proposed massing of the buildings can be developed.

3.1.3 A Landscape Framework

The form of the landscape design and planting plays a major part in the way the development relates to its setting and how it fits into the existing landscape. The principal theme should be decided upon at this early stage so that it can influence and inform the design as it evolves.

3.1.4 A Concept for the Built Form

Without a properly formulated concept for the shape of the built form, the way the buildings will fit into the land and forms the site and its general shape and massing. The development is likely to end up visually confused; a sprawl of elements, which do not relate to the site, its setting or existing development and it will become an intrusion into the wider landscape.

3.1.5 Linking Back and Continuity

Visual continuity, adding the new to the existing in a sensitive way helps its integration. Adding to the existing patterns in landscape or built forms rather than ignoring them will aid the new development to relate comfortably and naturally with its context. These patterns can help provide overall form for the development, which will give it meaning in a local context.

All individual buildings or groups of buildings form elements in the landscape and contribute to its character and local distinctiveness through their siting, building style and materials.

- The relationship of existing buildings to the overall landscape of the area.
- The overall form, scale and balance of buildings.
- The relationship and balance of the built environment with open space, trees.
- The scale of the buildings and the materials with which they are constructed.

If the new development is to contribute positively to the overall environment both from within the site and outside in distance panoramas, the design must ensure that these items have been taken into account.

3.1.6 View through the Site

Sometimes a view through the site is important to existing buildings. Blocking a view will have significant impact, which can be reduced by retaining a gap in the new development to preserve the view line. The view can also be used as a focal point in the design.

3.1.7 Skylines

Development on the skyline in rural surroundings should always be avoided because of the way groups of buildings interrupt the visual continuity of the landscape. Keep buildings below the skyline; they will fit more comfortably into their setting this way and the dominance of the landscape can be better maintained.

3.1.8 Boundaries

Consider carefully boundary constraints and adjoining land uses, which may not be compatible with the design of campus developments in suitable measures to respond to requirements. The landscape framework can include elements such as sound buffers and visual screening. Existing boundaries may be worthwhile features themselves, hedges or belts of trees, which if retained, can be beneficial to the development. Early in the design stage, special steps may be required to accommodate such features in the proposed layout.

Boundaries should be permeable at agreed locations to act as a `green corridor` to allow for the movement of wildlife across the site.

3.1.9 Contours

On sloping sites, buildings arranged parallel and at right angles to the contours sit more comfortably in the landscape than a random arrangement where buildings appearing at many different angles and levels present a disordered appearance.

3.1.10 Survey and Analysis: The Development Site Itself

The characteristics of the site must be considered during the site assessment in relation to its overall setting. This will include an assessment of its own character based on its shape, size, topography and existing natural features.

3.1.11 The Landscape Masterplan

When the site survey and analysis is complete, the actual process of designing the new development can begin. The landscape of a new development is as important as the buildings in creating this new sense of place and from the earliest stage in the process, its design should be given equal weight to that of the buildings. The architect, landscape architect and University of Edinburgh landscape services team should work together to create a development in which buildings and landscape complement one another and their surroundings. The objective must be to create new environments, which are of high quality, well integrated into their surroundings and with positive, rather than detrimental, impact in the landscape.

Positive opportunities to be considered:

- Build nature into the buildings
- Create new habitats and incorporate existing natural features to be enhanced by new planting of trees, shrubs and hedges

- Integrate trees, hedges and open space with the surrounding landscape pattern
- Enhance skylines and create focal points.
- Frame new vistas and create new landmarks
- Create interesting roofscapes with a real nature benefit.

3.1.12 Existing soft landscaping worthy of conservation

Wherever possible existing site vegetation and features are to be retained and enhanced to initiate a strong identity and new personality for the landscape of the site. A wide range of species benefit from having a variety of sites and habitats physically linked and expanded. The landscape guide ensures that all new development avoids damage to the existing landscape resource of the site and enhance it where possible.

Existing provisions for Biodiversity and Habitat to be retained and protected during construction. The use of vernacular materials such as dry stone walling and mixed hedgerows as boundaries wherever practicable protect and enhance areas of parkland landscape and native woodland.

Protect, enhance and develop opportunities for wildlife on site, whilst building upon the University campus landscape character, will serve to refine and enhance existing landscape character areas.

Develop the perimeter landscape as a ‘green corridor’ with a focus on ecological enhancement and to tie in with the wider area public footpath network – improve linkages and connectivity, on and offsite for wildlife and people. (Easter Bush, Pollock Hall & Kings Buildings).

Enhance the ecological value of the campus through appropriate management and practices to support the long-term viability of ecology on site. Introduce and adapt existing management of local flora and fauna to provide ecological benefit, using historical and recent survey data to implement the masterplan strategy to provide and manage ecological enhancements across the campus.

Retain and enhance green infrastructure routes through the campus to provide ‘Green Corridors’ through appropriate management and additional planting and future design.

The design of campus landscapes should include strong consideration of the future requirements of maintenance, including the consumption of water. In the past, the general philosophy has often been to “maintain the design”. In the future, the guiding principle should be to “design for maintenance”. Design for ecological resilience, human use, and aesthetic enjoyment should go hand in hand with an awareness of the implications for maintenance. The maintenance practices of the campus will also need to adapt to the requirements of native plantings where possible.

3.1.13 Nature Conservation – Principles

Nature Conservation aims to preserve wildlife habitats and maintain or increase the diversity of species which these habitats support.

It is the University of Edinburgh's policy that in the design of a new development, provision should be made for the retention, improvement or restoration of natural features. Opportunities for habitat creation should also be investigated where wildlife habitats do not exist.

At Site Survey Stage it is important to note not only the location of existing natural features such as ponds, woodlands, hedgerows and herb-rich grasslands, but also to be aware of their importance in providing different wildlife habitats. Different environments can provide habitats for insects, invertebrates, birds, bats and mammals and may contain species protected under the Wildlife and Countryside Act 1981:

Badgers:

https://www.nature.scot/professional-advice/statutory-protection/licensing/species-licensing-z-guide/badgers-and-licensing

Bats:

https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-species/protected-species-z-guide/protected-species-bats

Newts & Reptiles:

https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-species/protected-species-z-guide/protected-species-amphibians-and-reptiles

Hedgehogs :

https://www.britishhedgehogs.org.uk/hedgehog-friendly-campus/

Badger setts are protected under the Protection of Badgers Act 1992. Expert advice in the form of a written report will be required from the developer at Site Survey Stage.

3.1.14 Nature Conservation – Use of Native Species

In the majority of planting schemes associated with new development, it will be desirable to use species of trees and shrubs, which are native to the area.

The aim of this type of planting is to encourage the successful establishment of Scottish species in regions and on soils where they are indigenous. This is in order to maintain the character and composition of local and regional landscapes and their associated wildlife. These species provide natural habitats for wild creatures, insects and other organisms, which perform a vital role in preserving the natural balance in the biological chain of life. For example, the native oaks support more insects than any other British tree.

When creating new woodland areas or substantial structure planting, it is best to plant the same native species that occur in nearby ancient and semi-natural woodland. It will usually be most appropriate to encourage common and already widespread species, which are growing well in the area rather than rarer ones.

Ideally, all planting of native species should be restricted to stock of local origin.

3.1.15 Plant Bio Security

Plant Biosecurity is a set of measures designed to protect a crop, crops or a sub-group of crops from emergency plant pests at national, regional and individual farm levels.

Why is plant biosecurity important?

Biosecurity has emerged as a major global issue. Harmful plant pests and diseases can impact on food safety, trade, market access, market development and, ultimately, the profitability and sustainability of plant industries and the overall economy.

Plants:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307355/pb14168-plant-health-strategy.pdf

Trees:

https://www.gov.scot/publications/scottish-plant-health-strategy/pages/6/

https://www.gov.uk/government/publications/tree-health-management-plan

3.1.16 Nature Conservation – Water Features

It is important to retain and enhance any existing water features, which can provide special habitats for wildlife, as well as forming attractive elements within the new development.

These features can be in the form of rivers, streams, drainage ditches and ponds. Streams and ditches also form linear nature reserves, important not only in themselves, but by serving as vital links between habitats.

a) Slow moving streams, drainage ditches, ponds

These can become silted up and choked by vigorous shallow water plants such as common reed. Although it is important to keep some areas of these plants, it is better to introduce a variety of vegetation. This will be aided by having different depths of water, and areas of silt can be cleared carefully by hand or small machine, depending on the scale. This work should be carried out in winter when there is less disturbance to wildlife.

Areas, which have little emergent vegetation, can be enhanced by the creation of shallow water or marsh areas. This can be achieved by forming gently shelving banks in order to introduce a greater variety of plant life.

b) Access

Maximum value from the water feature will be gained if access to at least part of the bank can be provided. This could be with an informal path or an area of mown grass. However, it is preferable to deliberately restrict access to specific areas in order to leave the wildlife habitats undisturbed. The provision of water is vital for wildlife and access and egress is paramount and shallow beach areas should to be designed

c) Ponds

Ponds, as well as being important landscape features, also contain half of Britain's rarest wetland plant species and many rare invertebrates. They also provide a habitat for all of Britain's amphibians, several varieties of water birds and many mammals.

Wildlife thrives at the edges of lakes and ponds and on badly drained land. All these wetland habitats are particularly vulnerable to the effects of drainage and alterations to the water table. It is just as easy to damage ponds by draining their surrounds as by deliberately filling them in. Water abstraction and agricultural drainage can drastically reduce the level of the water table, which can then damage or destroy these features. Neglect and pollution also result in the loss of wetlands and ponds.

Existing Ponds are legally protected if they are:

- On a site of Special Scientific Interest of National Nature Reserve.
- Known to support a protected species (such as the great crested newt).
- Associated with an ancient monument.

It is important that their significance, both for nature conservation and amenity value in general is realised, and that the following points should be considered in order that they may be retained in the most appropriate way:

- Importance as a landscape design feature.
- Value as wetland wildlife and plant habitat, which should be preserved and enhanced.
- Value for general amenity with the creation of access where required.
- Value as part of the local heritage, reminding us of past industrial farming practices (e.g. mill ponds, canal remains).

A landscape “buffer zone” around the pond to help integrate it into the overall design and in certain circumstances to help intercept agricultural or urban pollutants should be provided.

d) Protection during site operations

It is important that all existing watercourses, ponds or other aquatic features and their associated vegetation be protected by fencing from physical silting, chemical disturbance or any form of pollution during site operations.

It will be expected that all proposals for development will maintain existing ponds as a feature of the design.

e) Creation of new water features / Sustainable Drainage Systems

Where appropriate the formation of well-designed new ponds will be encouraged. These can be of great benefit to wildlife and a valuable addition to the countryside, although the creation of new ponds cannot be seen as a simple substitute for the removal of existing ponds, which already have a stock of plant and animal species accumulated over many years.

New water features can also be sensitively designed in association with their practical use for water attenuation purposes on new developments.

Fountains on University Campuses are not a preferred design option.

3.2.7 Wildflowers Meadows

Background

Wildflower meadows offer a diverse, and typically exceptionally attractive, habitat for the pleasure of young and old alike. The twentieth century saw a sharp decrease in the variety of wildflowers in the UK countryside. This was due to changes in agricultural policy and practice, particularly increased field drainage and herbicide use, and the growth of urban sprawl.

Over the past two decades, renewed interest in wildflower habitats has grown with concerns for biodiversity protection and augmentation. Coupled with this concern has been increasing interest in the restoration of old, mismanaged wildflower meadows and the creation of new meadows through, for example, agricultural set-aside programmes and other countryside stewardship schemes.

Allowing open habitats such as wildflower meadows in urban settings for the provision of native or naturalised grasses, wildflowers and flowering plants offers several advantages:

- Plant diversity attracts insects and other invertebrates (including butterflies, bees, spiders and millipedes), birds and mammals
- Flowering species add a changing palate of colour to the urban environment throughout the seasons.
- Opportunities for education and recreation abound (ranging from nature studies to art lessons).
- Even small plots of wildflower planting can change the feel of a setting, so that the creation of a wildflower meadow as part of an urban greenspace can bring a little piece of countryside into the town.

Practical considerations

Wildflower meadows may pose a number of additional complications that can undermine their suitability in an urban greenspace. First, the site needs to be appropriate for wildflowers in terms of the soil's depth, description and nutrient status. Second, the management of a wildflower meadow is different from that of closely mown lawns or grasslands: long-term goals and commitment are required to see a wildflower meadow established and flourishing. Wildflower seed is more expensive than grass seed and, while unlikely to be prohibitive, cost may need to be considered in light of the management regime and its associated commitment.

