

Landscaping and Biodiversity Guide

for New Developments





Landscaping and Biodiversity Guide

for New Developments

**This guide was developed by Clúid.
The All-Ireland Pollinator Plan has endorsed
the biodiversity actions.**



Clúid Greening Strategy:
**Building a Sustainable
Future Together**



Contents

About the guide	5
Introduction	6
Climate action and biodiversity	7
Social and health benefits of nature-friendly developments	8
Preplanning checklist	10
Design stage	12
Boundary treatment selections and their impact on biodiversity	17
Public infrastructure to protect and encourage biodiversity	26
Groundworks	27
Hard landscaping	30
Soft landscaping/plants	36
Amenities	46
Make apartment balconies and private gardens biodiversity-friendly	52
Aftercare programme for landscape works	55
Appendix	58

About the guide

The purpose of this guide is to provide developers, landscape designers, horticulturists and other relevant stakeholders with the necessary information required to design and plant public and communal open spaces in Clúid developments to protect and enhance biodiversity.

The publication is informed by best practice in terms of landscaping and biodiversity and is endorsed by the All-Ireland Pollinator Plan.

The residential sector can make an important contribution to reducing Ireland's climate impact. Clúid Housing is committed to implementing meaningful sustainability measures across our organisation; creating sustainable homes and communities for our residents, and playing our role in achieving Ireland's climate action targets. We want every Clúid resident to live in a low-carbon, affordable home; in a place that promotes positive wellbeing and sustainable living.

In 2021, Clúid launched its dedicated greening strategy, *Building a Sustainable Future Together*. The strategy sets out Clúid's path to providing a greener future for our residents and organisation, and is based around three key pillars: Build Green, Live Green, and Be Green. These pillars address our key environmental risks and opportunities, and the issues that matter most to our key stakeholders. Protecting and enhancing biodiversity in our developments is central to our greening strategy.

This guide will establish a set of agreed standards to be achieved by those involved in landscaping and biodiversity provision for Clúid. Design compliance with the agreed standards should ensure the delivery of quality external spaces that enhance not only peoples' lives but local biodiversity too.

For the purpose of creating an informative and useable guide for this sector, we have concentrated on a number of topics, such as pre-planning checklists, design stage actions, boundary design, groundworks and various planting guides to promote biodiversity.



Introduction

There is an emerging climate, ecological and public health crisis.

Urbanisation is identified as one of the key drivers of biodiversity loss. However, there are opportunities to enhance and protect biodiversity in new developments, while at the same time improving climate resilience and enriching the health and wellbeing of those who live there, by allowing them to connect with nature. Biodiversity is not an 'added extra' or an inconvenience, it is something that can add value to a development. Clúid is fully committed to promoting biodiversity on our existing schemes and it must be a core consideration for the design of new residential developments.

The purpose of this guide is to provide developers, landscape designers, horticulturists and other relevant stakeholders with the necessary information required to sustainably design and plant the public and communal open spaces in new developments. It is intended to improve and enhance the potential for biodiversity within new Clúid residential developments. However, we hope it will have a wider application as a best practice landscaping and biodiversity guide for any new residential or mixed use development.

The recommendations contained in this guide are rooted in the quality and safety standards for the landscape industry.

There are recommendations that go above and beyond the industry standards and these are referred to as 'Biodiversity gold standard' recommendations.

Some of the 'Biodiversity gold standards' are aspirational as the industry cannot yet cater for them easily. However, it is only by pushing the boundaries and creating demand that the industry can change to the greater benefit of the environment.

This guide is a supplement to Clúid's *Design Guide* and should be read in conjunction with it. It reaffirms certain elements of the *Design Guide*.



Climate action and biodiversity

Using green infrastructure to help us adapt to climate change is a ‘win-win’ approach; delivering multiple social, economic, and environmental benefits.

Green infrastructure helps build resilience to more extreme weather events. In heatwaves, it helps by providing evaporative cooling and shade.

It can help us cope with heavy rain by capturing rainwater, providing temporary or permanent water storage solutions, and by allowing surface water to percolate into the soil rather than overwhelm drainage systems and cause soil erosion.



Social and health benefits of nature-friendly developments

There is a growing body of evidence that access to greenspaces and enhanced biodiversity can have a positive impact on our physical and mental health.

Having access to green spaces with good biodiversity where you live can:

- ✓ Promote and encourage resident engagement and social cohesion.¹
- ✓ Create more peaceful neighbourhoods, improve people's mood and increase their motivation to higher levels of physical activity.²
- ✓ Improve people's health, wellbeing and happiness.^{3, 4}
- ✓ Encourage people to grow vegetables, fruit and herbs, thereby improving food security and helping to reduce food costs and waste.

Biodiversity-rich and functioning ecosystems can also help mitigate some adverse impacts of climate change, and act as a dynamic education tool for all generations.

There are various ways that people can be encouraged to further engage and interact with nature within the development. Examples include; providing engaging signage and information boards about nature in the development, creating a biodiversity walking trail for residents, planting community gardens, fruiting hedgerows, pocket orchards or herb beds in public amenity areas.

-
- 1 Jennings V, Bamkole O. (2019) The Relationship between Social Cohesion and Urban Green Space: An Avenue for Health Promotion. *International Journal of Environmental Research and Public Health*. 16(3):452
 - 2 Twohig-Bennett, C. (2018) The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. *Environmental Research*. 166: 628-637. 11
 - 3 Kondo, M.C., et al. (2018) Urban Green Space and Its Impact on Human Health. *International Journal of Environmental Research and Public Health*. 15: 445 12
 - 4 Mackerron, G. Mourato, S. (2013) Happiness is greater in natural environments. *Global Environmental Change* 23 (5) 992-1000



Preplanning checklist

✓ Habitat survey

Some developments will trigger a requirement for an Environmental Impact Assessment Report (EIAR). Even if the development does not require an EIAR, a thorough assessment should be made of the sites' existing habitats. This enables the design team to fully realise the potential to retain existing habitats and/or mitigate the impact on existing flora and fauna. Retrospective ecological surveys can slow down planning applications and cost money. Early consideration enables biodiversity adaptations to be included and costed from the start of the development.

✓ Invasive species

Prior to any construction facilitation works or site clearance, the area shall be surveyed by a suitably qualified professional to identify if any invasive or reportable species are present. Invasive species should be fully removed before any works begin on site, in compliance with the most current industry guidelines.

✓ Tree and hedgerow survey

A tree and hedgerow survey carried out by a qualified arboriculturist will allow for the accurate assessment of the potential of the existing hedgerows within the development. It will also enable detailed planning for augmenting retained vegetative structures. This should comply with BS 5837:2005 Trees in Relation to Construction Recommendations. Trees of 'A' or 'B' Category shall be retained.

✓ Root Protection Areas (RPA)

Identify the RPA of all hedgerows and trees to be retained on the tree survey drawing. For further information please refer to BS 5837: 2012 Trees in Relation to Design, Demolition and Construction.

✓ Full level survey

A level survey should identify the ground level at the base of existing hedgerows and trees. The ground level shall not be increased more than 50mm per year within the RPA or it risks the health and viability of the hedging shrubs and/or trees. The base level of any ditches should also be recorded to allow them to be assessed for the viability of their inclusion in the Sustainable Drainage Systems (SuDS).

✓ Sustainable Drainage System (SuDS)

Identify opportunities within the site for SuDS and potential incorporation into Green rather than Grey Infrastructure. SuDS proposals should form an integral element of the measures to promote biodiversity. Green Infrastructure can be cost effective in the longer term, deliver biodiversity benefits, and make the development more resilient to climate change.

✓ Local area and national biodiversity plans

These plans can be very informative and provide insight into national and local biodiversity objectives. Local Authority Biodiversity Action Plans must be consulted.

✓ **Full assessment of landscape features**

Features such as views, micro-climate, prevailing winds etc., should be fully assessed. The proposed layout for any scheme shall aim to mitigate any potential wind tunnels.

✓ **Existing built boundary structures**

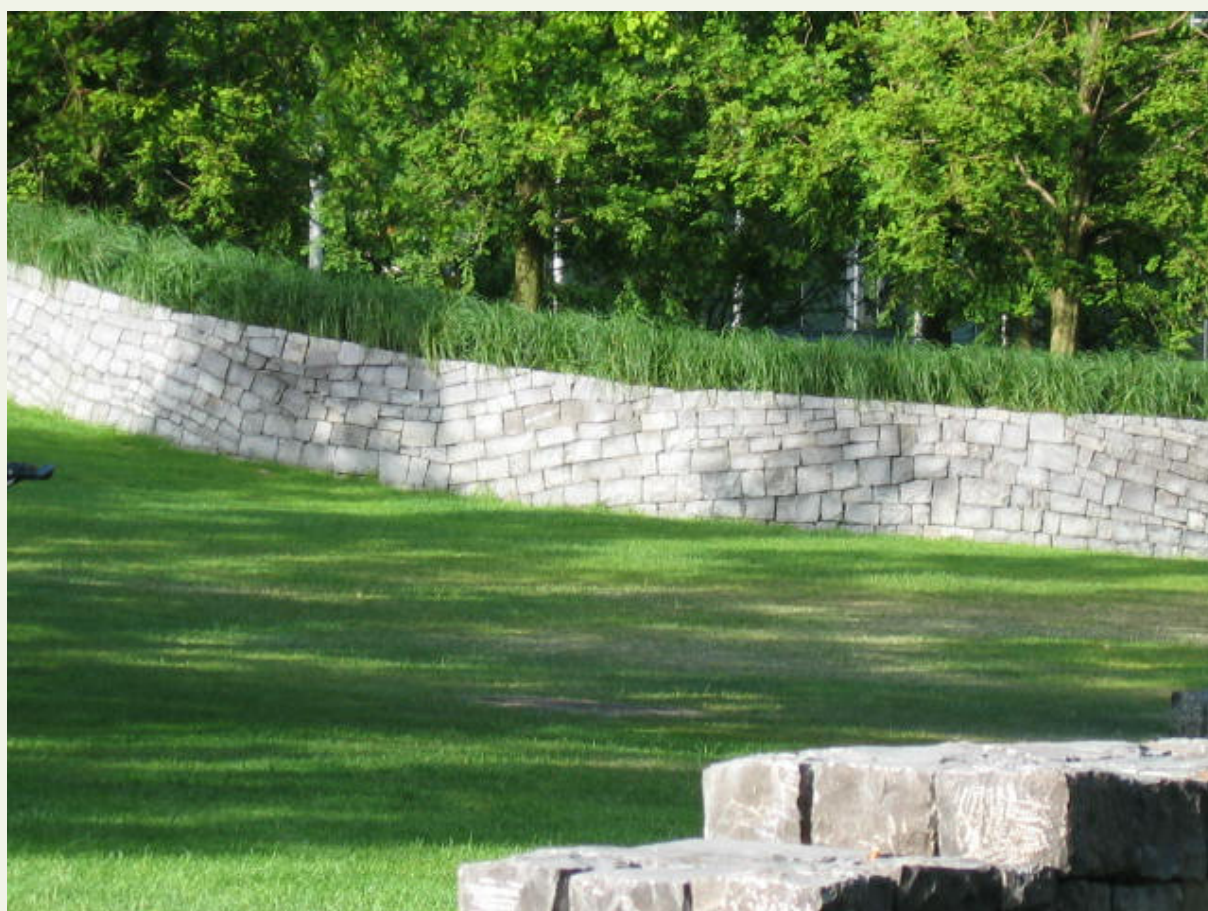
Wherever possible, existing drystone walls shall be retained. They provide a valuable habitat for insects, invertebrates and fauna. They may require restoration, but any repair works should avoid using mortar.

The retention of existing drystone walls will have to be examined on a case-by-case basis.

Existing drystone walls can be utilised in their entirety or breaks can be carefully created to facilitate pedestrian and cycle movement.

Retaining drystone walls can be utilised to create areas of elevated planting. Elevating planting beds increases the opportunity for sensory interaction with the planting.

The texture of natural stone is also a fantastic addition to a sensory space.



Drystone wall structures can be incorporated into the landscape design of public open spaces in imaginative ways to elevate planting. Image source: Jubilee Park, Canary Wharf by Jacques Wirtz.

Design stage

Taking considered actions at the design stage ensures that the retention and promotion of biodiversity are core to the proposed layout. The following actions shall be undertaken by the design team and shall inform the design.

Action 1 – Levels

- Drawings to detail the proposed levels to accommodate Sustainable Drainage Systems (SuDS), drainage, services and access.
- An assessment of the level requirements to connect into the foul and surface water drainage system will readily identify if it is viable to retain existing hedgerows and/or trees.

Action 2 – Layout proposals

- The layout should aim to incorporate as much existing hedgerow and/or trees as possible. The register of Tree Protection Orders (TPO) should be checked to ensure that any trees on site with a TPO are retained and protected.
- Existing hedgerows, where feasible, should be utilised in the creation of a green spine that will accommodate pedestrian and cycle traffic.
- Ideally, Public Open Space (POS) should be located along a green spine to allow for tree planting and/or whip planting that will benefit flora and fauna. Locating pedestrian and cycle routes along a green spine and through POS allows for a higher level of passive surveillance of green spaces.
- The entrance to the residential development should be highlighted by planting.
- The layout should be cognisant of any existing desire lines (including trespass) that have developed through the site. While

sometimes it will not be feasible, allowing pedestrian and cycle connections to the surrounding neighbourhood can improve access to local amenities.

- The layout should be cognisant of the future possibility of creating pedestrian and cycle links through adjacent lands zoned for development or amenity.
- The layout should aim to create planting beds at the base of dwellings. These beds shall contain planting that promotes biodiversity.
- A planted 'buffer zone' or 'privacy strip' shall be included to provide privacy to ground floor apartments and houses directly adjacent to public footpaths. The privacy strip for planting shall optimally be between 2.15m to 2.5m as detailed in the *Design Manual for Quality Housing – Department of Housing, Local Government and Heritage*.
- The building shall be protected from 'soil splash' by a 500mm wide gravel band or suitable surface that complements the construction of the development. This surface should be determined by the design team. The gravel shall be retained with a suitable edging.
- Strips of grass less than 1m wide and 5m long should be avoided.
- Thin unsustainable strips of planting between properties should be avoided. The preference is for larger planting areas. Housing layout and driveways should be designed to achieve this.

A planted area to the base of the buildings creates a buffer zone offering residents privacy from the street and footpath. This is an excellent method to provide privacy in high density schemes that cannot provide a front garden.



Marina Village, Greystones.
Image source: IS Design.



Private garden, Rochestown, Cork.
Image source: IS Design.



Creating larger but fewer planting beds increases the impact of decorative planting and provides a garden setting for properties. Larger areas of planting provide more foraging and nesting potential for wildlife. The beds should be planted with a low maintenance planting matrix.
Image source: Glenveagh Homes, Barnhall Meadows, Leixlip, Co. Kildare.

Action 3 – Level changes

- Where it is necessary to alter the existing levels of the site, every effort should be made to retain the existing levels within the Root Protection Area (RPA).
- A qualified arboriculturist shall advise on potential measures that will mitigate the impact of the alteration of levels on existing hedgerows and/or trees.
- Where level changes create a fall of 600mm or higher, a balustrade/protective barrier will be required.
- Retaining existing levels, to facilitate the incorporation of existing landscape features in the scheme, may create banks or slopes. All slopes must be a maximum of 1:4 gradient to facilitate mowing.
- In some instances, tree planting, bulb meadows or pictorial meadows should be considered on proposed banks to augment the wildlife corridor while adding value to Public Open Space (POS).
- Level changes required to provide access for fire tender vehicles in apartment blocks shall be calculated at planning stage to ensure that there is no conflict with landscape features to be retained.



Visualisation illustrating how existing hedgerows can be incorporated into green spines facilitating pedestrian footpaths and cycleways. The slope down to the hedge maintains the original level with the root protection zone and the ditch forms part of the SuDS proposals. An estate railing protects the public from the proposed fall which is greater than 600mm. Image source: Doran Cray Architects for Glenveagh Homes Ltd.



Visualisation illustrating how an existing hedge can be incorporated into the SuDS design, augmenting a riparian corridor. Image source: Doran Cray for Glenveagh Homes Ltd.

Action 4 – Sustainable Drainage Systems (SuDS)

- Some existing native hedgerows will invariably be along agricultural drains. These should be considered for incorporation into the SuDS design to maintain or establish a riparian corridor.

Action 5 – Potential for wildlife corridors and new connections

- Identify lesser secondary 'green routes' that could be connected to the main green spine with new native hedgerows.
- Ideally POS should be located along these 'green routes'.
- These routes should be planted with a native hedgerow mix (see appendix 1.1) that is suitable to the site conditions.

- These should be planted at 900–1200mm high and protected by temporary fencing to prevent them being degraded by pedestrian trespass until they establish.
- Aim for a total of 1km length of existing and new hedgerows per 2.5km² development.

Action 6 – Identify boundary types

- Identify the boundary types required within the development.
- Consider how the boundary types can be designed to promote biodiversity by providing shelter, connectivity, or food source. See section on boundary treatment/types on page 17 for more detailed information.

It is worth noting that at design stage you should plan for the following actions during construction.

Action 7 – Protection of existing native hedgerows and trees

- A tree survey identifying the spread, trunk girth, root protection zone and condition of each tree should be prepared by a qualified arboriculturist.
- Trees to be retained should be protected in accordance with BS Standard 5837:2012 Trees in Relation to Design, Demolition, and Construction – Recommendations.
- Identify on a plan where protective fencing for hedgerows and/or trees is to be located prior to the site being stripped of topsoil. No items may be stored within the RPA. No construction traffic may traverse the RPA.
- Identify any pruning works which should take place prior to works commencing on site to protect hedgerows or trees from damage. Pruning works shall take place when the trees are dormant (mid-November to mid-March).
- Accommodating changes in levels may require root pruning works. This should be carried out by a qualified tree surgeon.
- Create bee banks; where south or east facing natural soil banks occur, leave some areas bare of vegetation to create nesting opportunities for solitary bees.

Action 8 – Augmenting existing neglected hedgerows

- Aim to augment retained native hedgerows that have been neglected or are in decline. Gaps shall be planted with a native hedgerow mix (see appendix 1.1) that is suitable to the site conditions.
- These should be planted as whips in the planting season (mid-November to mid-March). Whips shall be a minimum of 900–1200mm high and protected by temporary fencing to prevent them being degraded by pedestrian trespass until they establish.
- Plan to carry out planting works as early as possible during the construction phase to allow them to mature before the public have access to the grounds. Any completed landscaping must be maintained until practical completion and handover.

Boundary treatment selections and their impact on biodiversity

Boundary treatments within new developments are often determined by the Local Authority's development plan.

Boundaries such as hedgerows, walls and verges should be designed to form connective corridors to maximise their value to biodiversity. This means that, as well as providing food and shelter, they provide connectivity through a development by creating corridors to the surrounding landscape, along which wildlife can travel safely.

When it comes to boundaries, the most valuable are hedgerows. Existing hedgerows should always be the bedrock upon which new ecological corridors are created through additional planting.

Boundary treatments/types

The following are examples of typical boundary treatments found in residential developments:

- Concrete block wall with capping
- Stone-faced concrete block walls with capping
- Shuttered concrete walls
- Plinth walls with railing
- Concrete post and timber panel fence
- Estate railings
- Security fencing
- Hedging
- Native hedgerows
- Boundaries and defensible planting
- Boundaries and wall shrubs

The list above can provide, or can be adapted to provide, nesting and foraging opportunities for native flora, fauna, insects, and invertebrates.

The potential biodiversity benefits of each boundary treatment/type are examined on the following pages.



Concrete block wall with capping

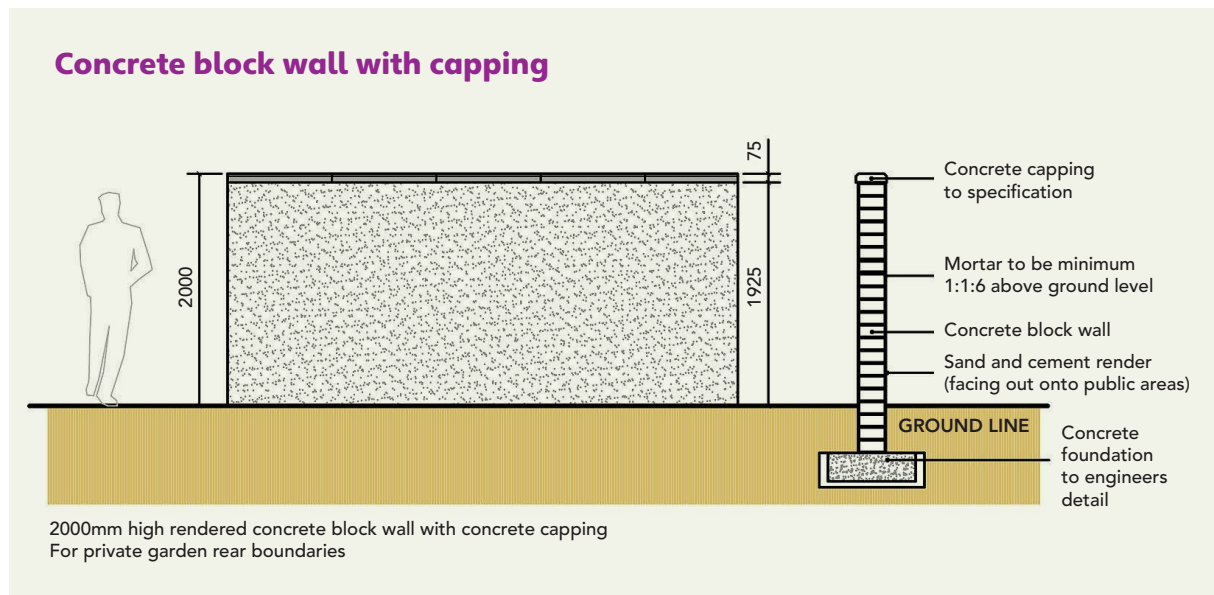
Concrete block walls offer little benefit to wildlife without supplementary soft landscaping or adaptation. However, they are a requirement at planning stage for boundaries that abut public space or form the rear boundaries of private gardens.

Recommended design measures

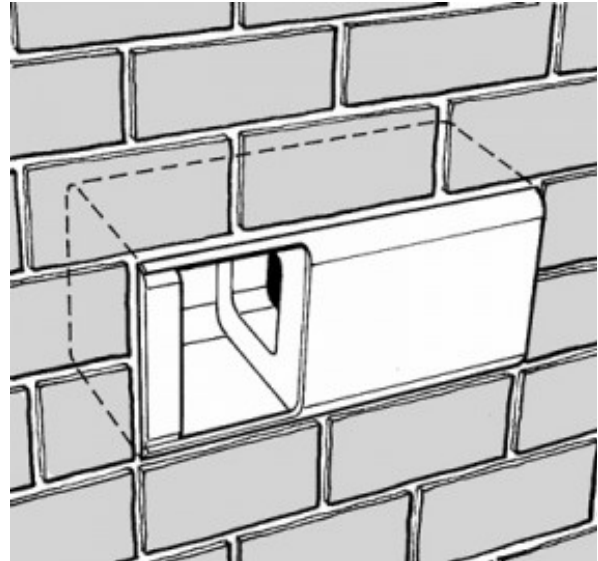
- Soft landscaping or planting against concrete block walls can create a rich habitat for invertebrates, arachnids, and birds. Plants selected for public areas must not pose high risk to individuals to limit liability.
- Plant wall shrubs 150mm out from the base and lean the plant back in towards the wall to ensure that the roots of the plant are beyond the rain shadow of the wall.
- Plant wall shrubs at 2m apart to ensure coverage.

- Selection of wall shrubs depends on aspect and soil conditions. Species should be selected for their ability to remain tight to a wall without intervention. Refer to appendix 1.3 for list of recommended wall shrubs.
- Concrete block walls could also incorporate nesting blocks and provide opportunities for installing nesting boxes. Nesting blocks shall be selected for species that nest at a lower height above ground as boundary walls do not normally exceed 2.4m in height. Ensure that suitable nesting is provided for species identified in the Local Authority's Biodiversity Action Plan.

Note: Nesting boxes shall be installed in combination with appropriate vegetative cover; for example, climbing shrubs and hedging.



Detail of concrete block wall with capping. Image source: IS Design.



Bird Nest, Brick Box HE1 from Schwegler. This model is primarily aimed at robins and wagtails; species that will nest at a lower level once there is vegetative cover. HE1 excludes corvid birds, cats and pine martens. Different models are available for different bird species. Image source: Schwegler.

Stone-faced concrete block walls with capping

This style of wall would often be an ashlar stone finish with jointing. New drystone walls are prohibitively expensive and are often a liability concern in a housing development.

- Bird nesting blocks, as described previously, could also be included in this type of boundary treatment.
- Climbing plants are usually not used in the treatment of this type of boundary as they would obscure the stone facing.

Recommended design measures

- The joints could be raked out to create more potential for invertebrates, but they could best be utilised by including bee blocks for cavity-nesting solitary bee species.
- Bee blocks are usually constructed from clay as it retains heat. East-facing walls are ideal for bee blocks.
- The blocks shall be placed high (1.8m and above) in the wall to prevent conflict with people, preferably under the capping.
- Bee blocks shall not be included in the boundary walls of private houses.



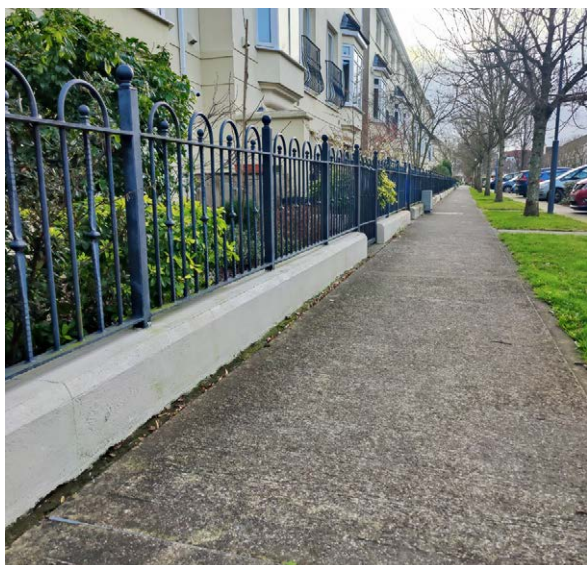
Bee blocks or bricks are a simple but effective addition to boundary walls to provide nesting for solitary bees. Image source: Green & Blue.

Shuttered concrete walls

Shuttered concrete walls are often a cost-effective method to construct a boundary wall. However, they have a very functional appearance and are often too industrial in appearance for a residential development. The appearance cannot be mitigated with self-clinging climbers as they cannot adhere to the smooth surface. A north-facing shuttered concrete wall will quickly turn green and unsightly.

Recommended design measures

- Shuttered concrete walls are not a preferred wall type and shall only be considered if the wall is textured, by using a patterned mould mat. The pattern of the mats should be agreed with the contracts manager after viewing a sample section.
- Shuttered concrete walls shall only be used if it is possible to grow a native hedgerow along its entire length and up to and beyond the walls completed height.
- Durable bird houses/nesting boxes must be securely installed along the length of any shuttered concrete wall that bounds public open space. The hedging planted in front of the wall shall provide the necessary cover for birds to enter and leave nesting boxes.



Plinth walls with railings

While these do not allow for nesting or habitat creation, they do allow for the movement of smaller fauna. The plinth wall also negates the need for strimming or spraying grass along the base of the railing as part of the regular maintenance regime.

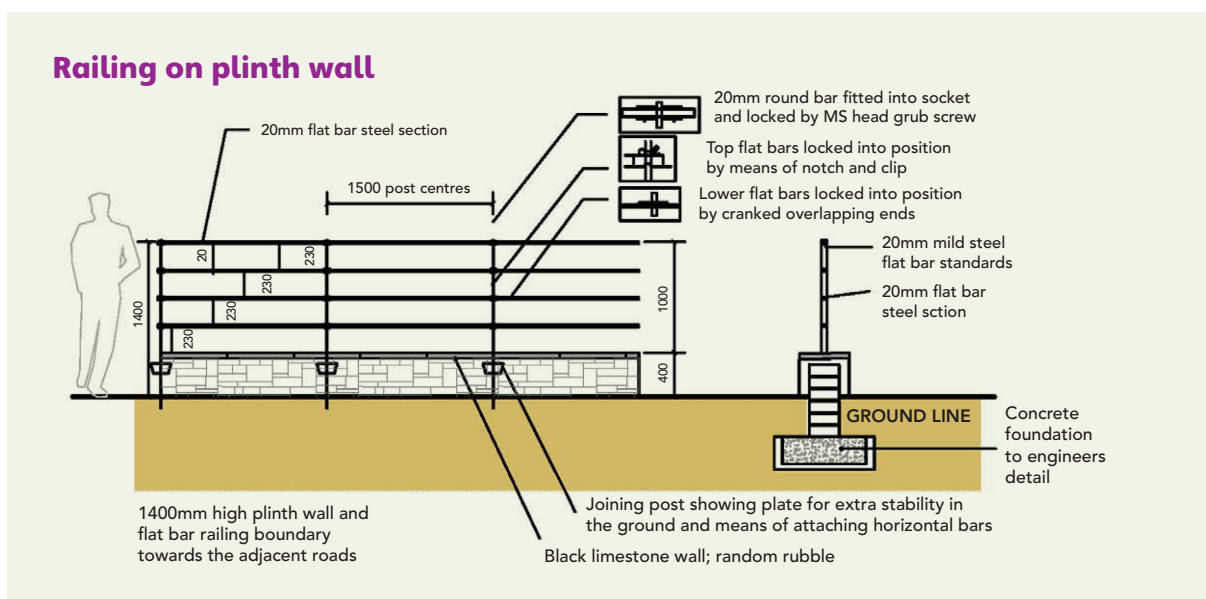
Recommended design measures

- Plinth walls with railings shall be considered where public space/footpaths meet front gardens and a secure boundary is a requirement.
- Plinth walls with railings shall be considered where passive surveillance of the area beyond the curtilage of the dwelling is required.
- This boundary type with a secure gate shall be considered where the front garden is in close proximity to a public road and the car is not parked with the curtilage of the property.
- This boundary type shall be considered where a secure boundary is required for communal open space associated with apartment or duplex units.