Most semi-natural grasslands in the UK, including wildflower meadows, exist on nutrient-poor or seasonally waterlogged substrates. For example, phosphate, nitrogen and potassium levels are in the lowest category of the ADAS index for soil nutrients (0 or 1). On rich, fertile soils, stronger, faster-growing grasses and woody plants rapidly smother wildflowers. Therefore, degraded soils typical of urban environments (especially brownfield sites) offer a unique opportunity to (re-)establish wildflowers if they are not over compacted. It is necessary to undertake a survey of the soil resource before attempting to establish a wildflower meadow. An appropriate annual management regime will also need to be adopted to encourage the wildflower meadow to establish and not be overrun by grasses, brambles, weeds (such as dock and thistle) or shrubs. Where the soil nutrient status is too high for the establishment of wildflowers, several options may be considered:

Establishment of an alternative habitat

A carefully planned and executed regime of mowing and removal of cuttings to reduce fertility slowly.

Whether the site is immediately suited to wildflowers or needs some preparatory amelioration works, an appropriate management regime is needed for the long-term success of the meadow. The desired wildflower habitat may be managed as either a flowery spring or summer meadow, but rarely both. Annual mowing or grazing must be undertaken once in the year, when the flowers have set and shed seed, as many of them are annuals and bare soil patches are needed to allow continued recolonisation.

Species selection need not be a major complication in the creation of a new wildflower meadow, provided the local environmental conditions are considered, including pedology (the study of soils in their natural environment), hydrology and the local climate. A wide variety of wildflower seeds is available from specialist suppliers. Most naturally, occurring habitats have a local resonance – species relate to their locality, underlying substrates and geology, climate, hydrology and ecological characteristics. A similar resonance should be sought in creating habitats to ensure the biodiversity has a long-term future.

Agricultural seed cultivars should be avoided. These principles are usually set out in the local Biodiversity Action Plan, which will also help guide your species selection. If in doubt, seek expert advice from county wildlife bodies to ensure successful establishment.

4 Site Preparation

4.1 Introduction

However much thought has gone into the production of a good design, money and time will have been wasted if the scheme is not successful on the ground.

All too often, trees and shrubs die, due to not only poor maintenance and aftercare, but also inadequate site preparation, such as planting areas not properly cleared of building debris and insufficient depths of, or poor quality, topsoil.

Often, the contract will include for existing topsoil to be stripped and stacked on site for re-use. This can be contaminated by rubbish and nutrients lost through stock-piling for too long.

It is expected that on all new development sites the following standards will apply for site preparation in order that the planting has the best chance for survival.

4.2 Site Preparation – Topsoil

Topsoil is living material and requires circulation of air and water within it to retain its quality. It is generally dark in colour, containing humus and roots, mineral particles, bacteria and micro-organisms. It varies in depth between a few mm and .5m, 150mm-200mm is most common.

4.2.1 Stripping and storage of Topsoil

Before removing topsoil, its depth must be ascertained by digging holes as this can vary. Very stony soil or one full of roots may not be suitable for later re-use and should be taken off site.

When existing topsoil is suitable for re-use for landscape, works, care must be taken in its stripping and storage. It should be stripped evenly without digging into or disturbing the subsoil.

The topsoil may be stored in shallow mounds for later re-use, which should not be:

- More than 2 metres height or 3m wide to prevent lower soil from becoming sour
- Compacted (vehicles or machinery)
- Polluted with chemicals e.g. cement, oil and fuel
- Covered or sheeted for more than a few days
- Handled (only moved in dry weather if really necessary)

Allowed to grow weed cover (cut and spray with approved herbicides as Weed control to be carried out at monthly intervals to prevent the establishment of pernicious weeds using a translocated non residual herbicide (following consultation with Landscape Services). If the

soil is to be stored in excess of 6 months the heaps should be protected from erosion by covering.

4.2.2 Imported Topsoil

- This should conform to BS3882:2015. As a general guide it should be clean, uncontaminated friable soil of medium texture with adequate humus content, obtained from previously cultivated land from an approved source with a neutral to slightly acid pH value. It should be free from unrotted vegetable material, brick and concrete or any material other than soil and have only a maximum 20% content (by dry weight) of stones not exceeding 50mm.
- A soil sample should be requested and inspected before bulk deliveries are taken and any soil spread on site.

4.2.3 Topsoil buying guide

In the UK today there are essentially three main categories of topsoil available; natural 'as dug' topsoil, skip waste soil and blended soils.

a) Natural topsoil

Natural topsoil is highly variable in quality and availability. It can range from an acid, nutrient deficient sand, to a strongly alkaline silt loam to an organic rich peaty clay. If the characteristics of the topsoil are not suitable for the end use then widespread expensive plant failures are possible;

Natural topsoil will virtually always have a seed bank with annual and perennial weed seeds. It can often contain rhizomes of persistent weeds and grasses such as creeping buttercup, couch grass or even worse Japanese Knotweed, which is regarded as one of the most invasive plants in the UK. Natural topsoil, which is derived from former agricultural land, may contain elevated levels of heavy metals because of the repeated application of sewage sludge. This is of particular importance if the topsoil is to be used in sensitive end uses, such as domestic gardens and allotments.

b) Skip waste soils

Skip waste soils are more common in urban areas and are a result of screening materials derived from building and demolition operations. Skip waste soils usually consist of a mixture of topsoil, subsoil, clay and numerous fragments of building waste materials - brick, concrete, mortar, ash, clinker and to a lesser extent asbestos, glass, metal, wood and plastic.

In terms of its physical and chemical properties, the material is usually extremely alkaline with a pH range of 8 - 10, saline, deficient in organic matter and plant nutrients and can often have elevated levels of zootoxic and phytotoxic contaminants. These soils can look like good topsoil, however, they often result in either plant failure or, at the very least stunted growth not to mention the consequences of having potentially contaminated soils present in a garden.

c) Blended soils

Blended soils, as the name implies are formed when two or more components are intimately mixed to form a growing medium. Any blended soil should use natural recovered topsoils which are blended with quality enhancing compost, peat-free soil conditioners and sand. Because the soils are blended from raw materials it will ensure the same consistent quality soil throughout the year and irrespective of the weather. Soils should be analysed to BS 3882:2015 and tested for PTE's (Potentially Toxic Elements).

Important questions to ask when buying topsoil:

- What is in the soil?
- Is it safe?
- Where is it from?
- Will it all come from the same source?
- What can it be used for?
- Does it meet British Standard BS 3882:2015?
- Is an independent test analysis certificate available?
- Does the testing include analysis of P.T.E.s (Potentially Toxic Elements)?
- Is it BS EN ISO 9001:2015 and BS EN ISO 14001:2015 certified?
- Can I get hold of the same soil year round?
- How is it delivered; in bags or loose?

4.3 Site Preparation – Formation Levels

(Reference should be made to BS 4428 1989 Section 4 “Code of Practice for General Landscape Operations”)

4.3.1 Subsoil

This lies beneath the topsoil. It is generally free of roots and humus and is poor in its ability to support plant growth. If stripped it must be kept separate from topsoil.

Care must be taken not to over compact the subsoil or produce a “hard pan” which prevents water percolation up and down through its surface. The surface must be broken up to assist drainage before the topsoil is placed over it.

Subsoil must be kept free from contamination by all chemicals, hard-core, stone and other rubbish.

4.3.2 Site preparation prior to planting

All areas to be planted will need to be reduced or filled ready to receive the specified depth of topsoil.

Good clean subsoil will be required for a further depth of 300mm below the formation level, whether existing subsoil as found on site or imported.

Subsoil cultivation should take place to a depth of 300mm to relieve any compaction and all stone and rubble exceeding 75mm in any direction should be removed.

Areas for planting should be filled with topsoil, allowing for settlement, so that the finished level is just below kerb and paving levels for shrub areas, and level for grass areas, to assist maintenance.

Where planting beds are to be prepared in car parks, near to buildings etc., it is also important to take care that beds have:

- Free drainage
- Kerb haunching kept to a minimum
- Finished soil level not above DPC.
- No shallow services present or service access covers.

4.4 Site Preparation – Filling and Mounding

4.4.1 Filling

The opportunity should be taken at the beginning of major grading to dispose of unwanted inorganic material at the bottom of tipping areas after the topsoil has been removed. However, a clear distance of 1 metre must be made available on top of it after filling for a covering of subsoil and topsoil (see “Formation Levels”).

Exclude:

- Materials that will leave cavities after rotting, such as grass, roots and timber.
- Metal containers should be flattened and large objects cut up.
- Stones, slabs, rocks and hard-core should be placed so that voids are not formed.(Specification for Highways: Department of Transport, 1986, describes unsuitable material for fill).

Sloping sides of cuttings and embankments

The stability of banks and slopes depends on many factors and should be fully investigated following the recommendations given in BS 5930 and BS 6031.

4.4.2 Artificial mounding

Although in certain circumstances suitable waste materials from site may be incorporated into mounding within the landscape scheme, this should not be to the detriment of good landscape practice and should form part of the overall design solution and not an un-related “bank”. Any proposed mounding must be shown on the Landscape Master Plan by contours and spot levels. Mounded areas will not be acceptable, particularly in rural situations, where

they do not form part of an integrated landscape design which relates to the landscape as a whole.

If mounding can be used to form a positive design feature it must integrate into the overall landscape with gentle curves to facilitate mowing and future maintenance.

4.4.3 Slopes

The top and toe of banks should be rounded. Slopes of 1 in 2, not suitable for grass, may be considered for planting. However, planting should not be used as a cheaper alternative to providing a proper retaining wall or other more suitable treatment. Wash down of soil should be considered where a steep slope abuts a hard-paved area. Although groundcover can provide suitable treatment for banks, difficulties of planting, establishment and maintenance should be taken into consideration.

Grass covered mounds should have a slope no greater than 16 degrees to allow for cutting with a ride on mower.

Maximum gradients for pedestrian mower maintenance is 20 degrees

Slopes of over 20 degrees to be cut with side-arm flail or remote control mower only, no pedestrian based operations.

5 Soft Landscaping Specification & Design Guidance Detailed and Technical design:

The Landscaping Team should be consulted to ensure that appropriate landscaping is planned, with special consideration given to appropriate species selection, ease of maintenance, access and site safety. The project manager will be responsible for ensuring that the finished landscaping can be maintained in a safe manner in accordance with the CDM regulations. Banks swales and slopes must be designed in order that they can be cut with ride on machinery and will be graded to a maximum slope of 16 degrees to the horizontal or less. Engineering solutions including retaining walls or terracing will be used to manage the risk of severe slopes.

Pre-contract:

The project team shall liaise with, and seek the agreement of, the Landscape Services on the design and implementation of the following where appropriate:

- Contractor access
- Location and extent of contractor's site compound
- Suitability of top soil retention for new landscaping to be determined by soil analysis and or assessment
- Location and size of top soil heaps
- Tree protection and tree retention
- Project landscape proposals and plans must receive written approval from the Landscaping Team.

In-contract:

The contractor should give a minimum of 3 working days' notice to the Landscaping Team:

- before stripping of top soil
- before sub-soil preparation
- before placement of top soil
- before commencement of planting
- before grass seeding or turfing
- before tree protection fencing is removed
- before any planned landscaping works within tree root protection areas (RPA's)
- before site preparation after sustained heavy rainfall (e.g. >10mm in 24 hours) or during periods of poor climatic conditions.

On site investigation

When Landscape Services identify concerns that landscape works are not being, or have not been, undertaken in accordance with the specification and agreed design. The PM should be

notified in a timely manner and request a site meeting and if necessary, the PM will direct the Contractor to carry out investigation work in the presence of the Landscape Services as required.

5.1 Soil

Notice of onsite operations must be given Correct handling, installation and preparation of top soil is vital to the success of the landscaping scheme

Reference: BS 3882: 2015 Specification for Top Soil.

5.1.1 Stripping, handling and retention of top soil

Tracked machinery to be used with access routes planned and suitably protected to minimize soil compaction. Top soil should not be stripped, handled or trafficked:

- in a waterlogged condition
- when the ground is frozen or covered by snow
- when there are pools of water on the ground surface

If sustained heavy rainfall (>10mm in 24 hours) occurs during stripping operations then the work must be suspended until the ground has had at least 24 hours to drain or has reached a suitable moisture content (To be agreed on site with the Landscaping Team).