■ Example of a bow-topped railing on a plinth wall. Image source: O'Flynn Construction.

Railing on plinth wall



Detail of railing on a plinth wall. Image source: IS Design.

Concrete post and timber panel fence

Concrete post and timber panel fencing prevents wildlife corridors from developing through the rear gardens in housing schemes. Mounting research is proving that the domestic garden has huge potential to offer a refuge to declining native species and enhance local biodiversity.

Recommended design measures

- Concrete gravel boards should include provision for a hedgehog highway. Hedgehog highways are a simple but effective measure to allow small fauna, such as hedgehogs,

to move with ease through a development. These create safe alternative or supplementary routes to the main wildlife corridor that is retained or established in any new residential development. Openings should be a minimum of 130mm high and 110mm wide.

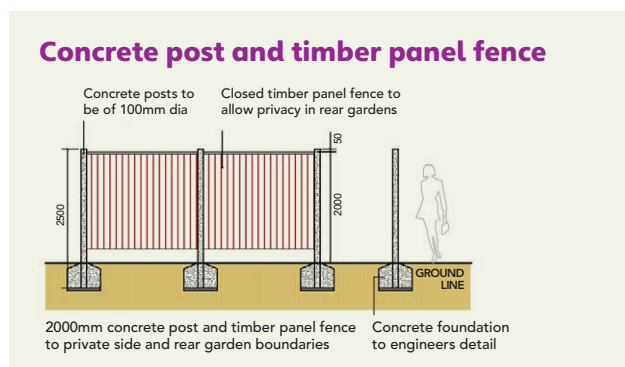
Note: This may not be achievable on all schemes and its viability shall be examined on a 'scheme-by-scheme' basis.

- Include signage to explain the purpose of the gap in the boundary treatment. A growing number of developers and nature groups are creating signage to go over these 'doors' to educate and engage the public.



Concrete post and hit and miss timber panel fence. Image source: Abwood.

Concrete post and timber panel fence



Detail of concrete post and timber panel fence. Image source: IS Design.



Hedgehog highway sign from the Hedgehog Street Campaign UK.
Image source: Joanne Davenport.



Hedgehog in Irish suburban garden.
Image source: Ingrid Swan.

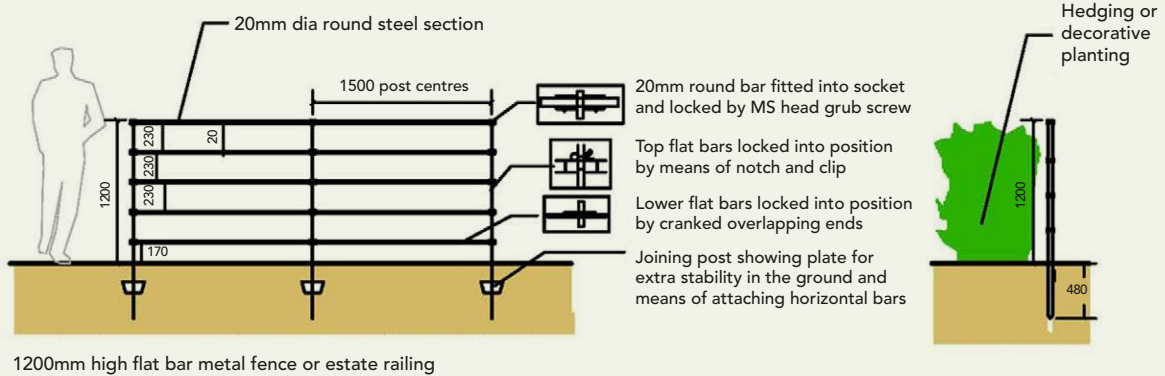
Estate railings

Low railings are an excellent option for front gardens as they allow the free movement of fauna while clearly defining a boundary.



Where space is available, estate railings should be reinforced with durable native hedgerow species (see appendix 1.1 for native hedgerow species mixes). Image source: Irish Fencing.

Railing



Detail of estate railing. Image source: IS Design.

Security fencing

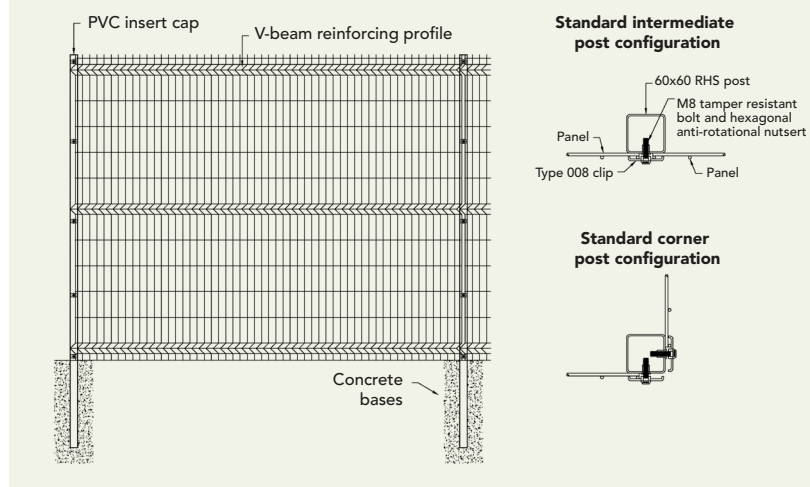
High railing fences, palisade fencing, or Ibx fencing are often used to secure a boundary between developments along the edges of public open spaces. Secure railing may be included to protect ancillary structures and services. Any treatment of these fences should be agreed with the utility or service provider, e.g. ESB or Irish Water.

- Hedging shall be planted in a double staggered row.
- Hedging species shall be suited to the local climatic conditions.
- Ibx fencing excludes more fauna and, therefore, is an undesirable option. However, if reinforced by hedging it could extend a wildlife corridor. Refer to appendix 1.1. for plant list.

Recommended design measure

- Where space is available, security fencing should be reinforced with hedgerow planting.
- Hedging whips planted in association with Ibx fencing shall be a minimum 1200–1500mm high.

Ibx fencing



A detail of Ibx fencing. Image source: IS Design.

Hedging

Hedgerows are introduced vegetative structures in the landscape. Our flora and fauna have learned to utilise these structures for their own benefit.

They offer protection, food and connectivity. They also offer opportunities to create habitat for flora which thrive in woodland edge conditions.

Recommended design measures

- Existing hedgerows can rarely form a boundary treatment in a new development. Existing hedgerows should be incorporated into public open spaces and green spines within the development to retain existing wildlife corridors. This will allow them to continue offering food and shelter for fauna while providing connectivity to the surrounding landscape. Wildlife corridors are essential to allow fauna to travel safely within their territory.
- Hedgerows should be connected to elongate the corridor as much as possible.
- At the earliest stage of the project, the hedgerows should be identified for retention and incorporated into the green spines for pedestrian and cycle access, and public open spaces.
- New hedgerows shall create potential for further wildlife corridors feeding into the main central green spine.
- Hedgerows shall also be mature enough and durable to withstand children playing and general wear and tear. Where it is anticipated that trespass will affect establishment, a temporary post and wire fence shall be installed.

Requirements for shrubs in limited space

- A minimum of 600mm of topsoil over subsoil
- A minimum of 1000mm wide trench
- Hedging shrubs shall be a minimum 600–900mm high.
- Where they are planted against a building, a minimum distance of 500mm from the wall and the edge of the hedging trench is required. A rain shadow will deprive the area next to the building of water, and building maintenance will have the potential of significantly damaging the hedge without the provision of a 500mm wide access area.

Native hedgerows

- When specifying native hedgerow mixes, it is important to examine the soil and climatic conditions on site.
- Hedging shrubs require a minimum depth of 600mm of topsoil over subsoil.
- Hedging shrubs will require a minimum planting bed width of 1000mm.
- A maintained native hedgerow will attain a minimum width of 1000mm.
- The edge of a proposed hedge should be planned to be located a minimum of 500mm from the wall of a house and 150mm from a garden or boundary wall to ensure that it is not in the rain shadow of a wall.
- Native hedgerow mixes are planted in double, staggered rows at 450mm apart each way.
- Species shall be randomly mixed throughout the length of the hedgerow. This will ensure the establishment of a robust hedgerow that can withstand human trespass when established. Please refer to appendix 1.1.

The standard native hedgerow mix used for stock-proof hedges in agricultural landscapes can be seen in appendix 1.1A.

In areas with heavy clay soil and poor drainage, the above hedge mix could be planted on a raised berm to improve drainage. Alternatively, you could plant the hedgerow mix as per appendix 1.1.B.

In a harsh coastal climate, it is necessary to expand the selection to naturalised species that benefit pollinators. See appendix 1.1.C for hedgerow mix tolerant of coastal locations.

Recommended design measure

Planting needs time to establish to make it an effective barrier. It may be necessary to include a temporary post and wire fence to protect the defensive planting while it establishes.

Boundaries and defensive planting

Boundaries can be protected from trespass with defensible planting. Defensible planting species have a dense natural habit and/or are thorny. Defensible planting should be planted in staggered rows at 450mm apart each way.

Dense, defensive planting provides excellent nesting potential for birds and mammals. Flowering and fruiting shrubs have the added benefit of providing foraging for insects and wildlife.

Recommended design measure

Planting needs time to establish to make it an effective barrier. It may be necessary to include a temporary post and wire fence to protect the defensive planting while it establishes.

See appendix 1.2 for list of appropriate species.

Boundaries and wall shrubs

Wall shrubs offer a number of benefits to wildlife but they also help to reduce wall maintenance and dissuade individuals from climbing a wall. Wall shrubs should be planted 150mm out from the base of the wall to ensure that the root system is beyond the rain shadow of the wall.

The aspect of the walls should be taken into consideration when selecting plant species.

Recommended design measures

- Consider planting wall shrubs along the length of walls that will otherwise require regular painting.
- Defensive wall shrubs should be considered where private gardens abut public open space or there is a perceived risk of people attempting to climb walls.
- Wall shrubs offer good cover for birds and bees who have utilised the bird or bee blocks.

Examples of suitable wall shrubs for north/east facing walls can be seen in appendix 1.3.A.

Examples of south/west facing walls can be seen in appendix 1.3.B.



Public infrastructure to protect and encourage biodiversity

Public infrastructure can be considered or incorporated into the landscape infrastructure to protect and encourage biodiversity.

Landscape Infrastructure consists of:

Groundworks

- Topsoil
- Retaining structures
- Green roof systems

Hard landscaping

- Pavements
- Gradient/falls
- Drainage
- Sustainable Drainage Systems (SuDS)
- Bioswales
- Boundary treatments/types
- Raised beds and planters

Soft landscaping/plants

- Trees
- Pictorial meadows
- Bulb meadows/drifts
- Community orchards
- Stable plant groups
- Irrigation
- Grass seeding/turfing
- Landscape fabrics/weed matting
- Mulches

Amenities

- Lighting
- Seats and benches
- Bollards
- Signage
- Litter bins and recycling units
- Bins stores, bicycle shelters and canopies
- Water butts/ rainwater storage
- Bird boxes
- Bat boxes
- Owl boxes



Ground works

Groundworks and the treatment of soil has a defining impact on the site's ecology and biodiversity. Landscape design proposals should make every effort to use all stripped soil within the site. This may necessitate the creation of mounds within public open space. Mounds shall be natural in appearance, an engineered appearance is undesirable. Mounding proposals in public open space should be incorporated into natural play areas.

Slopes should be no greater than 1:4 to ensure that they can be accessed safely by machinery.

Topsoil

Topsoil is a valuable commodity with a monetary value. It costs money to strip, store, remove, import and spread topsoil. Ensuring the topsoil is not compacted and is of good quality provides the foundation for a successful landscape scheme.

The site shall be assessed by a qualified horticulturalist prior to the stripping of soil to identify any invasive species. If required, an approved invasive species treatment strategy shall be established and implemented prior to stripping soil.

Stripping and storage

- The stripping and storing of topsoil shall be in accordance with BS Standard 3882: 2017 Specification for Topsoil.
- Soil shall not be stripped within the Root Protection Area (RPA) of trees and hedgerows to be retained.
- Subsoil and topsoil shall not be stripped after or during heavy rain.
- Machinery should be selected and routed to minimise compaction.
- Topsoil of varying characteristics shall be stored separately.
- Double handling of topsoil should be avoided.
- Stockpiles shall be contoured to allow surface water run-off.
- In the instance that soil is to be stored for longer than six months, stockpile heaps should be low and narrow to ensure that the core material is within 1m of the surface.
- Where topsoil and subsoil is to be stored for six months or more, stockpile heaps shall be grass seeded. This prevents erosion and ensures that nutrients and nitrogen are not leached from the soil.



Biodiversity gold standard

Store topsoil from good quality biodiversity rich habitats, such as species-rich grassland, separately. Re-use topsoil from these grasslands with moderate to good species richness to create new areas of meadow within the development. Even moderate quality grasslands can be diversified over time through good management – this can be achieved by maintaining these areas as short flowering (cut once a month) or tall flowering meadows (cut once a year).

Topsoil from poor quality biodiversity habitats, such as improved agricultural grassland, should be used for gardens.

Spreading

- Spreading of soil shall be carried out in accordance with BS Standard 3882: 2017 Specification for Topsoil.
- Subsoil shall not be spread over hardcore/ Clause 804. This will result in the rejection of soft landscape works.
- Spreading of subsoil and topsoil shall not take place after or during heavy rain.
- Machinery shall be selected and routed to minimise compaction.
- Subsoil shall be spread and levelled before the topsoil so that an even depth of topsoil can be achieved.
- If percolation through subsoil is poor and the ground compacted, the area shall be ripped with a subsoiler prior to spreading topsoil. This operation shall only be carried out in dry weather. This operation will be repeated after topsoil is spread.

Depths of topsoil

- Lawn: 150mm minimum over subsoil
- Hedge bed: 600mm minimum over subsoil
- Planting bed: 450mm minimum over subsoil
- Tree pit: 900mm over subsoil

The landscape administrator can request that the groundworks contractor provide the results of a maximum of three soil analysis test of subsoil and topsoil per phase of construction.

A minimum of five random sample holes, to ensure adequate depth of topsoil and subsoil, shall be dug by the ground works contractor per phase of building works. These must be excavated in the presence of the Landscape Architect or Landscape Administrator.

Retaining structures

Retaining structures shall be designed in a manner that diminishes the impact of the wall or structure's height.

This may require provision for planting at the base of the wall or the creation of



■ Green roof at PwC, London Bridge. Image source: Dusty Gedge, Living Roofs.

terraces that can be planted. Planting beds will have to extend beyond the rain shadow of the wall. Plant selection for terraces shall be mindful that irrigation and regular maintenance will not be possible.

Green roof systems

Green roof systems (GRS) offer huge opportunities for improving air quality, reducing surface water run-off, providing habitat for ground nesting birds and foraging habitat for pollinators. GRS design varies according to the weight capacity of the roof. However, a free draining growing medium of just 200mm can sustain a planting scheme in a GRS. They can be incorporated into a sustainable urban drainage system or a rainwater filtration system.

Dun Laoghaire-Rathdown County Council, Dublin City Council, Limerick City and County Councils require a GRS to be installed on 60% of the roof of new developments where the roof area exceeds 300m².

Benefits of green roof systems

- Improves air quality.
- Filters pollutants from rainwater.
- Slows surface water drainage.
- Habitat for ground nesting birds.
- Habitat for pollinators.
- Habitat for invertebrates.
- Foraging habitat for bats.
- Can be part of a rainwater harvesting system.
- Can be part of a sustainable drainage system.
- Potential to offer carbon credits.
- Can help mitigate the impacts of 'Heat Islands'.
- Can offer public open space opportunities making the development of smaller sites more viable.

Growing mediums consisting of recycled materials such as concrete are being increasingly used abroad and it is anticipated that it will be passed for use here in Ireland. Any updates in regulation regarding the use of recycled materials as a growing medium should inform the design of the growing substrate.

Design considerations

- Roof Pitch. Traditional green roof components can generally be safely and effectively used on roof slopes up to 10 degrees. Beyond this, the green roof requires a greater deal of structural design input.
- The desired vegetation type and aesthetic appearance will dictate the required depth of growing medium and the necessity for irrigation.
- Exposure and aspect.
- Minimum depth of growing medium is 200mm.
- Rooftop accessibility.
- Access for maintenance.
- Weight capacity of the roof.
- The area of the potential GRS: the larger types of green roof planting schemes offer more environmental benefits.

Hard landscaping

Pavements

Pavements covers road, path, driveway and patio surfacing. Road pavement selection is largely dictated by road and traffic standards. There is potential for path, driveway and patio surface selection to offer environmental benefits.

Design considerations

- Wherever possible, paving should be permeable.
- Driveways shall form part of the Sustainable Drainage System (SuDS). Therefore, they must be constructed with SuDS compliant paving capable of bearing the required vehicular load.
- Wherever possible, the subbase of pavements shall be formed with recycled material fit for purpose.



- The wearing course of the pavement should be robust, cleanable, colour stable and capable of longevity.
- For further information, please refer to the most current Clúid/Clann *Design Guide*.

Gradient/falls

Overall site gradients can give a scheme a unique character and assist in the creation of more interesting public open space. Localised gradients and falls can provide opportunities to divert surface water run-off into areas of planting and SuDS features.

Design considerations

- Within the curtilage of private dwellings, the gradient and direction of the fall of all hard and soft landscaped areas shall take water away from the house and towards gully traps or SuDS features.
- In public spaces, a fall shall direct surface water run-off toward adjacent tree pits and bioswales. This should be considered when locating gully traps to collect surface water and when specifying kerbing.
- Breaks in the selected kerbing will be required to allow water to pass into tree pits and bioswales. These shall be designed to minimise any trip hazard.
- Grass areas shall be graded to be free of ponding hollows.
- Ramped access to public open space shall be incorporated into planted areas.

Drainage

Drainage has traditionally been characterised by a desire to move water as quickly as possible away from its source. This approach has increased the risk of flooding during periods of heavy rain as it places an increased burden on underground drainage systems and instances occur where the system does not have the capacity for the volume of water.

Design considerations

- The main aim of drainage systems should be to filter the surface water run-off and slow its transit to the stormwater system as much as possible while mitigating the risk of localised flooding.
- Drainage should be mindful of the natural existing drainage patterns to mitigate the potential of contaminants entering streams, ponds, rivers etc.
- Existing hedgerows along agricultural drainage ditches should be incorporated into resident schemes as an element of the drainage proposals. These ditches can be augmented with planting to filter contaminants etc. from surface water run-off.
- Sustainable Drainage Systems (SuDS) design should be incorporated into the landscape proposals.

Sustainable Drainage Systems (SuDS)

SuDS reduce the potential for localised flooding, protect and enhance river and groundwater quality, encourage wildlife habitation and enhance the quality and value of the landscape.

SuDS aim to control surface water runoff at source, through design elements, such as:

- Porous surfaces
- Permeable paving systems
- Infiltration/attenuation trenches
- Retention ponds
- Reed beds
- Swales
- Bioswales
- Attenuation basins – above ground
- Attenuation tanks – below ground

SuDS are a holistic approach to drainage and should aim to utilise a combination of the above elements. Used in conjunction with one another the measures can have a positive impact on the immediate and wider environment.

Design considerations

- Porous surfaces, such as gravel, allow water to percolate into the surrounding soil placing less pressure on the surface water drainage system.
- Permeable, SuDS compliant paving is intended to be laid over shallow, clean stone filled attenuation trays that drain slowly into the surface water drainage system. If laid over compacted hardcore with fines, it is of little benefit.
- Attenuation trenches need to be kept free of humus and soil to remain free draining. When specifying, consider how this will be achieved in the maintenance regime. Trenches will require regular manual weeding without the use of herbicide.
- Retention ponds and reed beds present a health and safety risk. However, they are of huge benefit to wildlife and can create visually attractive features in the landscape. If included, they must be protected from trespass.
- Swales are usually depressed grass channels that can be utilised to slow surface water entry into the surface water drainage system. Consider the anticipated number of consecutive days that they would be waterlogged. Grass sward deteriorates when it is waterlogged for long periods of time allowing other species to break up the sward.
- Bioswales are more effective than swales. They also create a more visually amenable feature in the landscape.
- Above ground attenuation basins will have poor amenity value after heavy rain. It is vital to ensure that the soil in these basins has been decompacted with a subsoil and that the soil drainage properties are improved.
- Consider planting areas above ground attenuation basins with trees that quickly transpire or siphon water out of the ground; e.g. alder, willow, chestnut.

- Below ground attenuation basins have an amenity value all year round but minimise the potential for tree planting.

Bioswales

Ideally, surface and roof water run-off should feed into a bioswale before entering a piped drainage system.

Bioswales are typically porous, vegetated channels designed to transport roof and surface water to the stormwater system while filtering and removing pollutants from the water. The inclusion of check dams can further slow the transit of water. The water is filtered through a top layer of washed gravel and free draining soil before it slowly percolates into the ground. The plants are also capable of filtering air borne and water borne pollutants. The plants and check dams offer significant additional benefits over swales. Planted bioswales enhance biodiversity.

Design considerations

- A depth of water (no greater than 300mm) can accumulate, but should only be present during significant rainfall.
- Due to the 'build up' of the bioswale and the finish being a minimum of 100mm of washed gravel, the planting should consist of drought tolerant plant species.
- Grasses should feature in the planting matrix as their root system is effective in the prevention of erosion.
- The planting should aim to increase the amenity, ecological and environmental value of the bioswale.
- Proposed bioswales shall be assessed for health and safety risks on each project. Dense planting can effectively deter trespass through a bioswale. Bioswales may need to be temporarily fenced off to protect the planting while it establishes.
- The bioswale shall be gently dished and shall not exceed 600mm in depth at any one point.



Bioswale in Phase 1 of the Grey to Green Project in Sheffield by Prof. Nigel Dunnett and Zac Tudor illustrates how SuDS can enhance the enjoyment of public space while promoting biodiversity, creating habitat and providing a food source for wildlife. The planting list for a bioswale in the 'Grey to Green' project can be studied in appendix 1.4. Image source: Prof. Nigel Dunnett.

- Appropriate health and safety signage should be in place, and, where possible, signage should serve as an educational tool.
- Design should minimise any desire lines across the bioswales. Where unavoidable, they should be accommodated with bridges.
- Plant selection shall be determined by the plants' ability to survive drought conditions, their growth habits and root systems. It is essential to include plants with root systems that will anchor and hold the substrate and protect other plants during any temporary flooding of the bioswale.
- The plants must also be capable of withstanding the average range of pollutants contained in surface water. A portion of the planting matrix should have the capacity to filter these pollutants. The plants must fulfil this function before considering the aesthetics.
- These types of schemes are designed to be cut back in early January to approximately 150mm in height. The arisings are then removed.
- These planting schemes also have huge potential to enhance biodiversity; offering habitats for invertebrates and food sources for fauna.



Biodiversity gold standard

Wherever possible, the planting schedule shall contain native Irish species. Seed shall ideally be collected from 10km radius.

Boundary treatments/types

Refer to section on boundary treatment selections and their impact on biodiversity, starting on page 17.

Raised beds and planters

Raised beds and planters provide a protected location for growing plants that promote biodiversity and should be included where it is anticipated that pedestrians will trespass through proposed areas of soft landscaping in high traffic areas. Planters also offer the opportunity to introduce planting in locations where there is limited scope for soft landscaping due to extensive areas of hard landscaping or services. Raised beds and planters should also be considered where there is a requirement for bollards. There are two types of raised beds and planters; fixed and moveable.

Consideration should be given to the long-term benefits of durable materials such as fibreglass and metal. Consideration shall also be given to the following:

Fixed raised beds and planters

- Shall be constructed from a material that complements the materials used in the construction of the buildings and should be sustainably sourced, and recyclable where possible.
- Where a coloured monocouche render is used on buildings, it should be considered as a treatment for a concrete block constructed raised bed.
- The wall capping should complement capping and windowsills used elsewhere in the development.

- The incorporation of seating into the raised bed should be considered if it is located within an internal courtyard area.
- Wall seats shall be 450mm high above finished ground level (including capping). The area behind the seat shall be planted with robust planting, where feasible.
- Raised beds and planters shall be less than 600mm above finished ground level.

Moveable raised beds/planters

Planters shall not be located on areas of lawn as they create a requirement for careful grass edging. The impact on the maintenance contract must always be considered when locating planters.

Larger planters are more sustainable for the following reasons:

- The larger the planter the more scope to create a planting matrix that promotes biodiversity.
- The plants can achieve greater root depth to survive drought.
- The capacity of the planter to catch and hold water is greater.
- A self-replicating planting matrix can be achieved.
- Plants selected for both the site and growing conditions have greater longevity, and requirement for replacement planting is reduced.

Practical requirements

- Consideration should be given to the requirement to move the planter or change the configuration of a group of planters for access to services or for maintenance operations. Wheeled planters may be a more feasible option in some situations.
- Planters should be of a robust material with adequate drainage holes.
- Planters should be placed on a flat, solid surface.

Installation of raised beds and planters

The following should be considered:

- An adequate depth of drainage material shall be placed at the base of the planter.
- Cover the drainage layer with anti-root cloth. This will prevent the roots penetrating the drainage layer, preventing blockages with the growing medium.
- Growing mediums for planters shall be peat free.
- When planters are to be located on podium decks, the growing medium should be light weight but moisture retentive to minimise requirements for watering.
- The plant selection for planters should be drought tolerant to minimise the requirements for watering.
- Planters should be mulched with a fine horticultural grit to the depth of 50mm. This is to suppress weeds and to minimise evaporation of moisture.
- Provision should be made for cleaning planters with clean tap water a minimum of twice per year. Do not clean with high pressure cleaner or abrasive sponge.
- Provision should be made to top up the growing medium with fresh peat free compost annually. This essentially 'feeds' the plants as the growing medium will be depleted of nutrients during the growing season.

- Timber planters should be lined on the inside with butyl liner. This is to prevent contact with soil and water to delay the decomposition of the timber.
- All timber shall be tanalised.

Plant selection for raised beds and planters

The planting matrix shall:

- Be drought tolerant.
- Be tailored to the specific climatic conditions of the site.
- Not require regular 'feeding'.
- Contain a balance of ground cover, self-seeding and clump forming plants.
- Be beneficial to pollinating insects.
- Not require regular pruning.
- Contain species with seed heads that provide food for bunting bird species.



Soft landscaping/plants

Planting within the development should be used to create an inclusive environment that can be used to the greatest extent by all people, regardless of their age or ability. Planting regimes should also reflect the changing needs of residents over time.

Wherever possible, all plant materials shall be of Irish origin to limit the progress of disease and the importation of genetic variations in native species. All plant passport numbers shall be recorded and this information shall form part of the handover package. This is in the interests of being able to trace the source of any infection or disease.

Trees

For protection of existing trees – see Action 7 in the design stage, page 16.

Potential locations for trees

Trees are hugely beneficial in the ecosystem but they also perform several functions in our landscape. They have the capacity to enhance our living environment by combating the negative impacts of our built environment. Identifying potential locations for trees should also involve identifying why they are required. Trees help to reduce the scale of large built structures, mitigate heat reflection, offer shaded locations for cars, absorb sound, and mitigate the impact of unattractive views and overlooking structures.

The following shall be considered:

- Aim for a target of planting one appropriate tree per dwelling.
- Maintain sight lines and visual permeability.
- Identify potential wind funnels and locate trees to mitigate their impact.
- The heat reflection from large areas of hard standing shall be mitigated by trees planted in constructed tree pits.
- In public open spaces there is a preference for planting trees in clusters of three or more.
- A Pocket Forest or Tiny Forest, such as that created with the Miyawaki Method maybe viable in some schemes.
- Screening/Buffer Zones should be developed with the Tiny/Pocket Forest approach in mind.
- Trees shall not be located near services unless a constructed tree pit can be provided.
- Be aware that some local authorities do not permit trees to be planted within 7m of a lighting standard. Check distances and regulations prior to any planting.
- To prevent trunk damage, trees in public open space shall be positioned in planting beds.
- Where trees cannot be positioned in a planting bed, a 1m diameter circle, centred on the trunk, shall be mulched and maintained weed free. This shall be provided for in the landscape specification.



- When selecting trees, take note, the range of native/naturalised tree species available to the market is decreasing due to threats from Phytophthora species, see appendix 1.5 for details.