5.1.2 Sub-soil grading

Grade sub-soil to smooth flowing contours to achieve finished levels of topsoil no greater than 300mm. Areas of thicker sub-soil to be excavated and removed as required to ensure a depth of cover appropriate to the area (150-300mm). Should subsoil need to be imported to make up any deficiency it should be supplied with reference to section 4.2.1 and BS3882:2015. Material should be placed in layers no greater than 150mm before consolidating.

Minimum depths of subsoil over parent material or artificial structures:

- Tree planting 1000mm
- Shrub planting, grass areas 700mm

5.1.3 Sub-soil preparation

Loosening to be carried out with a tracked tractor using a suitable ripping tine to the depths described below after determining the nature of the sub-soil on site:

- Light and non-cohesive subsoils: When ground conditions are reasonably dry, loosen thoroughly to a depth of 300 mm.
- Stiff clay and cohesive subsoils: When ground conditions are reasonably dry, loosen thoroughly to a depth of 450 mm.

- Rock and chalk subgrades: Lightly scarify to promote free drainage.

Stones: Immediately before spreading topsoil, remove surface stones (larger than 75 mm in any direction), contaminants and any other debris or builders rubble. On completion inform the Landscape Services for inspection.

5.1.4 Soil classification – See Topsoil buying guide 4.2.2

5.1.5 Top soil spreading

Only after approval from the Landscape Services can top soil be spread. This must be carried out in a planned and systematic way to ensure the prepared sub-soil does not become compacted. Top soil to be loose tipped with a minimum of handling to ensure correct depths and levels. The soil should be consolidated NOT compacted in 100-150mm layers as appropriate to required depth.

The site must be allowed to settle for one month before planting operations begin, at which time deficiencies in depths or levels should be addressed. During this fallow period weed control using a translocated non residual herbicide (following consultation with Landscape Services or cultural methods are to be carried out, as required, to control significant weed growth.

5.1.6 Top Soil depths over prepared sub soil

- Grass areas minimum 200mm maximum 300mm
- Shrub beds and tree pits minimum 300mm maximum 400mm
- Design of chambers and kerb haunching need to take this into account allow adequate room for growth.

5.1.7 Preparation of undisturbed ground

- **Existing woody vegetation:** Remove existing planting, visible roots and large stones with a diameter greater than 50 mm. Stumps to be ground to 350mm below ground level and arisings removed from site. Plough or dig over to full depth of topsoil ensuring sub-soil is not brought to the surface. Fallow period (minimum) one month before further works.
- **Existing turf or thick sward:** Apply a translocated non residual herbicide (following consultation with Landscape Services. After total kill achieved (2-3 weeks) remove visible roots and large stones (with a diameter greater than 50 mm), plough or dig over to the full depth of topsoil, ensuring sub-soil is not brought to the surface. Fallow period (minimum) one month before further works.

5.2 Composts & other bulk soil ameliorants

Key objectives & considerations:

- Notice of source of product
- Statement of analysis
- Representative sample required before bringing to site

5.2.1 Green waste composts supply

Imported sanitised green waste and stabilized composts should be manufactured in accordance with BSI PAS 100 - CCS Compost Certification Scheme.

PAS100 provides strict requirements to make sure that feedstock materials, such as green and green-food waste, are processed in a controlled way. For example, that the materials being composted are passed through an effective sanitisation.

Submit representative sample to Landscape Services for approval, together with declaration of analysis if requested. To be used as soil improver and mulch where appropriate

5.2.2 Application rates as soil improver

General planting: compost etc. applied at the rate of 7.5m³/100 m² to achieve an even distribution of 75mm depth over planting area. Lawn areas (if required) compost etc. to be applied at the rate of 2.5m³/100 m² to achieve an even distribution of 25mm depth over planting area.

Incorporate into the top 200mm of the top soil using rotary cultivator, or by hand, before planting or lawn establishment works.

5.2.3 5.2.3 Peat

Peat must not be used as a soil ameliorant.

5.2.4 5.2.4 Sand

Horticultural washed sand for lawn top dressing or improving drainage within planting areas. Application rates as required. Particle size of between 0-4mm. Material should be free from pests, disease, fungus, weeds or any contaminant that is hazardous to human or animal life or detrimental for plant growth. Confirm source and analysis to Landscape Services before bringing to site.

5.2.5 Bark Mulches

Bark Mulches should only be used for established planting beds with agreement of the Landscape Services Department.

5.3 Lawn establishment

Key objectives & considerations:

- Lawn areas must be designed to avoid creating inaccessible areas or areas that require excessive hand cutting
- The areas should be accessible for works vehicles to load and unload materials and machinery.
- Drop kerbs should be used to allow access for grass cutting machinery
- Turfing or seeding should not commence unless the preparations have been approved by Landscape Services.
- Service lids and manholes
- New turf and seeded areas remain the responsibility of the contractor until hand over has been confirmed in writing from the Project manager to Landscape Services

5.3.1 Timing

Carry out work while soil and conditions are suitable. Seeding and turfing should normally be carried out between September-October and March-April. Grass sward establishment is possible at other times of year, but will be reliant on irrigation or suitable weather windows. The contractor will be responsible for supplying adequate irrigation until establishment or agreed point of handover.

5.3.2 5.3.2 Specified products

a) General purpose amenity grass seed: Perennial Ryegrass blend containing 25% Tetragreen, 25% Fabian, 25% Columbine, 25% Berlioz such as Rigby Taylor mix R140 (or product of equal quality approved by L).

b) General purpose amenity turf: Rolawn Medallion turf (or product of equal quality approved by Landscape Services.

5.3.3 Lawn establishment using seed

a) Initial preparation:

Minimum top soil depth 200mm (maximum 300mm). All banks, verges and landscape features laid to grass must be capable of being cut by ride-on machinery. These areas must be graded to a maximum slope of 150 to the horizontal or less.

b) Consolidation:

Lightly consolidate with a light “Cambridge” (Ribbed) type roller or, for smaller areas, by walking with the operatives putting their weight onto their heels and walking systematically over the site in two directions.

c) Finished levels:

Following rolling any variations in levels (hollows and high spots) will be apparent and addressed by adding top soil or spreading the surface layer. Finished layers to meet the falls

and levels of the surrounding grassed areas (acceptable variation +25mm to -10mm). Finished level to adjacent hard surfaces, such as drains, kerbs and paving, +25mm above hard surface.

d) Seed bed preparation:

The surface should be lightly and uniformly raked to produce a friable tilth. All surface stones 10mm+ (in any dimension) should be removed from site.

e) Fertiliser:

The area to have a suitable, pre-approved, base fertiliser (6:9:6) applied at the manufacturer's recommended rates.

f) Seeding:

In calm conditions apply pre-approved seed at a rate of 35-50g per m². The calculated seed quantity should be split in two and applied at right angles to each other to ensure an even coverage. Lightly rake in to cover the seed and leave a final level surface. Larger areas can be sown using a suitable seed drill, if conditions allow following consultation with the Landscape Services.

g) Irrigation:

Wet the top 100mm (minimum) to full depth of topsoil, ensuring even coverage without displacing seed, seedlings or soil if required. Repeat/apply as necessary to ensure even germination and establishment of all sown areas to result in a healthy, vigorous grass sward, free from the visible effects of pests, weeds and disease.

5.3.4 Turf establishment

a) Soil preparation for receiving turf:

Initial preparation in accordance with section 5.1.7 minimum top soil depth 200mm

b) Consolidation and finished levels:

Lightly consolidate with a light "Cambridge" (Ribbed) type roller, or for smaller areas by walking, with the operatives putting their weight onto their heels and walking systematically over the site in two directions. Following rolling any variations in levels should be addressed by adding top soil or spreading the surface layer. Finished layers to meet the falls and levels of the surrounding grassed areas (acceptable variation +5mm to -10mm). Finished levels with existing hard surfaces such as drains, kerbs and paving level to be 25mm above hard surface.

c) Turf bed preparation:

The surface should be lightly and uniformly raked to produce a friable tilt. All surface stones 20mm+ (in any dimension) should be removed from site. When adjoining existing lawns, a straight edge should be cut into the existing turf to ensure a seamless joint.

d) Fertiliser:

The area to have a suitable, pre-approved, base fertilizer (6:9:6) applied at the manufacturer's recommended rates and guidance.

e) Turfing conditions:

Turf should be laid when the weather is suitable and soil conditions are moist. Turf should not be laid if the area is waterlogged, or when frost is in the ground.

f) Delivery and stacking:

Turf should be delivered to site on the day of laying. Turves must not be stored on site for more than 48 hours. Turves should be stacked to a maximum height of 1.4 m on cleared ground.

g) Laying:

Turves from the stack to be wheeled to the laying area over planks butted together. Adequate timber planks should be used to support persons and loaded barrows. The turves should be laid on the prepared soil bed, working from planks set over previously laid turves, and should be firmed into position in consecutive rows with broken joints (as in stretcher bond brickwork) closely butted and to correct levels. Turf edges and margins should be laid with whole turves. Any inequalities in finished levels should be adjusted as work progresses by raking out and/or packing fine soil under the turf. Finished turf levels should be to existing hard surfaces such as drains, kerbs and paving, to be 25mm above and to existing turf to be 10mm above allowing for final settlement.

h) Irrigation:

Immediately after laying the turf the work area is to be watered using an appropriate overhead spray irrigation system. There should be sufficient water to soak the newly laid turf and, if necessary, the under lying soil to a depth of 75mm. Irrigation to be applied as necessary to prevent turf drying and shrinkage until rooting into the under lying soil is apparent. The contractor will be responsible for supplying adequate irrigation until establishment or agreed point of handover.

i) On site protection:

A light weight plastic mesh type fencing 1m high, or other suitable product, set on pins at 2m intervals should be erected around the newly laid turf and should be left in place until the turf is established.

5.4 Lawn edging

After seeded areas are well established ensure edges are clean and straight, or cut to smooth curves. Where they border ornamental plantings an edge, approximately 100mm-125mm deep should be created to permit edging with shears, with the mulch and soil drawn back approximately 100m above the lawn level.

After completion of turf laying ensure edges are clean and straight, or cut to smooth curves around. Where they border ornamental plantings an edge, approximately 100mm-125mm deep, should be created to permit edging with shears, with the mulch and soil drawn back approximately 100m above the lawn level.

a) Completion of works:

Ensure all arisings (Soil, turf, stones or other debris) are removed from site. Leave the works in a clean tidy safe condition.

b) Initial cut of new turf areas:

The contractor will carry out the first cut when the grass is established to 75 mm high before presenting for hand over. Before cutting, all stones above 25 mm in any dimension to be handpicked and the area crossed with a light weight roller to firm the grass and consolidate the surface. The grass cutting machinery should be sharp and in good condition to avoid pulling out young seedlings. All arisings should be collected and disposed of off-site.

c) Failures and rectification:

At handover seeded and turfed areas will form a close knit, continuous ground cover of even density, height and colour, with vigorous and healthy growth out competing weed growth. After assessment from the Landscape Services areas of necessary rectification will be classified as replacement or remediation.

d) Replacement:

To be specified by Landscape Services to bring the area to the required standard through cultivation work and/or extra soil followed by seeding or turfing as appropriate and irrigation as required.

e) Remediation:

Proposals to Landscape Services to bring the area to the required standard through remedial works which could include all or some of the following: slitting, spiking, top dressing, over seeding and fertilizer application.

5.5 Meadows

Key objectives and considerations:

- Meadow areas will only be considered where they make a significant contribution to the existing landscape
- Site assessment to be carried out to determine implementation plan proposals to Landscape Services
- It should be noted that little cover will be achieved in the first 2 years
- All meadow areas must be accessible to cut and collect machinery (Ride on mowers)

5.5.1 Site assessment and design

Where appropriate, a botanical survey by suitably qualified person of existing vegetation. Site and soil assessment to be carried out to determine design, species selection and implementation. Results and proposals to Landscape Services for approval.

Low soil fertility is essential. Where soils have an index value of 0-3 (0-45, 0-400, and 0-100 ppm of P, K and Mg respectively) they will assume to be suitable if N values are also low. As a rough guide, values of total of less than 0.1% is required.