Identify suitable tree species for the site conditions and their functional requirement

- Selected tree species shall be suitable to the sites specific climatic conditions.
- Selected trees shall be suited to their specific location; i.e. do not specify aggressive water seekers near water or drainage pipes.
- It is no longer practicable to include only native tree species in planting schemes and achieve a successful planting scheme tailored to a sites specific soil and climatic conditions. Planting only native trees does not acknowledge our need to address the current and predicted impacts of global warming and increased urban pollution.
- The tree planting schedule should still aim for a mix containing 75% of native Irish tree species. The list of accessible native Irish trees is becoming increasingly limited due to disease, regulation and commercial viability. A list of native and naturalised Irish tree species can be seen in appendix 1.8.
- Specified standard and feathered trees must be a minimum of 14–16cm girth. Specified multi-stemmed trees must be a minimum height of 2–2.5m. Pine trees must be a minimum height of 1.75–2m.
- The only exception to the above are tree species to be planted in a buffer zone. These may be a range of sizes. Buffer zones shall include whips, standards and feathered trees to ensure a variance of maturity. Buffer zones are typically 15m wide.

- In urban areas specify trees that can tolerate air pollution.
- Avoid tree species which are prohibitively expensive at the size required for the scheme.
- Where space allows, specify parkland trees. See appendix 1.7 for suitable species list.
- Where underground services or tanks prohibit the planting of trees, consider if large specimen shrubs are a viable alternative. See appendix 1.9 for suitable species list.

Requirements for the sustainability of street trees and trees in areas of paving

Street trees tend to be characterised by a narrow habit, ability to withstand urban pollution and the tolerance of paved/hard surfaces (heat reflection and drought).

- Ensure that sightlines are maintained for traffic, all street trees shall be standard trees with clear stems to 1.8m high. For examples of suitable street trees see appendix 1.6.
- Street trees must have adequate tree pits to be sustainable. Narrow strips of soil adjacent to roads are not sufficient. If these are unavoidable, a constructed tree pit is the only way to sustainably support a tree.
- Trees shall not be planted where there is no room for the crown to spread. Calculations of available space should be mindful that trees can come into conflict with high vehicles.
- Trees for public open spaces can have a broader crown and root system than street trees because, typically, they have more space to develop without conflict with built structures.
- Where the public open space allows, parkland trees can be considered.

Tree pits

Trees are an essential element of our ecosystem and landscape – they can improve air quality, support flora and fauna, mitigate flooding, increase real estate values, mitigate erosion, and protect us from the elements.

Tree pits shall be constructed in accordance with BS 8545: 2014 Trees: from Nursery to Independence in the Landscape. This is in the interest of providing the tree with the best chance of reaching maturity.

All constructed tree pits shall have an overflow pipe in the following situations:

- In areas of hard landscaping.
- When the tree pit forms part of a sustainable drainage system.
- Proximity to houses on raft foundations.

Root barriers/root deflector

Root barriers are required where there is a potential conflict between roots and services. The inclusion of root barriers will allow for the inclusion of more soft landscaping. Constructed tree pits and planters on roof decks/podiums should be lined with a root deflector.

The root barrier shall not impede the drainage of an area to be planted. The requirement for this should be identified on the landscaping plan prior to the commencement of any landscape works.

Tree guards

Tree guards should be provided for where trees are at risk from anti-social behaviour (ASB). The inclusion of tree guards can make the planting of trees more sustainable. The tree guards should allow for the expansion of the tree trunk and should be of a size that will accommodate tree growth for 20 years.

Tree grills

Tree grills shall be specified where there is a risk of compaction above the rootball area. Tree grills should be removeable to facilitate any maintenance works. The aperture shall allow for the expansion of the tree trunk and should be of a size that will accommodate tree growth for 10 years.

The soil level should be at least 100mm below the tree grill. This ensures that there is depth for applying an organic fertiliser if the tree is struggling. It also allows rainwater to collect and penetrate the top dry layer of soil in a drought.

Pictorial meadows

In lieu of any Irish standard for wildflower meadow seed mix, the preference is for pictorial meadow and or bulb drift/ meadow. Pictorial meadows are beneficial to pollinating insects while meeting the aesthetic expectations of residents.

Practical considerations:

- Areas to be seeded with a pictorial meadow seed mix shall be spread with topsoil.
- The pictorial meadow mix shall be selected for its suitability to the soil and climatic conditions.
- Grass seed shall not be included in the mix.



Biodiversity gold standard

Arrange the transfer of green hay from a nearby species-rich grassland meadow.



Biodiversity gold standard

Purchase brush harvested seed from a nearby species-rich grassland meadow site.



■ Bulb planting at Floriade Expo 2022, Amsterdam-Almere. Image source: Ingrid Swan.

Bulb meadows/drifts

Certain flowering spring bulbs offer valuable early foraging for pollinators. Summer bulbs can extend the flowering period through into the early Autumn. See appendix 1.11 for a list of bulbs.

Practical considerations

- Alliums are a valuable addition to a bulb drift in Ireland as they provide a food source for pollinators in May when there is a lull in flowering amongst our native species.
- Areas identified for Bulb Meadow/Drift shall be spread with topsoil.
- Bulb species should be planted at a minimum rate of 30 no. per m² per species and be layered to provide successive flowering from late winter until early autumn. Bulbs shall be selected for their suitability to the soil and climatic conditions of the site.

- After bulb planting has been carried out, the area shall be raked and seeded with a suitable grass seed mix containing yellow rattle (*Rhianthus minor*). 'Stand-alone' bulb meadows/drifts should be in areas that can be easily mowed back in late October, depending on the species selected.

Community orchards

Community orchards benefit residents, flora and fauna. The arrangement and layout of an orchard offers an opportunity to create a feature within the landscape.

Practical considerations

- Community orchards should contain a minimum of five fruit trees per 100m².
- Choose from apple, crab apple, pear or plum, depending on the site conditions. Ensure pollinating partners are planted where trees are not self-fertile.

- Ensure that the orchard trees are protected from mower damage by designing an edged and mulched area around the base of the tree.
- Ensure that there is a mix of edible and cooking fruit trees.
- Where conditions are unsuitable for fruit trees, shelter planting shall be installed to provide a viable location for an orchard in the future.



Biodiversity gold standard

The fruit tree cultivars shall be heritage varieties with a preference for old Irish cultivars.

Stable plant groups

Planting designers are very aware that planting schemes change over time as planting matures and soil conditions alter. However, the design of a stable planting group acknowledges the role that different plant groups have in creating a sustainable planting matrix.

The following should be considered in this regard:

- Consider increasing the rate of plants per m² and decreasing the size of the plant at the time of planting. Smaller sized nursery plants adapt more readily to their new environment.
- They can also ensure that the increased rate per m² is more economically viable.
- Consider using perennial spring and summer bulbs in the planting schemes.



Perennial planting does not have to be high maintenance. A well thought out matrix, tailored to the soil and climate conditions, will create high impact and minimise maintenance. Image source: Peter Korn.

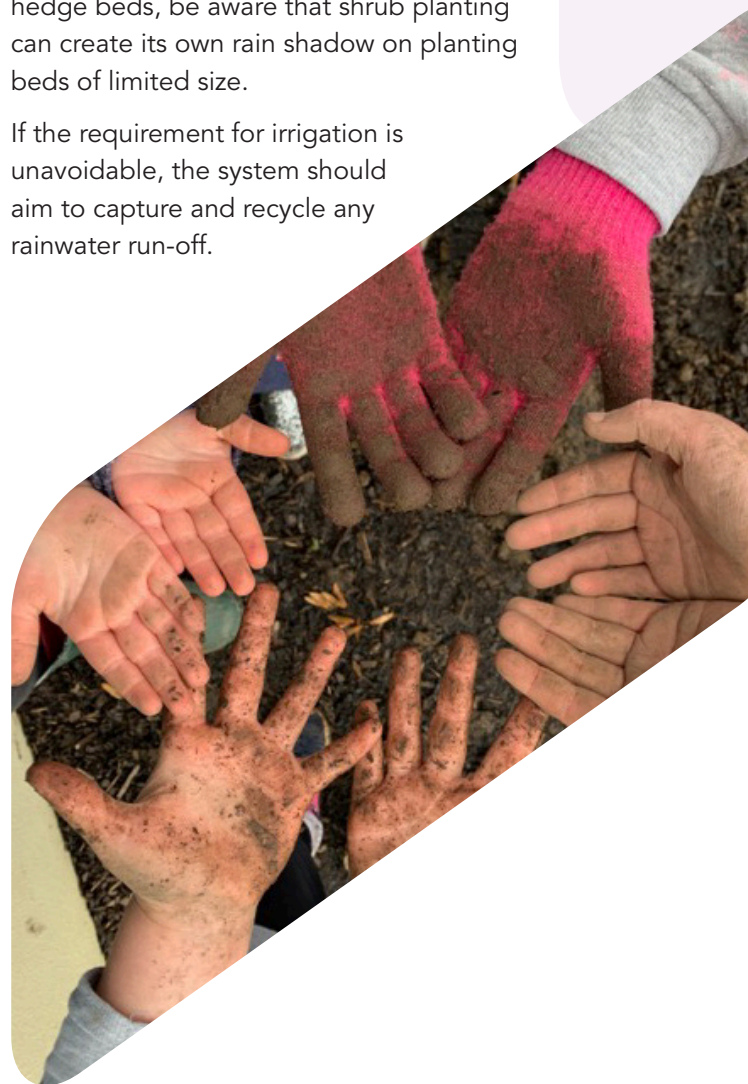
- Decorative planting shall consist of 25% shrub, 65% perennial, and 10% biennial or annual planting. Herbaceous planting shall consist of a minimum of 5% evergreen perennials and 15% ornamental grasses. Biennial or annual plants shall be capable of self-seeding to retain a presence in the planting matrix.
- The planting matrix shall be mindful of the need for a balance between running/spreading, self-seeding and clumping growth habits. Perennials shall be planted at 9cm pot size at a minimum rate of 10 no. per m².
- A higher planting rate ensures that a stable planting matrix is established as quickly as possible to exclude ruderals and weeds. This will have a positive impact on maintenance once the weed seed stock in the soil has been exhausted.
- The planting design should provide for low, middle and upper planting tiers.
- Ensure that the planting matrix is tailored to the site's specific climatic conditions and the aspect and microclimate of each planting area.
- Perennials shall include native species and/or cultivars of native species. This will ensure that there is a relationship between our native pollinators and the planting matrix. Examples of native species/cultivars of native species available commercially can be seen in appendix 1.10.
- Where budget is constrained, consider establishing a stable planting matrix from seed.
- Ensure the planting design includes plants that are beneficial to pollinating insects. There are many shrubs, perennials, biennials and annuals that benefit pollinators. There are a range of organisations, including the All-Ireland Pollinator Plan and the Royal Horticultural Society (RHS), who compile lists of plants that are 'pollinator friendly'.

Irrigation

Irrigation should only be required during the establishment of the landscape scheme. The requirement for irrigation shall be designed out of schemes with the careful selection of plants.

The following should be considered when designing the planting schemes:

- Plants suitable for coastal locations, alpine plants and plants suited to dry shade require less watering.
- Consider rain shadows when selecting the location of planting beds.
- Wherever feasible, hard landscaping areas shall be given a fall into planting beds to assist in the irrigation of plants.
- When selecting plants for planters and hedge beds, be aware that shrub planting can create its own rain shadow on planting beds of limited size.
- If the requirement for irrigation is unavoidable, the system should aim to capture and recycle any rainwater run-off.



Grass seeding/turfing

Grass areas can be established by seeding or laying turf.

Grass seeding

Grass covers the majority of public open space and natural play areas. It is therefore vital that the groundworks are implemented to best practice to ensure a quality grass sward.

The following measures shall be undertaken:

- Grass seeding or turfing works shall comply with BS 4428: 1989 Code of Practice for General Landscape Operations.
- The Landscape Architect/Contract Administrator shall specify the varieties and cultivars of grass seed to be used.
- Grass seed mix shall be of the specified species and cultivars as detailed in appendix 2.1 and 2.2, and shall conform in all respects to the European Union's Seed of Fodder Plants Regulations, 1976. The Contractor may propose alternative varieties provided that they are comparable to those specified.
- Grass seed mix shall include 10% red clover for foraging pollinators and to fix nitrogen for the grass sward.
- Seed shall be obtained only from a recognised seed supplier and each bag of seed shall be labelled in accordance with the above.
- The Landscape Contractor shall provide the Landscape Architect/Contract Administrator with a label or certificate stating the details of the seed mixture used together with a sample of the seed mix for testing.
- The grass seed mix shall be suitable to the intended usage, site conditions and location. This may require different grass seed mixes to be specified for different zones within the scheme.
- The area shall be protected from vehicular and pedestrian traffic for a minimum of six weeks after seeding.

- Seeding shall take place in the growing season, in suitable conditions, between the period from the 1st of April until the 1st of October.
- Typical seeding rate: 25g/m².



Biodiversity gold standard

Where possible grass seed shall be sourced from locally grown stock.

An example of a suitable grass seed mixture for informal lawn areas is available in appendix 2.1.

An example of a suitable grass seed mixture for low maintenance lawn areas can be seen in appendix 2.2.

Turfing

The following measures shall be undertaken:

- All operations shall be in accordance with BS 4428: 1989 Code of Practice for General Landscape Operations.
- Turf shall consist of Class 5C turf.
- The turf shall be laid well bonded and lightly tamped and when on slopes shall be laid diagonally.
- After installation, the turf shall be regularly watered as necessary during prolonged dry weather.
- The area shall be protected from vehicular and pedestrian traffic for a minimum of six weeks after installation.



Biodiversity gold standard

Where possible turf lawn shall be sourced from locally grown stock.

Landscape fabrics/weed matting

No mypex/landscape fabric shall be installed on Clúid sites.

Landscape fabric lifts over time, degrades, becomes unsightly and contains plastic. Research has proven that landscape fabric encourages roots to run along the surface of the soil, meaning that the plants are ill equipped to deal with drought conditions and severe frosts. Landscape fabrics can also heat the ground in hot weather and sterilise the soil of essential bacteria causing the collapse of the soil biome. The preference is for groundcover planting and mulch.

Mulches

Mulches should not be relied upon in the long term to suppress weeds. The planting schedule should combine planting according to growth type and with consideration to how plant communities can be designed to suppress weeds. An understory of groundcover plants should be considered. The mulches detailed below are for the establishment period of the planting scheme.

Mulches are required to be laid at a depth of 50mm to act as a weed suppressant. Any deeper and there is a risk of limiting access to water before light rain can penetrate the mulch. Planting beds should be watered to field capacity prior to the spreading of mulch. A deeper mulch may also 'tire' some species of plants when they are emerging at the start of the growing season.

There are a variety of mulches used within the landscape industry. Mulches are specified for the following reasons:

- Weed suppression.
- Mitigate water evaporation from the soil.
- Improvement of the soil structure.
- Protecting soil from light frost and leeching.
- Retaining soil temperatures.



Bark mulch

Bark mulch comes in a range of grades and, in Ireland, is made from our commercially harvested pine trees. It has varying levels of acidity. The acidity of the bark mulch can cause plants that prefer alkaline or neutral pH conditions to struggle and emerging perennial foliage to burn. It is not recommended for use with perennial schemes or in schemes incorporating mediterranean plants such as lavender. If bark mulch is a suitable option the preference is for a fine grade.

Pros

- Good weed suppressant if depth is maintained.
- By-product of commercial forestry.
- The acidity can play a role in suppressing some weeds.
- Finer grades can act as a soil improver, adding humus to the soil.
- Good choice in areas with naturally acidic soil.
- Light and easy to install.

Cons

- The selected grade is important. When dry, bark mulch can blow off the planting beds and make surrounding areas unsightly. This is reduced with finer grades.
- It is flammable when dry.
- Needs to be topped up every 2 years.

Gravel mulch

Gravel mulch comes in a range of colours and sizes. Gravels should be sourced as locally as possible and reflect the natural stone of the area. Where decorative gravel is specified elsewhere in a scheme the gravel mulch should be matched to create continuity. Gravel mulch is usually specified at 10–14mm in size. Gravel mulch should always be a pebble rather than a chip to prevent risk of injury.

Pros

- Longevity; it does not biodegrade.
- Contributes to the retention of heat in the soil.
- Effectively retains soil moisture.
- Effectively suppresses weeds.

Cons

- Heavier product – takes more time to install.
- Does not improve soil.
- Can make additional planting works or replacement planting more difficult.
- Can lift and fly if it comes into contact with strimmers.
- Can cause harm if lifted and thrown.
- Can transfer onto roads and footpaths.

Grit

Grit is a small grade of gravel (6mm). It is increasingly used for perennial schemes in areas where soil is of poor quality, often waterlogged and in areas where heavy and deep frost is common. It is installed prior to planting. The planting process may result in a quantity of grit being dug into the soil, but this helps with drainage. The grit provides the plants with somewhere to 'hide' from frozen waterlogged soil in the winter. The perennial scheme is cut to approximately 150mm high in mid-January and mulched to help improve the soil. The grit is slowly incorporated into the soil.

Pros

- Helps to achieve a sustainable planting scheme in difficult conditions.
- Effectively suppresses weeds.
- Any weeds are easily hoed out of grit.
- Effectively retains soil moisture.
- Contributes to the retention of heat in the soil.
- Gradually improves poorly drained soil.
- Less likely than gravel to cause harm if lifted and thrown.

Cons

- Heavier product – takes more time to install.

Green waste/compost mulch

Green waste/compost will replace peat compost as a mulch. It should be free of plastics and other rubbish when installed.

Pros

- Great soil improver and conditioner.
- A recycled product.
- Light and easy to install.
- Suppresses weed seed stock in the ground.
- Germinating weeds are easily removed with a hoe.

Cons

- It requires annual topping up.
- Will support weed seed transferred by wind etc.
- Can blow in the wind when dry.

Wool mulch

Wool mulch is becoming increasingly available and is a by-product of sheep farming. Currently, it is usually used for growing beds.

Pros

- Great soil improver and conditioner.
- Protects soil structure.
- Suppresses weeds.
- Effectively retains soil moisture.
- Contributes to the retention of heat in the soil.
- Deters slugs.
- Natural product.

Cons

- It can look unsightly at the start of the season.
- It requires topping up after two years.

Woodchip

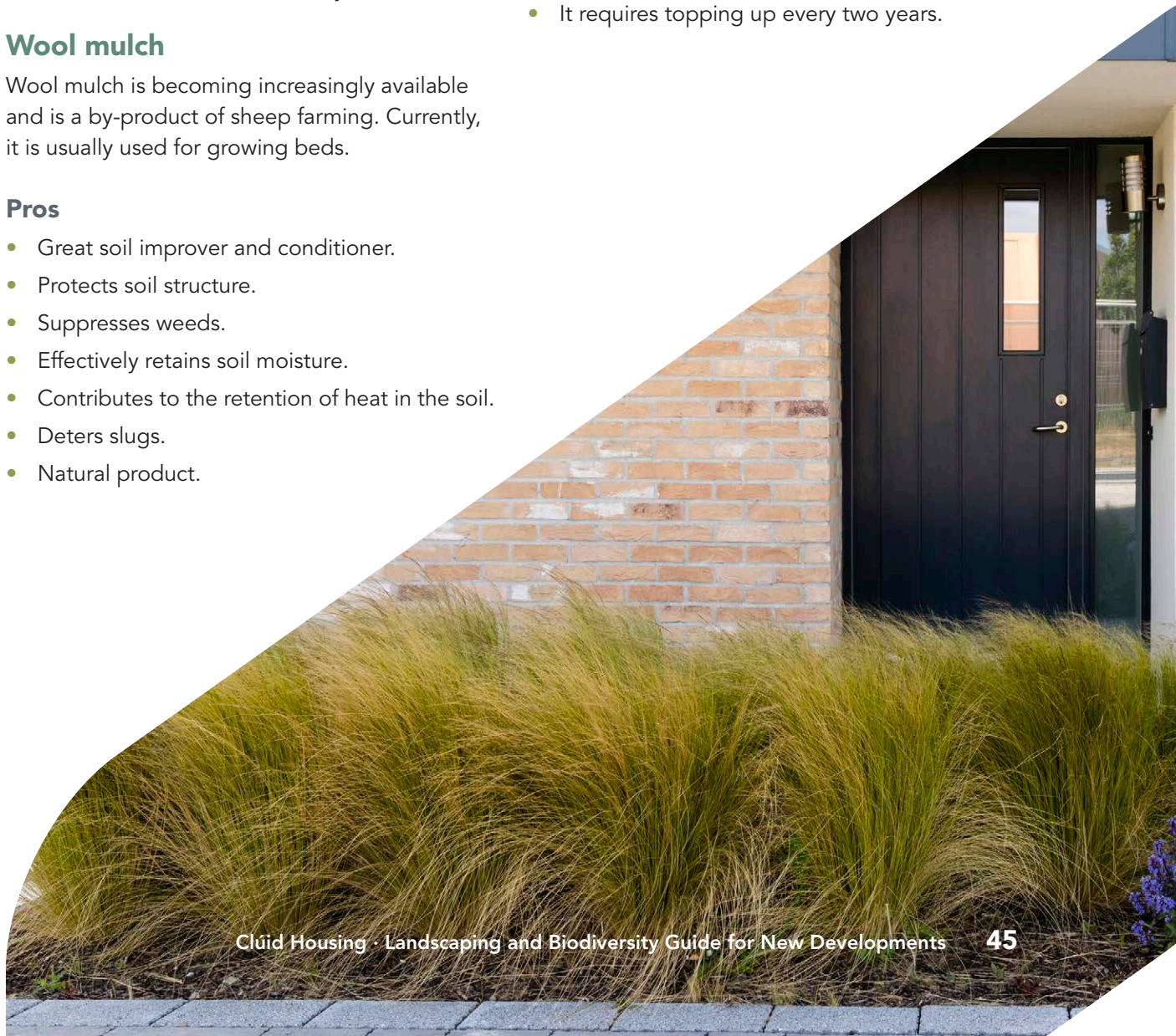
Woodchip is not used for planting areas but is usually used as a surface mulch in areas of pedestrian traffic where it is desirable to protect the soil structure.

Pros

- Weed suppression.
- Protects soil structure.
- Contributes to the retention of heat in the soil.

Cons

- Can transfer onto roads and footpaths.
- Can be lifted by the wind.
- It requires topping up every two years.



Amenities

Materials selection can reinforce the character of a scheme. The selection can hugely impact the sustainability and maintenance requirements of build structures and amenities.

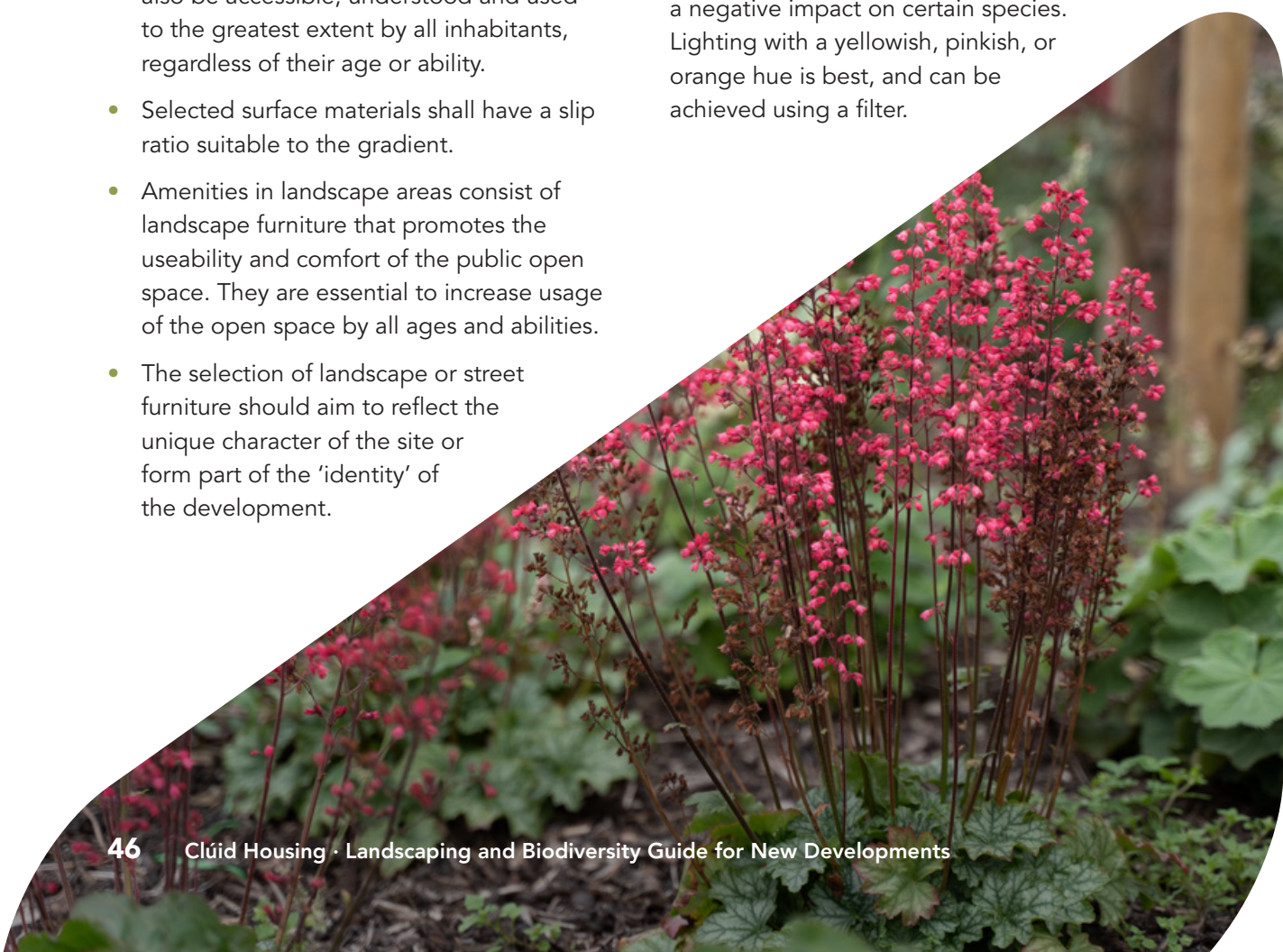
The following shall be considered:

- The use of materials shall be sustainable and low maintenance.
- Materials should be recycled and recyclable where possible.
- Surface material palate should be constrained to three materials in visually complementary finishes to ensure that the scheme has a cohesive appearance.
- Materials should reflect the vernacular building materials of the area i.e. local stones and gravel.
- Amenities and infrastructure should protect and encourage biodiversity, but also be accessible, understood and used to the greatest extent by all inhabitants, regardless of their age or ability.
- Selected surface materials shall have a slip ratio suitable to the gradient.
- Amenities in landscape areas consist of landscape furniture that promotes the useability and comfort of the public open space. They are essential to increase usage of the open space by all ages and abilities.
- The selection of landscape or street furniture should aim to reflect the unique character of the site or form part of the 'identity' of the development.

- In large developments, the selection of the street furniture should form an integral part of the creation of character zones.
- The selection process should also aim to ensure that the landscape will be inclusive of all people, regardless of their age or ability, in line with the principles of Universal Design.
- Materials used in public open space should be robust, resistant to graffiti or washable.
- It is important to consider the future availability of any selected product for repair, maintenance or the potential required use/ inclusion in further phases of the scheme.
- Any coloured concrete products shall have a stable colour that is not susceptible to leaching.

Lighting

Work with the Local Authority to choose public lighting that will have a minimal impact on biodiversity. White or blue lighting can have a negative impact on certain species. Lighting with a yellowish, pinkish, or orange hue is best, and can be achieved using a filter.





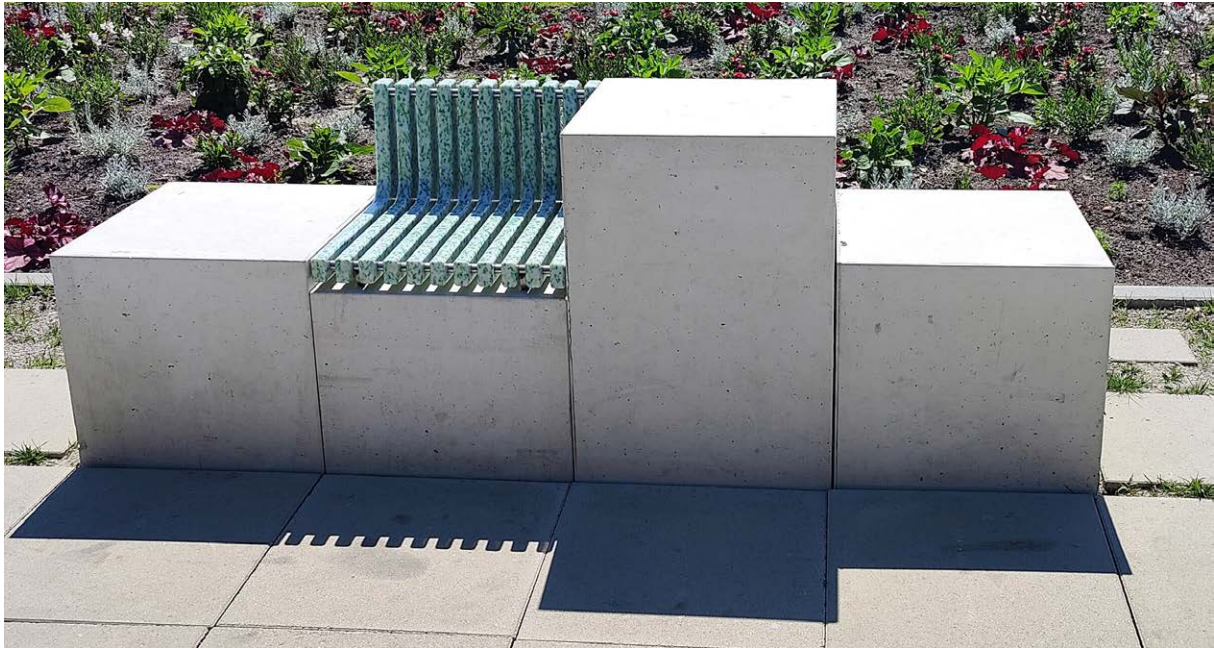
■ Benches can provide a habitat for invertebrates. Image source: Ingrid Swan

Seats and benches

Seats and benches shall be included in schemes to facilitate a broad age demographic. In public spaces, seating and benches shall be located in dynamic spaces that provide connections to public transport and neighbourhood centres. They shall not be located in passive areas of public open space, unless specified by the design team.