The safety of road and other site users is of paramount importance. Tall wild flower mixtures should not be used where there is the chance of obscuring sight lines or of causing undue distraction to drivers: for example on bends, road junctions consideration should be given when sowing meadows adjacent to footpaths so as not to cause a trip hazard.

5.5.2 General requirements

Use suitable translocated herbicide (notice and proposals to be given to Landscape Services if existing herbage especially pernicious weeds minimum 4 weeks before intended commencement of works. Minimal cultivation to 100mm to produce suitable seed bed using disc or power harrow etc. (Pedestrian rotary cultivator in smaller areas).

5.5.3 Consolidation and finished levels

Lightly consolidate with a light “Cambridge” (Ribbed) type roller, or for smaller areas by walking, with the operatives putting their weight onto their heels and walking systematically over the site in two directions. Following rolling any variations in levels should be addressed by adding sub soil, other preapproved low nutrient fill or spreading the surface layer. Finished layers to meet the falls and levels of the surrounding grassed areas (acceptable variation +5mm to -10mm). Finished levels with existing hard surfaces such as drains, kerbs and paving level to be 25mm above hard surface. Where it is not possible to form a seed bed with the existing sub straight low nutrient fill (proposals and representative sample to the Landscape Services for approval) should be used to bring up levels and form a seed bed. The fill material should not be played in excess of 100mm.

5.5.4 Seed bed preparation

The surface should be lightly and uniformly raked to produce a friable tilth. All surface stones 10mm+ (in any dimension) should be removed from site.

5.5.5 Sowing Dates

Preferred August September or April May immediately after seed bed preparation to minimise erosion and capping.

5.5.6 Sowing rates

In accordance with suppliers recommendations.

5.5.7 First year maintenance

If growth exceeds 100mm cut at 75mm with flail or rotary mower and remove arisings repeat if sward height exceeds 200mm. Carry out weed control of pernicious weeds such as Nettles (Urtica sp.) and Doc leaves (Rumex sp.).

5.5.8 Preparation for hand over

Suitably qualified person to carry out species count over 10 randomly placed transects (Per 100 m²) with species count report to Landscape Services . Where the species mix does not match the specified mix contractor to carry out over planting using plug plants of the defective species. At least 70 % ground cover to be achieved at hand over.

6 Trees and Development

6.1 Existing Trees on Development Sites – Selection

Trees are valued features of the Universities estate and make an important contribution to the character of the local environment. They help to create a visual link between the new buildings and the surrounding area and aid their integration into the landscape. They also provide a mature setting which new planting will take many years to achieve.

Under the Town and Country Planning Act 1990 local planning authorities have power to protect trees and woodlands in the interests of amenity by making tree preservation orders, and a duty to make adequate provision for the preservation and planting of trees when granting planning permission for development.

The majority of tree roots grow in the upper 600mm of soil and they spread outwards in any direction a distance equal to the tree's height. Any disturbance of the ground within the root spread of a tree can damage its roots and may severely injure the tree. Damage to roots will interrupt the supply of water necessary to keep the tree alive and may cause decline in vigour, dieback or even death of the tree. The tree may also be unstable and so pose an unacceptable threat to the safety of people and property. Development of a site, including construction of access routes, driveways and parking areas can result in substantial root severance of trees.

Trees, which are to be retained in a development scheme, need careful selection. A location and quality survey of all trees on the site will be required at Site Survey stage.

6.2 Tree Preservation Order

A Tree Preservation Order (TPO) is made by the Local Planning Authority (LPA) usually a local council to protect specific trees and woodland from deliberate damage and destruction. TPO's prevent the felling, topping, lopping or uprooting of trees without permission from the planning authority

Statutory constraints - With trees protected by a tree preservation order or being within the subscribed size requiring formal pre-notification within designated conservation areas, failure to adhere to the correct procedures (Section 211 notices, exemption and application procedures) could result in criminal prosecution for unauthorised works. Fines for such works are £20,000 per tree plus any financial gain accrued by the landowner from removing the trees (i.e. development gain).

This would obviously be highly detrimental to the reputation of the UoE. If a company commits the contravention of a TPO, section 331 of the Town and Country Planning Act provides that a director, manager or secretary of the company is guilty of the offence if it can be proved it was committed with their consent, or connivance, or was attributable to their neglect. Failure to comply with conditions attached to tree works consent, often containing very detailed technical specifications regarding the type and extent of pruning awarded consent is also an offence as such pruning works would be considered as unauthorised works.

Trees in a Conservation Areas - anyone proposing to cut down, lop or top a tree which is not subject to a TPO is required to give 6 week's notice to the local planning authority who will then consider making a TPO, taking into account the visual, historic and amenity contribution of the trees to the character and appearance of the area.

Bat disturbance – Bats and their roosts are legally protected, on conviction the penalties for people disturbing bats can be six months imprisonment and or an unlimited fine

Conversely, trees, which are not suitable to the spatial constraints of the new layout, are often misguidedly retained. The guidance contained within BS 5837 provides a process for determining which trees are suitable for retention and how much rooting volume around a retained tree should remain undisturbed to ensure that the tree survives the redevelopment process and is stable and safe in the future. Sometimes the Local Planning Authority (LPA) will require planning applications to be supported with a tree survey to the above-mentioned British Standard, however, this doesn't necessarily always occur.

6.3 Tree Survey

This should contain the following:

A plan showing the position of each tree (which must be numbered for reference). An accompanying report noting the following:

- Species & variety
- Individual specimen, or part of a group
- Trunk diameter at 1m from the ground
- Spread – noting any unevenness in crown
- Condition of trunk and branches
- Any weaknesses
- Schedule of any tree works required

This initial survey will form the basis for the decision concerning which trees are suitable for retention.

The Local Council will consider making Tree Preservation Orders on important trees on development sites.

When considering the retention of existing trees take account of:

- Finished ground levels
- Routing of services and drains
- Proximity to buildings, roads and footpaths
- Changes in climatic conditions of the development
- Although priority must be given to retaining good quality trees a balanced approach should be taken.

Avoid the following:

- Misplaced tree conservation when a large over-mature tree is “trapped” in a courtyard and may eventually die due to changes in water-table etc.
- Thinning of groups of trees which have grown up together. Those remaining will be more susceptible to wind throw effects and be less stable.
- Lack of space for tree to develop to maturity.

6.4 Existing Trees on Development Sites – Protection

All too often, time and trouble is taken with the choice of trees which are to remain, but little is done to protect them on site or consider building works in relation to damaging their roots etc.

Trees which are to remain on development sites must be suitably protected throughout the development period. Site protection should only be removed at the end of the project.

Please Note:

- 95% of tree roots are to be found in the surface 600mm of soil.
- The root spread of a tree often exceeds its crown spread by a considerable distance.
- Root damage leading to the eventual death of a tree can easily occur.

Avoid the following:

- Compaction of the ground in the root area.
- Raising soil levels over the root area
- Direct toxicity through the soil by, for example, petrol spillage or lime from cement.
- Stripping of topsoil from the area of the tree roots
- Excavation work in rooting area even for driveways, paths and kerbs and installation of services
- Damage by heat to the whole tree. Fires must not be lit in a position where the flames could extend to within 5m of foliage branches or trunk (general guide – no fires within 20m of tree).
- Storage of building material and machinery.

Temporary Fencing must be erected around all trees, which are to remain.

Guidance on the minimum distance around the tree, which should be left undisturbed, is given in Table 1, BS 5837 1991 “Trees in Relation to Construction”.

However, a general guide is that fencing may be erected below the outermost limit of the branch spread, or at a distance equal to half the height of the tree (whichever is the greater).

Plans indicating the agreed lines of protective fencing around trees to be retained must be issued prior to commencement of work on site.

Fencing must be erected before any materials or machinery are brought onto the site. Once erected, fences should not be removed or their positions altered. No work/storage of material etc. should be carried out within the fenced area.

Type of fencing

Fencing should be at least 1.2m high comprising a vertical and horizontal framework of scaffolding supporting either cleft chestnut pale fencing (BS 1722 Part 4) or chain link fencing BS 1722 Part 1).

6.5 Existing Trees On Development Sites – Construction

a) Services:

- Ideally, there should be no open trench work within the ground area under the branch spread of a tree. However, where this is unavoidable the following guides to good practice should be noted:
- Keep services together where possible – avoiding placing them on more than one side of a tree.
- No roots over 25mm in diameter should be severed. If roots over 50mm diameter are likely to be encountered, particular care should be taken to avoid damage.
- Excavations should be undertaken by hand avoiding damage to the bark. The roots should then be surrounded with sharp sand before replacing soil or other material in the vicinity.
- Consultation with the Landscape Department is advised and detailed plans showing the routing of all services in the proximity of trees must be produced. These should also show the access space needed for excavating and laying the service.

b) Roads and Driveways:

It should be noted that the formation of the sub-grade for roads and driveways will destroy most of the tree's surface roots if located under its spread. Lowering the soil level will also sever roots and skimming the soil surface to establish new paving at the former ground level can also cause damage.

Excavation for kerbs, edgings and their associated foundations and haunchings can also damage roots. Ideally these forms of construction should be kept away from the spread of a tree, or if it is unavoidable then new paving should be established above the former ground level using a granular fill and an alternative, less damaging form of construction considered for kerbs and edgings.

c) Walls or similar structures:

Detailed advice on foundations in relation to existing trees should be obtained. If it is necessary to build a wall or similar structure over a root greater than 50mm diameter, provision should be made for its future growth. The roots should be surrounded with un-compacted sharp sand and an adequately reinforced lintel or raft laid over the surface.

d) Hard surface treatments around existing trees:

Paving slabs should be laid dry jointed on a sharp sand foundation to allow air and moisture to penetrate the roots. Bricks or blocks are suitable when laid in a similar way. Provision should be made for the growth of the base of the trunk by leaving an unpaved strip around its base. Washed gravel retains its porosity and is a useful surface to accommodate changes in level or any irregular shaped area around the base of the trunk. Avoid the use of gravels with a high fines content such as binding gravels or hoggin which become impermeable when consolidated.

7 Designing with Plants – General Principles

New planting schemes must be appropriate for their particular location. The following should be taken into account when designing a scheme.

- Ecological Context
- Visual character
- Setting within the local landscape.
- Function of planting.
- Maintenance access and aftercare

Planting should not be used as a cosmetic afterthought merely to make a new development look superficially attractive. It is not just an infill material for the oddly shaped spaces left between paths and buildings, or a screen for a building or development, which should have been more appropriately sited or designed. Its real function, however, is of a positive tool in the creation of new and dynamic environments, which have a sense of place and local distinctiveness. This can be achieved by recognising that planting is an architectural element with as much significance as a structure built from bricks or concrete.

The design functions planting can have are to:

- Form a structural framework to a new development.
- Give spatial enclosure by creating and linking new external spaces.
- Form focal points or frame views.
- Give shape, colour and texture to complement the built environment and to soften its hardness.
- Relate buildings to the site and to each other.
- Planting also has practical functions (although these must be reconciled with its use within the overall design context).

It can be used to:

- Form new habitats.
- Provide barriers, screens and create privacy.
- Define boundaries.
- Create shelter and shade.
- Help ameliorate nuisances e.g. suppress noise, screen headlights.
- Filter pollutants from the air.
- Deter crime.

The elements, which are used by a designer to create a planting scheme, are trees, shrubs, ground cover (plants and grass) and climbing plants. These all have different design and

practical functions, which must be taken into consideration in order to reach an acceptable design solution.

7.1 Design for Low Maintenance

Designing and selecting plant species that require less maintenance inputs can reduce resources used to maintain the landscape. In addition, it can promote healthier space for the campus community by reducing pollution. There are a few important principles to follow when designing planting for low maintenance; in general these principles include:

- Select plant species that require minimum fertilizer and pesticide use
- Select plant species or assemblages that require little to no mowing/pruning/thinning
- Select plant species that have exhibit consistently appealing architecture, thus requiring minimal pruning
- Select plant species that covers bare ground to minimise mulching needs

7.2 Designing with Plants – Structure Planting

This is a term used to describe significant areas of tree and shrub planting which will create a framework for a new development. It should not, however, be used merely to form a screen, but should provide a well-designed and interesting visual feature to integrate the new development into its surroundings.