The following shall be considered:

- All forms of seating shall be located within 7m of a lighting standard in public open space.
- If it is anticipated that there will be a high proportion of residents over 55 years of age, the benches shall be specified with arms and a back rest.
- Seating should not be designed to facilitate being utilised by one individual for protracted periods of time.
- Seating should be robust, non-combustible, and cleanable. Seating blocks or benches without back and armrest should include anti-skateboarding nibs. Seating can also be used as bollards or to direct foot traffic.
- Wall seats shall be 450mm high above the finished ground level.
- Seating blocks can be designed to provide habitat for invertebrates.
- In private and public spaces, consideration should be given to incorporating seating into raised planting beds or planters.



This bench is a simple example of Universal Design Principles applied to a public bench. A section has a seat back for people who need support. The taller section acts as a rest to lean into for those who have difficulty seating and rising. The taller section can also act as a table to place items while a person rests. The design also allows people to seat at different angles so that they can interact with wheelchair users. Image source: Ingrid Swan.

Bollards

Bollards shall be included in the following situations:

- Where there is a requirement to provide a safe and identifiable route for the visually impaired.
- Where there is risk of vehicular trespass.
- Where there is risk of damage to built and natural structures from vehicular traffic.
- Where fire tender access must be maintained clear of obstruction.

Different types of bollards are required in different situations. Consider the potential for using seating/planters to act as a fixed bollard.

Bollards incorporating lighting shall not be used in public open space and shall be limited to internal courtyards and building access paths.

Signage

Add interpretative signage and biodiversity information panels – templates at www.pollinators.ie. Consider using signage to create a biodiversity walking trail throughout the development to incorporate the various biodiversity features. Signage should be included for features such as:

- Bee blocks
- Bug hotels
- Nest blocks and boxes
- Bioswales
- Community orchards
- Retained native hedgerows
- Bulb drifts/meadows
- Pictorial meadows
- Decorative planting for the promotion of biodiversity



A number of small compact bug hotels are preferable to one large structure. Larger bug hotels can promote the spread of disease and are not actually attractive to pollinators and invertebrates. Image source: Úna Fitzpatrick, All-Ireland Pollinator Plan.

The signs should rely on graphics to convey the message, and where feasible include QR codes to provide links to websites with further information.

The signage should identify links between nature and health/wellbeing.



This bug hotel incorporates signage to educate people about solitary bees. The design is robust and the signage reflects its purpose. Smaller bug hotels are preferable as outlined in the adjacent image. Image source: Ingrid Swan.

The signage shall be suitable for the outdoors and shall be UV stable. Consider creating tactile signage that can be read by the visually impaired.

The signage can also be incorporated into features.



Graphic signage can have huge impact. Including QR codes can provide quick access to more detailed information and information translated into other languages. Image source: Ingrid Swan.

Litter bins and recycling units

Litter bins shall not be included in public open spaces.

In the instance that the development will extend or incorporate an existing popular walking route, the addition of dog litter bins should be discussed with the Local Authority.

The requirement for cigarette bins should be assessed. Cigarette bins should be located adjacent to entrances. People often put out their cigarette to enter an enclosed or public space. These are the locations where cigarette butts tend to be thrown away.

Bin stores, bicycle shelters and canopies

Bin stores, bicycle shelters and canopies to facilitate outdoor activities shall be located to ensure that they are able to be passively policed by residents from nearby public spaces and adjacent residential properties.

Consideration should be given to locating them off existing or planned structures, such as a lean-to style design. The location should provide for the potential development of a resident 'Grow-Your-Own' area that can be irrigated with rainwater captured from the roof.

Wherever feasible, the roofs of these structures should be anti-climb and have a green roof system. The locks on the bin stores should be fob access to avoid ASB and illegal dumping.

Water butts/rainwater storage

Access to water increases the viability of community garden/biodiversity projects.

Capturing and storing water run-off from bicycle/bin stores in water storage tanks should be considered.

The selected water storage tank should ideally be capable of being connected to a series of storage tanks to maximise rainwater capture, the location of these shall be agreed at the early stages of the project.

Water storage tanks must be secure to ensure that they cannot topple or fall and should be elevated to allow for a gravity feed on a hose and filling of watering cans.

The requirement for a gulley trap to take overflow should be assessed at an early design/planning stage.

Water butts shall be located:

- In areas that are passively policed.
- Where there is potential for a grow-your-own area.
- In internal courtyards with raised beds.

Bird boxes

Bird boxes shall be installed if:

- It is not possible to incorporate nesting blocks in boundary walls.
- Nesting blocks are not suitable for bird species recorded on site or in the surrounding environment.

Bird boxes shall be installed on the upper part of walls to avoid human interference and consideration should be given to any nuisance noise etc., when choosing a location.

Consult with local area biodiversity plans to find out what type of bird species are in the area or need to be attracted to the area (for example swifts), to ensure that appropriate bird boxes are installed to align with local species needs.

Bat boxes

If appropriate to the area, consider placing bat boxes in a scheme. The boxes should be fixed up as high as possible in a sheltered location which gets sun for part of the day. Walls, as well as trees, are suitable. For example, multiple boxes may be fixed around the circumference of a large tree trunk.

Owl boxes

Again, if appropriate to the area, consider placing owl boxes in a scheme. Ensure that a well-designed owl box is placed in suitable locations only.



Make apartment balconies and private gardens biodiversity-friendly

Consider the following actions to make private gardens or balconies more biodiversity-friendly before they are made available to the occupant.

Apartments design stage checklist

- ✓ There shall be a planting buffer zone between apartment blocks, car parking and footpaths. Footpaths shall not abut apartments, balconies, or houses. This is in the interest of privacy, but it also makes maintenance easier as cars do not have to be moved to carry out works and pedestrian access routes do not have to be closed off.
- ✓ Wherever possible, ground floor apartments shall have a private garden space. This space shall be defined by a boundary treatment reinforced with pollinator-friendly planting.
- ✓ Two balcony designs, for south-east facing and north-west facing balconies, shall be provided in Clúid's handover pack for residents. These designs shall include details of planting that is suitable for balconies. Planting selection should assist in promoting biodiversity and be wind/drought tolerant. The balcony designs should use off the shelf products that are readily available. Suggested suppliers should be included in the pack.
- ✓ Ground floor balconies shall have an outdoor tap and/or water butt.
- ✓ Water butts shall be provided on upper balconies if feasible.
- ✓ An electrical socket, IP65, shall be fitted on each balcony.
- ✓ Balconies shall have low level lighting.
- ✓ Balustrades shall provide opportunities to support twining climbing plants.
- ✓ Where the façade is not painted, wall mounted planters, or the provision of grounds for mounting, shall be provided.
- ✓ Planters shall have a connected irrigation system, where possible.
- ✓ The balconies shall be surfaced with a sustainable product that can be easily cleaned. If the material is porous, it shall be sealed.
- ✓ The weight capacity of each balcony type shall be included in Clúid's handover pack for residents.
- ✓ Ancillary buildings should provide residents with secure storage for garden supplies and equipment.



A balcony garden can offer an extension to the living space while providing opportunities to improve local biodiversity. Image source: Kevin Dennis, Cityscape Gardener.

Apartment balconies

The design for the apartment balconies shall be mindful of the weight capacity of the balcony. Planters, when at filled capacity, must be included in weight calculations.

Balconies are small outdoor spaces, and it may be necessary for items to fulfil multiple requirements for the design objectives to be achieved.

The two designs for north-west and south-east facing balconies, should include the following, where possible:

- ✓ Water storage
- ✓ Small composting unit – this may be a compact bokashi unit
- ✓ Furniture with storage
- ✓ Wall mounted planters
- ✓ Seating for 2–4 people
- ✓ Planters shall be on wheels
- ✓ Bird feeder
- ✓ Sustainable screening options



Design of living walls should consider irrigation/manual watering. Image source: Peter Dowdall, livingwalls.ie

Private gardens

The typical functions and requirements of the residents should be kept in mind when determining the arrangement of, and access to, private gardens. Boundary types for private gardens will be dictated by Local Authority guidelines. However, wherever possible, hedgerows bounding private gardens shall be retained.

Private gardens design stage checklist

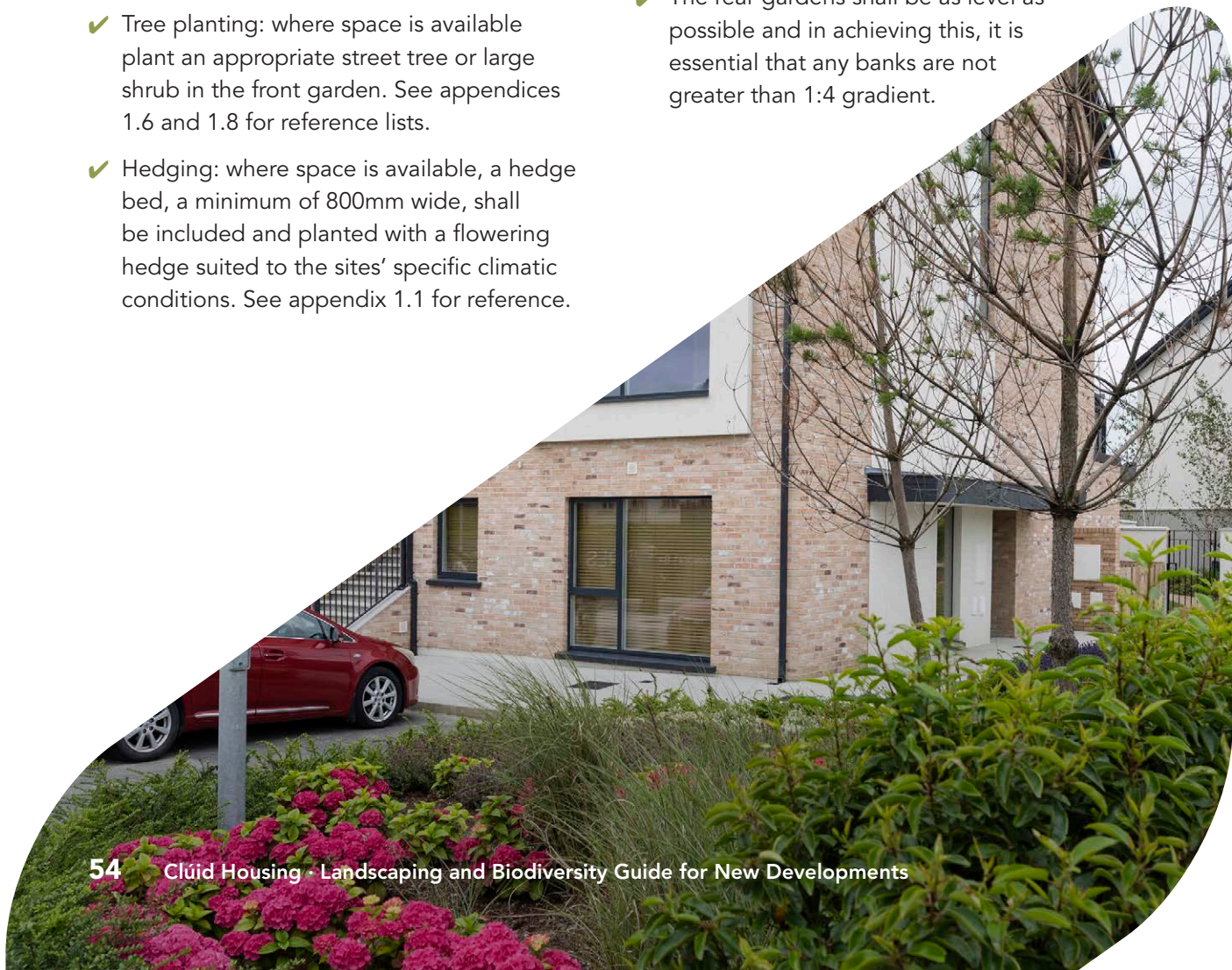
Front garden and driveways

- ✓ 1m² minimum of planting to promote pollination and biodiversity.
- ✓ Wherever possible a buffer strip of planting should be positioned between the dwelling house and the car parking. This strip should be a minimum of 1m² of planting to promote biodiversity. The planting matrix should include early flowering spring bulbs.
- ✓ Tree planting: where space is available plant an appropriate street tree or large shrub in the front garden. See appendices 1.6 and 1.8 for reference lists.
- ✓ Hedging: where space is available, a hedge bed, a minimum of 800mm wide, shall be included and planted with a flowering hedge suited to the sites' specific climatic conditions. See appendix 1.1 for reference.

- ✓ Boundary wall treatment: boundary walls shall be planted with self-clinging climbers/wall shrubs. See appendix 1.3 for reference.
- ✓ Ensure that the front façade of houses adjacent to public open spaces are protected from ball play. This may be achieved when designing the public open space or determining the boundary and landscape treatment of front gardens.

Rear garden

- ✓ Rainwater storage: a water butt shall be fitted to the downpipe of each dwelling in the back garden. The overflow from each water butt shall feed into the surface water drainage system.
- ✓ Access to water: an external water tap shall be installed in each garden.
- ✓ Access to electrical power: an external power point, IP65, shall be installed in each garden.
- ✓ The rear gardens shall be as level as possible and in achieving this, it is essential that any banks are not greater than 1:4 gradient.



Aftercare programme for landscape works

A site specific handover package shall be prepared for the landscape maintenance of the scheme. This landscape maintenance specification shall be made available to the Landscape Contractor prior to commencement of maintenance operations. The preference is for the Landscape Contractor, who carries out the implementation of landscape works, to undertake the establishment aftercare and the 12-month aftercare programme.

Establishment aftercare commences immediately upon completion of landscape works in each area or zone. As each area is completed, aftercare shall commence immediately on the same basis as described in the contract documentation for full year aftercare.