7.2.1 Uses of Structure Planting

- Extend features of the surrounding landscape into or through the new development, such as woodlands, copses and hedgerows.
- Enhance and strengthen existing natural features within the site e.g. hedgerows.
- Soften the junction between the built environment and the open countryside.
- Create an identity for a large featureless site by breaking it up into spaces of more human scale.
- Separate or define land uses or neighbourhoods within a development.
- Act as a wind barrier to give shelter and improve the micro-climate.
- As a general guide where a development is adjacent to open countryside a substantial woodland buffer should be provided.
- It should also be noted that tree planting with shrub under-storey could give protection down- wind for a distance of ten to twenty times its height and reduce wind speed by up to 50%. A mixture of deciduous and evergreen trees with smaller trees and shrubs on the windward side has most effect.

7.2.2 When to plant

This type of planting should commence, wherever possible before the development, to give it an opportunity to establish and form a pleasant setting before the development is occupied. It will remain as a permanent woodland type feature to provide the required screening, shelter and enclosure as well as a natural habitat to attract wildlife.

7.2.3 7.2.3 Type of plants

Traditionally, standard trees have been planted to produce an immediate effect, but the use of small native tree whips and shrubs planted at high density (approx. 1.5m spacing) will be more economical. These are cheaper, easier to handle and do not need stakes and ties.

Within two to three years of planting, these smaller trees can overtake staked standards planted at the same time and can look more natural and become sturdier.

Other advantages are that:

- A barrier is formed quickly and the surrounding vegetation is rapidly suppressed.
- Plants protect and force each other to grow taller than in less dense planting and a dense thicket is formed.
- More visually acceptable once established.
- However, in smaller areas for prestige planting, a mixture of tree sizes can be used to include feathered and standard, which will give a more immediate effect by adding height and substance while the younger trees establish.
- Visually this type of planting may be more acceptable particularly in close association with residential development.
- Use of species
- Tree and shrub species, which are native to the area, should be used. Some of the more vigorous “nurse” species may need to be removed or coppiced later to allow the naturally dominant species such as oak, ash and beech space to mature.
- Species such as poplar, alder, willow and birch are fast growing and will establish well in difficult conditions. These can be either thinned later or coppiced to form bushy growth.

7.3 Designing with Plants – Hedges

Hedges may be defined as linear communities of woody plants which form dense bushy growth and respond well to pruning to form effective barriers, screens and enclosures. They form one of the most distinctive visual features in the landscape and are an important element in its historical evolution over hundreds of years. They are also of considerable importance for wildlife habitats.

It is therefore important that whenever possible, existing hedgerows should be retained for the following reasons:

- Landscape element of historical significance.
- Give immediate character and structure to a site.
- Form good natural boundaries (will help new buildings integrate into the existing landscape).
- Give shelter to humans and wildlife.
- Value for nature conservation, particularly in the formation of wildlife corridors, where important connections between one hedge and another and to adjacent woodland are made.
- New hedges should therefore be composed of native species and this will be a requirement when new hedge planting is proposed.
- In no circumstances will planting of species of quick growing evergreens (such as Lawson's cypress) be acceptable.

a) Species:

Some well-used species for hedge planting are hawthorn, blackthorn and hazel, but it is desirable to use a mixture of species to give a more interesting visual effect and add variety for wildlife. When deciding on suitable species for new hedge planting, it is advisable to use those, which are already found in existing hedgerows in the area.

b) Protection:

If the hedge adjoins agricultural land grazed by stock, fencing must be provided far enough away to ensure that cattle/horses cannot browse the tops of the hedge. The chosen hedge species should be chosen so as not to be detrimental to their health. Fencing should also be provided against rabbits, hares and deer.

c) Maintenance:

The line of the new hedge must be kept weed free for 3-4 years to allow the plants to establish.

- Trim and shape the hedge without cutting the leading shoots until the required length is reached (1.4m for stock-proof hedge, 1.8m for shelter hedge).
- It must be decided at an early stage whether the hedge will be laid.
- A well-laid hedge is stock-proof and attractive and after 3-4 years forms a better habitat for birds than a trimmed hedge.
- If to be laid: The Plants will need to be sided up until the leaders have reached pleaching height (2.5-3.5m). Usually laid after 8-15 years.
- If not laid: All the shoots should be trimmed from the first year to produce dense bush growth.

d) Management of existing hedges

When existing hedges are to be incorporated into a scheme, notes must be made at the stage of the survey drawing describing their type, condition, species component, age and proposed future management. For example, a hedge may be on an embankment to mark an important boundary, over-mature and gappy, or have been well managed.

Suggested management measures

- Remove poor hedging shrubs such as elder. Decide on timing and nature of management e.g. trimming to ‘A’ shape and laying. Tag suitable saplings or shoots to grow up to form trees if required.
- Allow hedge to grow tall if required for screening effect.
- Alternate year trimming will help protect nesting sites and food sources for wildlife. Do not cut hedges in nesting season (April – July), late winter preferred.
- Plant up gaps. Leave saplings to grow into hedgerow trees.

7.4 Designing with Plants – Trees

Most tree planting schemes should consist of a mix deciduous and everygreen trees suitable for the location. The planting of extensive coniferous planting can look out of place in the landscape. Screens composed of lines of conifers, for example, Lawsons’ cypress, are more likely to draw attention to the building to be screened and form alien features in the landscape.

In a situation where it is known that screening will be required, land must be made available for a wide belt of tree and shrub planting to give adequate screening qualities, but in a more natural manner. In rural situations, this type of planting should be composed of native species. In submitted planting schemes, use of quick growing cypress species to form screens will not be permitted.

7.4.1 Choice of Species: design aspects

When trees are used as a design feature in relation to the built environment, the following aspects should be taken into consideration.

a) Height and Shape:

May be used to reflect or contrast with the architectural form of a building. When planting groups of trees, a mix of different heights and shapes will give more interest.

b) Foliage:

Foliage varies with its density, texture and colour. Dense leaf cover will be more suitable for screening purposes, whereas a more open textured type of tree could be used nearer buildings. Trees vary at the time they come into leaf, for example birch and cherry give leaf cover early in the year whereas oak and ash come into leaf later.

c) Colour:

Leaf colour is an important design feature with a range of greens to consider ranging from the highlight feature of the yellow leaved “false acacia” to the grey greens of the whitebeams. Seasonal tints are attractive features and a planting scheme should contain trees to give interest throughout the year. Bark, flowers and berries are added aspects of associated tree colour.

7.4.2 Choice of Species: practical aspects

The following practical aspects associated with new tree planting should also be taken into consideration when preparing a design. These restrictions however, should not result in a decision against planting trees, but rather lead to a careful choice of species, which will be suitable for the site where these limitations may apply.

a) Siting of trees in relation to buildings: Consider type of tree in relation to its height and spread when mature and effect of various species on foundations.

b) Location of Services: Both underground and overhead.

c) Archaeological remains: Proximity to.

d) Road Safety: Visibility Splays, road signs

e) Nuisance: Fruiting or berrying trees in wrong locations (e.g. horse chestnuts in car parks). Loss of light if planted too near windows. Dense shading by large trees in small areas.

Roadside trees

- Distributor, transitional and collector roads often have poor or non-existent landscaping which contributes to a low level of satisfaction with the general appearance of many developments.
- Allowance should be made for planting trees and shrubs along such roads to soften their appearance and give an immediate identity to the area.
- There are however, requirements which must be taken into consideration in relation to such planting.
- Visibility requirements of and for drivers and pedestrians must not be impaired.
- Narrow strips of planting (1.5m minimum) should be avoided adjacent to carriageways or footways.
- Service strips and verges which are within visibility splays may be planted but usually with species which will not exceed 300mm in height.
- Section 141 of Highways Act 1980 should be adhered to. This states that no tree or shrub should be planted in a made-up carriageway or within 4.5m of the centre line of a made- up carriageway.
- Consideration needs to be given to th location of lampposts and CCTV poles when site trees on schemes.

7.5 Designing with Plants – Shrubs

- Shrub planting should be considered its horticultural interest and architectural form, although a good planting scheme will be able to combine these qualities.

- Shrubs are more effective than trees for screening ground level features and will not cause future problems by growing too tall for their situation as may happen with trees.
- Their use should be considered in place of areas of grass under trees which are difficult to maintain. Shrubs should always be planted in groups or as a feature in relation to other shrubs rather than dotted in grass areas.
- Choice of Plants: Plants should be chosen that will give all year round interest.
- Consider whether the shrubs are: Evergreen or deciduous
- Foliage: Overall effect for mass group planting, attractiveness as a specimen/feature. Contrasts in leaf form, texture, colour, growth pattern. Autumn colour/flowers/berries.
- Architectural qualities: Plants should be chosen to suit the situation in relation to soil type, growth rate, ultimate size and maintenance requirements.

Practical uses of Shrubs Planting

Encourage wildlife.

Dense visual screening (above eye level) car parks, boundaries.

Softening harsh building lines – fences, walls.

Physical barrier to increase security and restrict access.

The use of native species (see “Nature Conservation”) will have greater value for habitat creation, and in rural locations, this type of planting will be required. However, in association with buildings and in more urban environments, it will be acceptable to use a wider variety including ornamental and introduced species for their architectural and design qualities.

7.6 Designing with Plants – Ground Cover

7.6.1 Grass

Grass is a hard-wearing ground cover which renews itself and is the only vegetation which can be continually walked on.

Its use should be considered as a positive addition to the design and not merely to fill in spaces which could be more suitably treated in a different way. Areas of grass for no specific purpose can produce featureless landscapes which are also expensive to maintain.

Areas of mown grass should be used to:

- Complement buildings.
- Provide amenity areas.
- Provide private gardens.
- Provide a space for recreation and sunbathing

Areas of unmown grass can be used in most design situations depending on the function required. Areas of unmown grass supporting wildflowers give another design aspect to the use of grass.

In areas of high public use it is advisable to use turf rather than seed.

- Looks finished as soon as laid.
- Ready for use shortly after laying

Although seeding can be successful, the site preparation work must be carried out to a high standard, the area kept weed-free, a suitable seed mix used and the area fenced off until established.

7.6.2 Ground Cover Plants

In certain situations, the use of ground cover plants may be more suitable than grass. These form a low-growing carpet which will, when established, smother any other new growths. However, in public places, large areas of ground cover plants which are likely to be trodden over before establishment, should be avoided.

Design Use:

- Use in a mass planting to form an attractive and distinctive feature.
- Contrasts in colour and texture for groups of specimen shrubs and trees planted within it.
- Practical Functions of Ground Cover Plants
- Shade tolerant
- Fast growing, vigorous and spreads without help.
- Shallow rooting, does not hinder growth of trees and shrubs when under planted, unlike grass.
- Can be controlled easily.
- Good for establishing on banks rather than grass. Relatively maintenance r free once established.

8 Designing to Deter Crime - Secure by Design

An awareness of the need to take sensible measures to help reduce crime will be part of the overall philosophy in the design of new developments.

The following points should be considered in relation to this:

- Grouping buildings in small clusters around a central area.
- Use of boundaries – real or suggested. Planting or changes in material can help indicate a feeling of territory within a community unit.
- Central siting of public greenspace, in order for them to be overlooked by the surrounding buildings.
- Provision of wide, well lit paths which are not isolated from other activities and do not provide unrestricted access to rear of premises. They should not be enclosed by walls or areas of dense high-level shrub planting.
- Planting should be used sensitively with this philosophy in mind. Its use as a deterrent to crime should be balanced with its appearance and amenity value. Often, both the landscape designer and public want well planted, enclosed naturalistic landscapes, whereas open environments with more visibility could be considered safer. However, these issues can be reconciled by the use of thoughtful detailing.

Some basic principles can be adhered to in relation to the choice of plant material:

- Dense planting should not hinder opportunities for natural surveillance and must avoid the creation of potential hiding places especially adjacent to a footpath or dwelling.
- Use ground cover and below eye-level shrub planting in semi-public areas and open plan frontages.
- Use hedges which can form impenetrable boundaries.
- Avoid densely shrubbed areas which will eventually form thickets in areas of open space. Use, instead, areas of low planting with specimen trees or shrubs as focal points. Groups of trees, which can be seen through, can be used in open grass areas.
- Appreciate the function of the plant material itself. Dense prickly species such as Rosa rugosa varieties, berberis, hawthorn and blackthorn have obvious deterrent features once established. However on the other hand they can create a litter trap.
- Although of course, good design alone cannot solve the problem of crime, when co-ordinated with other measures its contribution can be significant.

9 Planting and Aftercare

When the site has been suitably prepared, planting can take place.BS 3936 covers best practice for the planting of trees, shrubs, hedging plants, climbers, herbaceous plants and bulbs and reference should be made to this.

BS 8545:2014 Trees: from nursery to independence in the landscape

9.1 Trees - Shrubs

Most deciduous shrubs grown in the open ground should only be moved in the dormant period (November to March).

Evergreen and herbaceous plants are best planted early autumn or late spring.

Container grown plants may be planted during the growing season, but they will need regular watering and maintenance. Planting in the dormant season is still to be preferred if possible.

9.2 Planting

Plants with bare roots should be heeled in on site if not planted immediately after delivery. At all times plants must be protected from wind and drying out. They should not be laid out on a site before planting.

Planting should not take place in frozen ground or waterlogged soil. In dry weather plants should be firmed and watered immediately after planting. After planting, the beds should be mulched to help retain moisture and inhibit some week growth. Medium grade mulch or woodchip to a depth of 75mm can be used. This will also improve the appearance of the area when newly planted and provide an additional rotting wood habitat.

9.3 Aftercare

Regular maintenance during the first five years after planting is essential to help the survival of the plants and increase growth. This should include weed control, replacement of failures, pruning and attention to protection where required.

Trees Irrigation:

Trees are required to be watered about twice each week with 20 L of water adequate to keep an 800 mm diameter rootball well irrigated, and that 40 L of water or less thoroughly moistens a soil ball of 500 mm to 600 mm. BS 8545:2014 (Section G2). The frequency of irrigation is more important than the volume of water given at any one time.

An Irrigation Plan must also include a system for reporting back to the UoE to confirm implementation of each irrigation operation. The period over which irrigation is required shall be for at least three full growing seasons from planting. As the root system develops, the frequency of irrigation can be reduced.

10 Minor Works within Landscaped Areas

Key objectives & considerations:

- The need for repairs can be significantly reduced with careful planning and ground protection measures;
- Early engagement with Landscape Services essential.

10.1 Service trenches within lawns

Consult with Landscape Services with regards to turf retention. Turf must be re-laid within 48 hours.

Turf to be retained to be cut using a turf cutter (25mm thickness) and cut in to pieces no greater than 1.2m long and rolled. The retained turfs are to be covered with hessian or plastic sheeting to prevent drying.

Trench excavated using ground protection as required to prevent damage to adjacent lawn.

Spoil to be placed on protective sheeting or boards with sub and top soil kept separate.

On completion of installation back-fill with sub-soil but allow for 200-300mm of top soil cover. Ensure service run is adequately consolidated to prevent subsequent subsidence before placement of the top soil. Top soil consolidated in layers no greater than 150mm by walking, the operatives putting their weight onto their heels and walking systematically over the site.

Finished layers to meet the falls and levels of the surrounding grassed areas (to be +25mm for seed, level for turf). Finished levels to existing hard surfaces such as drains, kerbs and paving +25mm.

The surface should be lightly and uniformly raked to produce a friable tilth. All surface stones 10mm+ (in any dimension) to be removed from site.

Replace turf, ensuring any gaps are filled with stone free soil or, in calm conditions, apply an over seeding with pre-approved seed at a rate of 35-50g per m² and lightly rake in to cover the seed and leave a final level surface.

Remove all arisings from site leaving it in a clean and safe condition.

10.2 Service trenches within existing landscaping or within the vicinity of trees

Consult with Landscape Services with regards to planting retention and tree protection.

Trench excavated using hand digging methods and ground protection as required around retained planting and tree to prevent damage to roots. Where hand digging is specified no roots > 15mm diameter are to be severed.

Spoil to be placed on protective sheeting or boards with sub and top soil kept separate.

On completion of installation back fill with sub-soil (where tree roots have been retained carefully pack soil around) but allowing for 200-300mm of top soil cover. Ensure service run adequately consolidated to prevent subsequent subsidence before placement of top soil. Top soil consolidated in layers no greater than 150mm by walking; the operatives putting their weight onto their heels and walking systematically over the site.

Finished level to meet the falls and levels of the surrounding areas. Finished level with existing hard surfaces such as drains, kerbs and paving level

The surface should be lightly and uniformly cultivated to produce a friable tilth all surface stones 25mm+ (in any dimension) to be removed from site.

As far as reasonably possible match existing mulching material. Remove all arisings from site leaving it in a clean and safe condition.

Make good any deficiencies in levels or sward cover after 3 months

11 Hard Landscaping Details

11.1 Hard Landscaping Details – Surfaces

Consideration should be given to materials for hard surfacing to ensure they are appropriate for their function and sympathetic with the overall external design.

Where roads are to be adopted details of materials and construction must be agreed with the Highway Authority .Sites in Conservation Areas will require the use of traditional paving materials of local origin.

All surfaces (and substrates) shall have sufficient loading capacity for ongoing use of maintenance vehicles such as MEWP's, Delivery vehicles and cranes etc (where required for plant replacement).

11.1.1 Mowing Margins & Drop kerbs

Mowing margins should be provided where grass abuts a building, wall or fence line. The edging should be composed of a hard surface such as concrete, brick or slabs.

Drop kerbs should be installed to allow access for ride mowers and other service vehicles.

11.2 Hard Landscape Details – Street Furniture

This can include seats, bollards, lighting columns, signage, litter bins and cycle racks.

Consideration should be given to the style and siting of street furniture in order to avoid conflicting period styles and clutter caused by too many elements with haphazard siting. Street furniture must be considered as part of the landscape design at an early stage and incorporated in the detail Master Plan to avoid furniture conflicts, such as tree growth obscuring signs. Consideration must be given to the use of anti-skateboarding measures on items such as steps, edgings, upstands, benches, handrails etc. where the risk on ongoing damage is likely.

Street furniture should not impede access for gritting and snow clearance activities, as well as maintenance vehicles for the building such as MEWP's.

11.3 Hard Landscape Details – Boundaries and Barriers

Boundaries and barriers must be sensitively designed to associate with the character of the new development and its surroundings.

Their function must also be considered. This can range from delineating land ownership and defining spaces to providing security and privacy.

11.4 University Squares

General design considerations for the Design Team:

Any New Square should be considered within the context of the other public spaces within the city.

11.4.1 Social design consideration

The proposed Squares should be designed so that it can provide an eclectic mix of opportunities for students and staff as well as the wider public, creating space to meet between lectures, for local business and residents to enjoy and spend time in, an arrival point for visitors, and an area to host a range of public events.

11.4.2 Structural design consideration

The square should be designed to be a flexible and adaptable space, which is not 'overdesigned' and enables different temporary structures to be installed when needed, rather than designed into the space as permanent features.

- There should be an area of flat space, where temporary structures can be installed such as stages, market stalls and large marques.
- The size of the flat space should be such that a large marquee/temporary structure can be constructed at 36 x 36 metres with consideration to servicing and access.
- Soft landscaping should be included as appropriate, although not at the detriment of the flexibility of the space and with consideration given to ongoing maintenance.
- The materials and construction of the surface are required to be of a standard to allow for HGVs and maintenance machinery moving across it, if required.
- Access and on-site parking for maintenance vehicles and operatives.
- Provision for strategic points within the square where water and electricity can be accessed.
- The space and access to it must take account of disabled access (DDA regulations as a minimum) to allow access for all – ramps should be provided in lieu of any external platform lifts at changes of level.
- Detailed structural loading drawings for external areas must be provided that provide clear and easy to understand information on the extents of surfacing/hardscapes that can accommodate specific loadings e.g. light, medium and heavy-duty loadings.

11.4.3 Local weather conditions

The meteorological conditions of the space should be considered when designing a square and how these materials will react to adverse weather conditions and changes in temperatures.

Currently snow clearance and gritting is carried out by mechanical means using a range of small tractors and associated snow clearance blades. Gritting is done using white marine de-icing salt. So all surface materials and sub-bases should be sufficiently designed to carry the load of these machines and withstand the corrosive nature of the salt.

Pathways should be a minimum of 1.8m wide and free of obstructions such lighting columns, bollards and sign posts. This will allow free access for snow clearing equipment.

Risk of flooding must be assessed by the Designers, and appropriate drainage systems and specifications of materials/products, along with other protective measures shall be used on hardscapes to mitigate flood risk. Over-provision may be prudent given the ongoing impact of climate change.

11.5 Staff & Student Growing Spaces

Where possible within a new development provision should be made to develop designated vegetable growing spaces for use by students and staff.

References and Addresses:

https://www.ed.ac.uk/about/sustainability/themes/food/get-involved

https://edinburghlivinglandscape.org.uk/

https://www.landscapeinstitute.org/technical/jcli/

https://www.trees.org.uk/Help-Advice/Managing-your-Trees

http://www.adas.uk/Portals/0/Documents/V4-Trees-Issue-2-16-11-2007%20%281%29.pdf

https://www.sepa.org.uk/

https:/www.buildingwithnature.org.uk/

11.6 Amenity Planting

Key objectives & considerations:

- Beds must be presented to Landscape Services for inspection before planting begins;
- Plants must be presented to the Landscape Services for inspection before planting begins;
- Success is dependent on good ground preparation, plant handling, planting and aftercare.

11.6.1 Soil preparation for shrub/ornamental planting areas

Ensure that all visible roots and large stones with a diameter greater than 50 mm are removed. Spread sanitized imported green waste and stabilized composts at 7.5m³/100 m² (75mm depth over planting area). Incorporate into the top 200mm of the soil using a rotary cultivator or by manual means.

Finished levels

Level to existing hard surfaces such as drains, kerbs and paving. Level to lawn edges 100mm -125mm above (including mulch coverage) with an edge strip.

Surface finish

The surface should be lightly and uniformly cultivated to produce a friable tilth. All surface stones 50mm+ (in any dimension) to be removed from site.

Fertilizer application

Apply pre-approved controlled release (8-9 Months) planting fertiliser 11-21-9+6MgO at the manufacturers recommended rates and incorporated into the top 150mm of the soil prior setting out and planting.

Soil Conditions before planting

Soil conditions should be moist & friable, NOT waterlogged, frozen or snow covered.

Climatic conditions

No planting to be carried out in extremes of temperature <3°c or > 24°c (without consultation with the Landscape Services and provision for irrigation). If the water supply is, or is likely to be, restricted by emergency legislation then planting should be suspended. Planting in periods of forecast high wind, especially in low or high temperature, must be avoided.

Times of year for planting

Bare root and container grown deciduous shrubs: Late October to late March.

Root balled and container grown evergreens: September/ October or April/ May.

Container grown plants can be planted at other times, but only after consultation with Landscape Services and only if adequate irrigation can be provided by the contactor.

11.6.2 Supply of shrubs and plants

The contractor will ensure that, on delivery to site, plants will have the following attributes:

- Condition: Materially undamaged, sturdy, healthy and vigorous.
- Appearance: Of good shape and without elongated shoots.
- Hardiness: Grown in a suitable environment and hardened off.
- Health: Free from pests, diseases, discoloration, weeds and physiological disorders.
- Budded or grafted plants: Bottom worked.
- Species: Labelled with full botanical name, true to type as specified, substitution will be allowed only after the written approval from the Landscape Services .
- Provenance: Country of origin with appropriate EU plant passport. Contact Landscape Services for inspection of nursery stock before planning begins.

Supply of root balled shrubs and plants

Only to be used following consultation with Landscape Services. Root balls are to be well filled with fibrous roots and cohesive natural soil which has been carefully lifted with the plant and remains attached to the root system. Bare root plants, which have been bagged with soil or containerised will not be accepted.

11.6.3 Plant handling, storage and transport

Plants to be handled and dispatched in accordance with the National Plant Specification.

Handling and establishment with special reference to the following:

- Frost: Protect bare root plants and frost susceptible plants.
- Handling: Handle plants with care. Protect from mechanical damage and do not subject to shock, e.g. by dropping from a vehicle.
- Trees to be protected from falling before planting e.g. carefully lay against hedge at 45°
- Plant packaging: Bare root material to be sealed in co-extruded black and white polyethylene bags.
- Handling of bulk quantities: Consult with Landscape Services with regards to storage and care before planting.
- 11.5.6 Plant quality
- Should be in accordance with BS3936, ensuring before planting that:
- Plant nutrition: Plant foliage is not showing signs of chlorosis due to nutrient deficiency
- Plants: Centred and stable within containers
- Root growth: Substantially filling containers, but not root bound, and in a condition conducive to successful transplanting
- Moisture: Root ball soaked to full depth of container no signs of drought, stress or foliage scorch
- Hardiness: Grown in the open for at least two months before being supplied
- Containers: With holes adequate for drainage when placed on any substrate commonly used under irrigation systems

Excavation of planting hole

Place plants on the prepared ground at the specified density, ensuring an equal distance between plants.

Excavate planting hole, ensure that the hole is the correct depth when the plant is placed in the hole, Containerised: The top of root ball should be level with the soil surface.

Root Balled: Nursery mark level with the soil surface.

Bare root: Root flare at surface of soil transplants.

The hole must be wide enough to easily accommodate the root ball:

Planting

Position the planting upright, with best side to the front where appropriate.

Backfilling

Check planting depth before cutting the sides of the hole into the planting hole. Consolidate ensuring good soil to root ball contact.

Finishing

Lightly firm soil around plants and cultivate soil surface with hand tools, without damaging roots, to a fine level tilth with no hollows.

Watering

Water plants immediately after planting in order to settle the plants. Where the planting bed is not at field capacity, water thoroughly, to full depth of top soil without damaging or displacing plants or soil.

Mulching

Carefully spread compost mulch or green waste compost, ensuring plants are not damaged or buried. Finished appearance: level with mulch flicked back from turf edges to allow maintenance. Depth of mulch minimum 75mm maximum100mm ensuring stem collars are not buried.

Finishing

Ensure any damaged plant material is carefully pruned to the nearest bud using sharp secateurs. Any arisings (subsoil, stones, debris, wrapping material, canes, ties, temporary labelling, and rubbish or pruning material) are to be removed from site.

Handling of bare root plant material

The material is to be supplied and stored in co-extruded black and white polyethylene bags and temporarily stored in a frost free area pre-planting. At planting the material should be carefully bought to site but must not be removed from the bag until ready to be placed into a prepared hole and back filled immediately.

Hedge planting

Shrubs for hedges: Consistent in species, cultivar and clone to ensure a uniform hedge.

Planting: In trenches large enough to take full spread of roots. Set out plants evenly but ensure bare root material is handled in accordance with

Subsequent irrigation

First year (March-October) post planting: Ensure that full depth of top soil remains moist. Apply irrigation evenly to the site without damaging or displacing plants or soil, to ensure successful establishment and good plant health.

Failures

Plant replacements as original specification will be supplied and planted in the next available planting window or as agreed with the Landscape services.

11.7 Specimen Tree Planting

Key objectives & considerations:

- Early engagement with Landscape Services is required to ensure suitable species selection
- Present stock for inspection prior to planting
- Trees poorly handled or stored will be rejected
- Planting depth is critical any trees planted too deep will be rejected

11.7.1 References

BS 8545: 2014 - Trees: From nursery to independence in the landscape - The National Plant Specification - Handling and establishment.

11.7.2 Soil conditions before planting

Soil conditions should be moist & friable, **NOT waterlogged, frozen or snow covered**.

11.7.3 Climatic conditions

No planting to be carried out in extremes of temperature <3°c or > 24°c (without consultation with the Landscape Services and provision for irrigation). If the water supply is, or is likely to be, restricted by emergency legislation then planting should be suspended. Planting in periods of forecast high wind, especially in low or high temperature, must be avoided.

11.7.4 Times of year for planting

Container grown trees from late September- mid March (Optimum Late September-November)

Bare root deciduous trees: Mid October (as available) up to mid-March. (Optimum October-December) Container grown conifers and evergreen trees: September/ October or April/ May. Container grown trees and conifers can be planted at other times but only if adequate irrigation can be provided.

11.7.5 Tree quality

Tree stock to be in accordance with BS3936: Nursery Stock Part 1 Trees and Shrubs.

11.7.6 Supply of trees

The contractor will ensure that, upon delivery to site, trees will have the following attributes:

- Condition: Materially undamaged, sturdy, healthy and vigorous.
- Appearance: A clearly defined leader, a balanced branching framework subordinate to the central leader evenly spaced along the stem, defined stem taper.

- Budded or grafted plants: Bottom worked, free from the signs of graft incompatibility e.g. disproportionate growth of stock or scion, excessive sucker growth.
- Plant nutrition: Plant foliage is not showing any signs of chlorosis due to nutrient deficiency.
- Health: Free from pests, diseases, discoloration, weeds and physiological disorders.
- Plants: Centred and stable within containers.
- Root growth: Substantially filling containers and able to hold the compost together, but not root bound, and in a condition conducive to successful transplanting.
- Moisture: Root ball soaked to full depth of container no signs of drought stress or foliage scorch.
- Containers: Trees supplied are within light pots, or similar approved container, which stimulates fibrous root growth, with holes adequate for drainage when placed on any substrate commonly used under irrigation systems.
- Hardiness: Grown in a suitable environment and hardened off.
- Species: Labelled with full botanical name, true to type as specified, substitution only after approval from Landscape Services. The contactor is liable for all replacement costs if not true to type.
- Provenance: Country of origin known with appropriate EU plant passport if applicable.
- Contact Landscape Services for inspection of stock before planting begins. Material not considered to be in an appropriate condition or standard will not be accepted.
- Species: Labelled with full botanical name, true to type as specified, substitution only after approval from Landscape Services. The contactor is liable for all replacement costs if not true to type.
- Provenance: Country of origin known with appropriate EU plant passport if applicable.

Contact Landscape Services for inspection of stock before planning begins. Material not considered to be in an appropriate condition or standard will not be accepted.

11.7.7 Supply of root balled or bare root material

Only to be considered if containerised material not available, or, if small sized, e.g. whips or transplants are specified. Use to be agreed with Landscape Services .

Root balled material

Root balls are to be well filled with fibrous roots and cohesive natural soil, which has been carefully lifted with the plant and remains attached to the root system. Bare root plants which have been bagged with soil or containerised will not be accepted.

Bare root material

To be supplied in co-extruded black and white polyethylene bags tied and bundled in groups appropriate to the size and material. A high proportion of fibrous roots should be evident.

11.8 TREES IN HARD LANDSCAPE

In a Hard Landscape situation the required soil volume/root growing environment for trees will be provided through the use of underground load bearing root zone technology.

These broadly fall into three Categories:

- Structural growing media (exclusive of tree sand /Amsterdam tree soil)
- Crate systems/cell systems e.g. SilvaCells, Root Space, Stratacells etc
- Raft System

For more information- these techniques are extensively reviewed in the free download document Trees in Hard Landscape: a Guide for Delivery by TDAG – http://www.tdag.org.uk/trees-in-hard-landscapes.html

Sand-based substrates (also referred to as tree soil/ Amsterdam tree soil) are not accepted for the following reasons. These soils are not conducive to root growth. High levels of compaction are required and low levels of organic matter present (with the subsequent need for regular soil management). There are risks from over compaction and requirements for automatic irrigation due to low water holding characteristics.

Medium- sized aggregate and the stone skeleton substrates typically only have 1025% void space to support root growth (and to possibly accommodate surface water runoff). Designers should therefore take care to ensure that each tree has sufficient volume of growing medium for its lifespan. Growth is limited by the net soil volume rather than the total volume of the soil/stone mix. (Ref: BS 8545:2014 British Standard- Trees from nursery to independence in the landscape)

Trees are sensitive to pH (acidity and alkalinity) and pH can significantly affect the life and health of a trees and its ability to absorb nutrients. When using structural growing media the pH of the aggregate therefore must be carefully considered.

Geotextiles to surround the cell installation will not be supported if the membrane is a barrier to root growth beyond the planting pit thereby preventing trees exploiting adjacent native soil. This will adversely affect long term survival.

Whatever the under-pavement system that is adopted, some means for air and moisture to reach the Growing Media must be provided to sustain Soil Life and to maintain moisture levels. Below-ground irrigation and aeration systems such as Greenleaf ‘Root RainUrban’ should be installed in all hard surfaced areas. Irrigation system only for all other trees

Documentation on soil /root growing environment for tree planting must be submitted for approval prior to installation in accordance with BS 3882: 2015 (or current version) and the remaining with loosened subsoil in accordance with BS860: 2013(or current version).

Statutory undertaker’s equipment at design stage: Developers are encouraged to design tree planting and landscaping schemes in a manner which allows ease of access for future maintenance to underground services, such as gas and water pipes and electricity cables.

This is best achieved by not planting trees over or within 2 metres of statutory undertaker's equipment. Intelligent design and advanced planning should allow for trees to be positioned in the optimum locations, whilst also minimising future disruption for utilities contractors and allowing any future maintenance works to be undertaken in accordance with BS 5837 and National Joint Utilities Group guidelines.

Drainage: too little water shortens both the lifespan and growth of the tree but too much water creates anaerobic conditions (no oxygen) that are lethal to roots. The tree-growing environment therefore needs to facilitate water infiltration and retention as well as drainage.

It is a prime requirement of any tree planting situation that planting pits do not hold water and become waterlogged. In new construction the minimum requirement is a layer of stone consisting of 200mm deep of clean aggregate 50mm nominal size in the base of the pit topped with a geotextile blanket, to reduce contamination of the drainage layer by fines. This will allow surplus water to drain freely from the rooting zone.

Directing surface water run-off into Rooting Zones where possible, try to direct a little surface water run-off into Rooting Zones. This helps keep the Growing Media within them charged with moisture and can help ventilate soil. However, it must be done with caution to avoid the Growing Media becoming saturated. For this reason, for basic designs Rooting Zones may not receive input from a total surface area greater than 1.5 times that of the overall permeable surface area over them - and only then from footway surfaces (not carriageways). In addition, that input must be distributed evenly across the Rooting Zone.

Full hydraulic and water quality design calculations must be undertaken for larger input volumes. Notwithstanding the ability to direct water from surrounding pavements to Rooting Zones, permeable or semi-permeable surfacing must be provided over a minimum of 70% of the top area of each Rooting Zone in new streets and parking spaces. Surfaces must be set to falls so that run-off will drain positively to a gully if infiltration fails.

11.8 Tree Planting Pits

11.8.1 Hard landscaped areas

Planting pits within hard landscaped areas need to be designed after evaluation of the site conditions. The pit must be of sufficient volume to ensure successful establishment through to maturity. The final tree pit design should be agreed with the Landscape Services.

11.8.2 Soft landscaped areas

The majority of tree planting takes place within the parkland setting of the University, in areas of lawn, grassland or soft landscaping plantings and therefore a more generic approach to planting pits can be taken.

11.8.3 Excavation of planting pit

To be carried out by hand. The top and sub-soils are to be kept separate. Place excavated material on boards or sheeting to protect the surrounding grass if necessary. The pit width should be determined by measuring the container or root ball width, ensuring that the pit

width is wide enough to provide a minimum 100mm clearance around the root ball. The pit depth should be determined by measuring the height of the container or root ball to ensure that the trees root flare will be clearly visible on the soil surface when placed in the pit. The base of the pit should not be disturbed unless there are specific problems of poor drainage or soil smearing resulting from pit construction; in this situation the pit sides should be scarified using hand tools.

11.9 Planting

11.9.1 Placement within planting pit

The trees root system should be wetted prior to planting. The tree should be positioned in the planting pit ensuring the best side is to the front, where appropriate. Any damaged branches should be removed using sharp secateurs to an appropriate pruning point before placing the tree in the pit. The root flair or root transition must be level with the host soil or surface. It may be necessary to expose the root flare by carefully removing the surface compost and fibrous roots if the tree has been put too deep in the container when in the nursery. When the tree is correctly positioned remove the container or other root wrappings.

11.9.2 Backfilling

Backfill with sub-soil first (if necessary) in order to match the soil profile that surrounds the pit; the topsoil must not exceed 300mm in depth on completion. Back fill should be added gradually in layers of no more than 150mm, firming gently to eliminate air pockets. Do not excessively compact.

During backfilling, ensure the tree remains straight. The final 100mm layer should not be consolidated but should be of sufficient depth to allow for settlement and mulch. Immediately after planting, the tree pit should be saturated to field capacity. Should the turf surrounding a tree pit become compacted during planting operations this should be relieved using a garden fork to penetrate the ground to a depth of 200mm.

11.10 Tree furniture and staking

11.10.1 Support systems

Support systems should be installed at planting stage, ensuring stakes are not driven through root balls or irrigation tubes. Double staked, equally spaced and upright. Damaged stakes should be cut cleanly at the same height. Flexible ties should be used with spacers to ensure that the tree does not make contact with the stake. The tree should be tied at approximately one third of the trees height and removed within 24months of planting.

11.10.2 Irrigation tubes

Such as Green Leaf Root Rain Urban or similar products approved by the HOGM should be installed in accordance with the manufacturer's specification. The irrigation tube should be placed in the prepared planting pit surrounding the entire root ball prior to backfilling.

11.10.3 Tree mulching

Suitable materials

Composted bark as described in section 5.2.5 should be used for tree mulching. Alternative materials to be approved, by the Landscape Services prior to use and sample provided.

Mulching

Carefully spread mulch to depth of 75mm over the planting pit area (to a minimum 500mm diameter from tree base) ensuring that the mulch does not make contact with the tree stem. After applying mulch ensure it is clear 100mm diameter (hand width) from the tree stem. Do not use hand tools. Ensure irrigation tubes are not buried with mulch material.

Finishing

Ensure all arisings from tree planting operations are removed from site.

Failures

Tree replacements as original specification will be supplied and planted in the next available planting window or as agreed with the Landscape services.

11.11 Woodland whip or transplant planting

Key objectives & considerations:

Early engagement with Landscape services required to ensure suitable species selection:

- New planting should not negatively impact on existing trees especially veterans
- Trees poorly handled are likely to be dead before planting

11.11.1 Tree stock

Tree stock to be within accordance with BS3936: Nursery Stock Part 1 trees and shrubs with fibrous root system evident.

11.11.2 Soil Conditions before planting

Soil conditions should be moist & friable, NOT waterlogged, frozen or snow covered.

11.11.3 Spacing

Approximately 2m in either direction, or as specified. Positioned in straight lines edges of planting to be irregular to produce scalloped edges to maximise habitat value.

11.11.4 Site preparation

Surface vegetation clearance: Clear an area one metre diameter around each planting station.

11.11.5 Planting hole

Excavate by hand. The hole should be large enough to easily accommodate the root system. Consult with Landscape Services with alternative proposals if soil conditions are appropriate e.g. Mechanical auger.

11.11.6 Planting

Ensure tree roots are moist and remain in the planting bag at all times until placed in the hole and immediately back filled. Position tree in hole and “cut” the surrounding soil using a spade. Back fill the excavated material. The root flair or root transition must be level with the host soil after backfilling and gently consolidating.

11.11.7 Mulching

Composted bark, as section 5.2.5 Alternative materials must be approved, by the Landscape Services prior to use and a sample provided. Carefully spread mulch to depth of 75mm over the planting area or a minimum 500mm diameter from tree base ensuring mulch does not make contact with the tree stem. After applying mulch clear 100mm diameter (hand width) from the tree stem by hand do not use hand tools.

11.11.8 Tree shelters, spirals or mesh cages

Preferred product Tubex shrub tube 75 cm 130-160mm diameter secured with single wooden stake 90cm 32mm² Submit proposals to Landscape Services for alternative products round shelters only will be considered. Carefully positioned over mulched transplant ensuring branches are not damaged secure shelter with two cable ties to driven wooden stake. Stake to support full length of shelter but below shelter lip. Shelter to be upright and undistorted.

11.11.9 Failures

Tree replacements as original specification will be supplied and planted in the next available planting window or as agreed with the Landscape Services.

11.12 Maintenance

Key objectives & considerations:

- Maintenance to be carried out in accordance with Landscape Services specification relevant to the project area (To be supplied to Landscape Services) and the general notes below
- Regular maintenance visits to achieve the specification are required

Duration:

Carry out the operations until the end of the rectification/maintenance period (typically one calendar year from completion of all landscaping operations) or until handover.

Failures of planting and rectifications:

Defects are defined as materials or workmanship which are not in accordance with the contract resulting in plants/ trees/ shrubs that fail to thrive. This specification excludes damage from theft or malicious damage after completion.

Replacements:

Should match the size of adjacent or nearby plants of same species or match original specification, whichever is the greater. Timing of making good: next suitable planting season or by agreement with the Landscape Services

11.13 Signage, Lighting, CCTV and other Street Furniture

Key objectives & considerations:

- Items to be positioned to avoid maintenance problems
- Street furniture to be placed within a hard landscaping detail in lawn areas
- Accessibility and the contents of BS8300, must be taken into account in design and specification

11.13.1 Planning

Signage, CCTV, lighting and street furniture proposals to be agreed with Landscape Services , before orders are placed, to ensure positions do not restrict maintenance. Tree root protection areas are to be avoided.

11.13.2 Positioning

The creation of “dead areas” inaccessible to machinery which require hand mowing must be avoided or a hard landscaping solution must be provided by the project. Signage, lighting and other street furniture must not block sight lines or be positioned within areas of soft landscaping which will require continual pruning.

11.13.3 Street lighting

Street lights must not be positioned within the canopies of existing trees with cable runs planned to avoid tree RPA's. New tree planting should not share the same space as street lighting. Hinged street lights should not be positioned so they hinge towards new plantings or developing trees.

11.13.4 CCTV

CCTV must not be positioned within the canopies of existing trees with cable runs planned to avoid tree RPA's. New tree planting should not share the same space as CCTV.

11.13.5 Installation within turf areas

Signage and other street furniture to have hard surface below. The surface to be of bespoke design to ensure minimum 300mm clearance around obstruction and 25mm below turf level. Mowing equipment to be able to pass by and over the obstruction. A solid non jointed kerbed surface, appropriate to the surrounding area, to be agreed with Landscape Services Suggested material Resin bonded gravel.

11.14 Hard landscaping around car parks, buildings and fixed structures

11.14.1 Car parking spaces:

Car parking spaces to include an 800mm over hang from the kerb this area to have a hard landscaping detail with soft landscaping beyond where appropriate. It is recommended to reduce the parking space length by the 800mm of the overhang. Space must be provided for drivers to exit their cars on ends of rows and therefore no planting and a hard landscaping detail must be provided.

11.14.2 Grasscrete type cellular grass growing systems:

Submit details of system for approval by Landscape services details to include: installation method statement, maintenance, on site protection proposals until establishment. Where the system allows it is to be installed ready filled with growing grass. Where filled on site representative sample of materials to Landscape Services and notification at each stage of installation.

11.15 Swales ditches and other open drainage schemes

11.15.1 Design:

Supply design, management objectives and maintenance requirement to Landscape Services for assessment. Ensure maintenance is possible by mechanical cutting and does not restrict the access of existing landscape. Give notice to Landscape Services when earth works are complete.

11.15.2 Seed bed preparation:

The surface should be lightly and uniformly raked to produce a friable tilth. All surface stones 20mm+ (in any dimension) should be removed from site.

11.15.3 Sowing Dates:

Preferred August September or April May immediately after seed bed preparation to minimise erosion and capping.

11.15.4 Sowing rates:

In accordance with suppliers recommendations.

11.15.5 First year maintenance:

If growth exceeds 100mm cut at 75mm with flail or rotary mower and remove arisings repeat if sward height exceeds 200mm. Carry out weed control of pernicious weeds such as Nettles (Urtica sp.) and Doc leaves (Rumex sp.)

11.15.6 Hand over:

Continuous ground cover, as specified at design, to be established. Suitably qualified person to carry out species count over 10 randomly placed transects (Per 100 m²) with species count report to Landscape Services if appropriate. Where the species present does not match the specified mix or insufficient areas of ground cover contractor to carry out over planting using plug plants of the defective species.

12 Landscape Features

The specification of green roofs and living walls must be considered very carefully given the potential for ongoing issues with leaks and regular maintenance, as well as issues with irrigation, fire and ongoing maintenance costs, please reference Fabric Guideline 12 – section 2.32.

The specification of these types of Landscape Features must form part of a consultation with Landscape Services and Building Services and in some instances may not be acceptable.

In the UK there are two types of extensive green roofs:

- Mat based systems – have very shallow soils, typically between 20-40mm, are pre-grown to provide 100 per cent instant cover and generally consist of Sedum species. However, a number of suppliers are now pre-seeding their mats with a wider selection of hardy plants. The shallow substrates of mat based systems retain less rainfall and have less thermal mass. They are also restricted in the advantages they deliver for biodiversity.
- Substrate based systems – are generally between 75mm and 150mm in depth, consisting of either a porous substrate or similar reused aggregates. In the UK such systems are generally planted with a variety of Sedum species, whether as plugs, cuttings or seeded, although on continental Europe it is more common to use species of wildflowers that are typical of dry meadow habitats. As substrate based systems are deeper than those that are mat based, they have potential to support a greater variety of species, hold significantly more rainfall, have a greater thermal mass and have greater evapotranspiration properties. A potential disadvantage is that they are heavier than mat based systems and take time to establish full vegetation cover, should that be required.

12.1 Living Walls

Living walls are those covered in some form of vegetation. Generally they are comprised of climbing plants of one kind or another, and are designed so as to support such vegetation. More radically, living walls are now being constructed that provide an additional structure into which vegetation can actually be planted.

Depending on the species used living walls can provide environmental benefit in the form of biodiversity, thermal insulation and cooling benefit to the building, and noise attenuation.

12.1.1 Benefits of Living Walls for Biodiversity

Plants on buildings can potentially provide a food source for invertebrates on which, in turn, other invertebrates and birds may feed. They also provide breeding and nesting habitat for invertebrates, birds (including the house sparrow, a London biodiversity action plan priority species) and possibly bats and are ideal for including artificial animal breeding structures such as nest boxes or bat roosting boxes. Careful choice of species and the orientation of the wall will increase the potential of a living wall to harbour other forms of wildlife.

For example, our native ivy (Hedera helix) is a valuable food source for innumerable invertebrates, which feed on its leaves, flowers and nectar, and it also, provides valuable over-wintering and hibernation habitat. In addition, a living wall can be part of an overall greening strategy linking ground level open space with street trees, watercourses and living roofs.

Other potential and related benefits include:

- greenhouse gas reduction – indirectly through reduced energy demand
- amenity space – roof gardens, etc.
- aesthetic – softening, greening and enhancing the cityscape
- well-being – restoring the link between humans and nature
- cost – extending the life of the roof membrane and reducing energy costs of the building
- noise attenuation – on airport flight paths, etc.
- electro-magnetic insulation – on buildings under or near high voltage electricity transmission lines
- food production – roof allotments
- Support for more compact urban form and related resource efficiency.

12.1.2 Maintenance for Living Walls and Green Roofs

Maintenance of a green roof will depend on the roof system and what is desired from it. Intensive and semi-intensive green roofs are in many ways a high-rise version of a garden, and therefore will require similar level of upkeep. This will include weeding, mowing, hedge trimming, fertilising and watering.

Semi-intensive wildflower meadows need an annual mow to maintain floristic diversity. However, it is possible for this to be a neglected aspect and there are a number of instances where such management has not been undertaken. This ‘lack’ of maintenance has had no impact on the building, but merely reduced the value of the meadows from an ecological point of view.

Extensive green roofs, which are generally not amenity spaces, need very low maintenance. A one to two year inspection will normally suffice to weed out unwanted plants, remove deep roots and, if necessary provide fertilisation. For the first year the installation team generally covers such work, after which it becomes the responsibility of the building owner or the building management team.

Contrary to common perception the use of a green roof can have a positive impact on maintenance in that intentional vegetation within the system keeps out unwanted vegetation that can harm the integrity of the building’s fabric. On grey roofs and other conventional green roof systems butterfly bush and other shrubs can become established and potentially cause problems.

Leaks on green roofs can be exceptionally difficult to locate, and very costly to rectify. Access for maintenance, with the use of MEWP’s or scaffold platforms (for living walls) and

the use of edge protection systems (for green roofs), must be carefully considered and consulted on with Landscape Services, Building Services and Estates H&S. The use of any form of anchor or cable based system to provide access to green roofs, is not acceptable.

The presence of a root barrier and competition from other plants can limit this significantly.

- Operational Maintenance Costs
- Training of University Staff
- Outright purchase

13 British Standards:

- BS 3936 – Trees, Shrubs, Turf etc.
- BS 3998 (1989) – Recommendations for Tree Works
- BS 4428 (1989) – Code of Practice for General Landscape Operations BS 5837 (1991) – Guide for Trees in Relation to Construction
- BS 5835:2012 Tree in relation to design, demolition and construction.
- National House-Building Council Standards – Ch.4.2 “Building near Trees” (Updated 1992) Building Research Digest 298: The influence of trees on house foundations in clay soils
- BS 3882:2015 Specification for topsoil,
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