The 12-month aftercare period shall commence from the date of issue of the certificate of practical completion for all landscape works. The 12-month aftercare is exclusive of establishment aftercare irrespective of the time any area or zone has been maintained prior to achieving practical completion of all landscaping works detailed in the contract.

The Landscape Contractor shall be required to bring all areas up to the specified standard one month from the commencement of the 12-month aftercare period. The landscape contractor shall be required to maintain the landscaped areas of the site to an agreed standard for the duration of the defect liability period of one calendar year commencing from the date of practical completion for all works.

In particular, the following needs to be considered under each of the headings below.

Weed control

- All planted areas are to be kept in a weed-free state for the duration of aftercare.
- Trees located in grass areas shall have a 600mm radius circle maintained in a weed and grass free state for the duration of aftercare. This circular area shall be mulched to a depth of 50mm with a mulch appropriate to the scheme and location (see Soft Landscaping section, page 36). This is to ensure that the trees are not damaged by mowers or trimmers during routine maintenance. If the bark of trees is damaged by trimmers, mowers or mechanical equipment during maintenance operations, the damaged trees shall be replaced in the first planting season (mid-November to mid-March) following initial installation. The supply, planting, staking and tying of the replacement trees shall be carried out at the expense of the Contractor.

- These measures are to ensure the successful establishment of the installed trees, shrubs, herbaceous perennials, and bulbs. The maintenance regime may be altered after the 12-month aftercare period.

Checking and firming

- On each site visit the Contractor shall be required to check that all stakes are firm in the ground, that all ties are adjusted as appropriate and that any wind-blown or frost lifted plants are straightened and re-firmed.

Litter

- The Contractor shall be obliged to collect and dispose of all litter, within the areas for which they are responsible, at the commencement of a maintenance operation and prior to mowing. If there are excess litter issues this should be communicated to the Contract Administrator.
- Any such litter or debris is to be removed off site and disposed of in accordance with best practice and legislation.

Formative pruning

- During the year, top growth on all hedging (except for *Fagus sylvatica* [Beech]) shall be trimmed to an agreed height to encourage bushiness and establish uniform growth.
- *Fagus sylvatica* and *Carpinus betulus* shall only be pruned when they reach the desired final height for the hedge.
- Dead, damaged, or discoloured branches on all trees and plants shall be pruned out as they occur.

Pests and diseases

- The Contractor shall inspect all plants on each site visit for evidence of pest infestation or disease. If necessary, the pest or disease will be reported to the Department of Agriculture with relevant plant passport information. The Contractor shall recommend a strategy to the Client for approval.

Damaged, broken or dead plants

- The Contractor shall note any damaged, broken, or dead plants on each site visit and report same to the Client or Contract Administrator. These should be removed as soon as possible after documenting and reporting same. Where damage is caused by trespass or vandalism, the instance should be photographed, documented, and reported to the Client or Contract Administrator.
- It is important to note that the existence of damaged and broken plants on sites tends to encourage further damage if they are not removed.
- Dead plants shall also be removed on an ongoing basis in the interest of the overall appearance of the site. However, if the Landscape Contractor believes the cause of failure is not attributable to poor workmanship or the quality of materials on their part, it is vital that they refer same back to the Landscape Consultant together with their assessment of the probable cause of death.

Watering

- The Landscape Contractor shall make provision for the possible requirement of watering operations of trees, hedging and ornamental plants as part of the 12-month maintenance period.

Grass maintenance

- Grass in 'kick-about' areas in public open space shall be mown to maintain a height between a maximum of 50mm and a minimum of 15mm. The cutting season is to extend from the first week in March to the second week of November each year.
- The programme for the implementation of aftercare on the site shall entail fortnightly mowing operations. This frequency may be interrupted by inclement weather conditions. If weather conditions result in the cancellation of a mowing operation, the contractor shall

activate that operation in the instance that growth is excessive or extends beyond the cutting season dates outlined above.

- The cutting season of grass areas that are not used for kick-about shall extend from the first week in April until the first week of August each year. These areas shall be mown to maintain a height between 50mm and 150mm.
- The Contractor shall use appropriate equipment and machinery, driven or operated in a manner appropriate to the task.
- The Contractor shall ensure that the machines and equipment do not damage the sward or visual appearance.
- Litter, stones, and other debris shall be collected immediately prior to cutting or treatment being undertaken.
- Once a cut or treatment has started on site it shall be completed in one operation.
- Arisings from the first cut shall be collected and disposed of in accordance with best practice and legislation.
- Arisings shall be gathered and disposed of off-site if grass growth is sufficiently heavy for the cuttings to damage the sward.
- The use of a mower with a mulching mechanism is the preferred method of cutting for areas of regularly maintained grass.
- The Contractor shall immediately on completion, or at the end of each working day, clear any cuttings, earth or other debris that lands on surrounding hard surfaces because of cutting or treatments to grass areas.
- Naturalised bulb areas (where bulbs have been planted in the grass sward) shall be cut according to the specification for the surrounding area except that the defined planting area shall not be cut until at least six weeks after flowering.

Pictorial meadows

- The Contractor shall allow for the pictorial meadow area to be mown down in December.
- The arisings shall be raked off, removed and disposed of offsite in accordance with current legislation.

Bulb meadows/drifts

- The Contractor shall cease mowing all bulb meadow/drift areas at the end of November. Mowing shall not commence until the leaves of the last flowering species have died back. The handover package shall identify when site specific bulb mix will cease flowering.

Hard surfaces

- Pathways, car parks and areas of parking shall be always kept clean and free from obstruction.

Reporting procedure

- A report sheet detailing the work carried out during each visit shall be filled out by the Contractor and a copy forwarded to the Landscape Consultant/Client after each visit.
- The format of the report sheet shall be agreed prior to commencement of the maintenance phase of the contract.

Inspections

- The Landscape Consultant will carry out random inspections during the period of aftercare to ensure that all maintenance operations are being carried out in accordance with specification.



Appendix

1. Planting list

1.1 Hedging mix

Native/naturalised hedgerow mixes.

1.1.A – In general areas

Latin name	Common name	Percentage
<i>Crataegus monogyna</i>	Hawthorn/Whitethorn	45%
<i>Prunus spinosa</i>	Blackthorn	25%
<i>Ilex aquifolium</i>	Holly	5%
<i>Corylus avellana</i>	Hazel	5%
<i>Rosa canina</i>	Dog Rose	5%
<i>Viburnum opulus</i>	Guelder Rose	10%
<i>Sambucus nigra</i>	Elder	5%

1.1.B – In areas with heavy clay soil and poor drainage

Latin name	Common name	Percentage
<i>Crataegus monogyna</i>	Hawthorn/Whitethorn	45%
<i>Prunus spinosa</i>	Blackthorn	25%
<i>Prunus padus</i>	Bird Cherry	5%
<i>Corylus avellana</i>	Hazel	5%
<i>Rosa canina</i>	Dog Rose	5%
<i>Viburnum opulus</i>	Guelder Rose	10%
<i>Sambucus nigra</i>	Elder	5%

1.1.C – In a harsh coastal climate

Latin name	Common name	Percentage
<i>Crataegus monogyna</i>	Hawthorn/Whitethorn	35%
<i>Corylus avellana</i>	Hazel	15%
<i>Acer campestre</i>	Field Maple	10%
<i>Rosa canina</i>	Dog Rose	10%
<i>Olearia x haastii</i>	Olearia	15%
<i>Sambucus nigra</i>	Elder	5%

Note: In general, areas with heavy ground and poor percolation, it may be beneficial to plant hedges on low berms.

1.2 Defensive planting

Where defensive boundary planting is necessary choose from pollinator-friendly species.

Examples of these include:

Latin name	Common name	Defensive attributes
<i>Crataegus monogyna</i>	Hawthorn	Thorns
<i>Ilex aquifolium</i>	Holly	Prickly leaves
<i>Berberis darwinii</i>	Darwins Barberry	Thorns and prickly leaves
<i>Rosa rugosa</i>	Beach Rose	Thorns
<i>Prunus spinosa</i>	Blackthorn	Thorns
<i>Berberis stenophylla</i>	Barberry	Thorns and prickly leaves
<i>Mahonia x media</i>	Oregan Grape	Prickly leaves
<i>Mahonia aquifolium</i>	Oregan Grape	Prickly leaves
<i>Chaenomeles</i>	Quince	Thorns

1.3 Wall shrubs

1.3.A – North-East facing walls

Latin name	Common name	Benefits
<i>Hydrangea anomala</i> subsp. <i>petiolaris</i>	Climbing Hydrangea	<ul style="list-style-type: none">• Self-clinging climber• Nesting potential• Habitat for invertebrates• Minimal pruning
<i>Garrya x elliptica</i>	Silk Tassel Bush	<ul style="list-style-type: none">• Minimal pruning• Evergreen• Nesting potential• Habitat for invertebrates
<i>Hedera hibernica</i>	Irish Ivy	<ul style="list-style-type: none">• Self-clinging climber• Nesting potential• Habitat for invertebrates and arachnids• Attractive to pollinators

1.3.B – South-West facing walls

Plant name	Common name	Benefits
<i>Itea illicifolia</i>	Holly Leaved Sweet Spire	<ul style="list-style-type: none">• Nesting potential• Habitat for invertebrates and arachnids
<i>Ceanothus</i> 'Concha'	Californian Lilac	<ul style="list-style-type: none">• Attractive to pollinators

Note: Wall shrubs/climbers are not typically adapted or suited to exposed areas. Therefore, a list suitable to coastal areas has not been included.

1.4 Planting list for the BioSwales in the Sheffield Grey to Green Project, Phase 1 by Nigel Dunnnett and Zac Tudor

Latin name	Common name
<i>Achillea fillipendula</i> 'Coronation Gold'	Yarrow
<i>Anemanthele leesoniana</i>	Pheasant Grass
<i>Armeria maritima</i>	Sea Thrift
<i>Symphytotrichum</i> 'Purple Dome'	Aster
<i>Symphytotrichum armellus</i>	Aster
<i>Symphytotrichum sedifolius</i> 'Nanus'	Aster
<i>Calamintha nepeta</i>	Lesser Calamint
<i>Coreopsis verticillate</i> 'Grandiflora'	Whorled Tickseed
<i>Dianthus carthusianorum</i>	Carthusian Pink
<i>Echinops ritro</i> 'Veitch's Blue'	Globe Thistle
<i>Erodium manescavii</i>	Garden Storksbill
<i>Euphorbia polychroma</i>	Spurge
<i>Gaura lindheimeri</i> 'Whirling Butterflies'	Lindheimers Bee Blossom
<i>Helictotrichon sempervirens</i>	Blue Oat Grass
<i>Knautia macedonica</i> 'Mrs. Midget'	Macedonian Scabious
<i>Kniphofia</i> 'Tawny King'	Red Hot Poker
<i>Libertia formosa</i>	Chilean Iris
<i>Lychnis coronaria</i>	Rose Champion
<i>Panicum</i> 'Dallas Blues'	Switchgrass
<i>Miscanthus sinensis</i> 'Undine'	Elephant Grass
<i>Origanum</i> 'Herrenhausen'	Oregano
<i>Perovskia atriplicifolia</i>	Russian Sage
<i>Pulsatilla vulgaris</i>	Pasque Flower
<i>Salvia nemerosa</i> 'Caradonna'	Woodland Sage
<i>Hylotelephium</i> 'Jose Aubergine'	Stone Crop
<i>Stachys byzantina</i> 'Big Ears'	Lamb's Ears
<i>Stipa gigantea</i>	Golden Oats
<i>Verbena bonariensis</i>	Purple Top
<i>Veronicastrum virginicum</i> f. roseum	Black Root
<i>Scabiosa columbaria</i>	Small Scabious
<i>Malva moschata</i>	Musk Mallow
<i>Limonium sinuatum</i>	Sea Lavender

1.5 Trees affected by phytophthora

These diseases are limiting our access to and the viability of our native and naturalised tree species. Sorbus or Prunus must not be planted in areas where Fireblight is prevalent. All trees installed on a scheme should be monitored for signs of disease. If disease is recorded, it must be reported to the Department of Agriculture, Fisheries, and the Marine with the relevant passport numbers.

Tree name	Disease
Quercus (Oak)	<ul style="list-style-type: none"> • Xylella • Processionary Moth
Larix (Larch)	<ul style="list-style-type: none"> • Sudden Larch Death
Sorbus (Rowan/Mountain Ash)	<ul style="list-style-type: none"> • Fireblight and European Mountain Ash Ringspot
Prunus (Cherry)	<ul style="list-style-type: none"> • Fireblight
Fraxinus (Ash)	<ul style="list-style-type: none"> • Ash Dieback
Aesculus hippocastanum (Horse Chestnut)	<ul style="list-style-type: none"> • Bleeding Canker
Fagus (Beech)	<ul style="list-style-type: none"> • Sudden Larch Death

1.6 Suitable street trees

Latin name	Common name	Native	Naturalised	Beneficial to pollinators	Notes
Acer campestre 'Elsrijk'	Field Maple		✓		More upright cultivar.
Malus sylvestris	Ornamental Crab Apple			✓	Locate in areas where falling fruit does not stain hard landscaping.
Quercus robur 'Fastigiata Koster'	Oak	✓			Narrow crowned cultivar.
Sobus aria 'Lutescens'	Whitebeam	✓		✓	Tolerates coastal/exposed conditions.
Sorbus aria 'Majestica'	Whitebeam	✓		✓	Tolerates coastal/exposed conditions.
Sorbus aucuparia	Mountain Ash/Rowan			✓	Light crowned. Can be difficult to establish – ensure well prepared tree pit.
Tilia cordata 'Greenspire'	Lime			✓	Good street tree that retains it's shape well. Pollen can stupefy bees.
Ulmus 'Lobel'	Elm				Resistant to Dutch Elm Disease.

1.7 Trees suitable for public open spaces (excluding areas with underground SuDS)

Latin name	Common name	Native	Naturalised	Notes
Taxodium distichum	Bald Cypress			<ul style="list-style-type: none"> Exposed conditions Heavy soil
Fagus sylvatica	Beech		✓	
Quercus robur	Common Oak	✓		<ul style="list-style-type: none"> Unlikely to be available in 14–16cm girth or larger
Quercus petraea	Oak	✓		<ul style="list-style-type: none"> Unlikely to be available in 14–16cm girth or larger
Prunus avium	Wild Cherry	✓		<ul style="list-style-type: none"> Shallow root system can interfere with services
Crataegus monogyna	Hawthorn	✓		<ul style="list-style-type: none"> More readily available as a multi-stem

1.8 Native/naturalised* trees

Latin name	Common name	Notes
Alnus glutinosa	Alder	<ul style="list-style-type: none"> Fast growing tree. Good for inclusion in Public Open Spaces, Riparian Corridors and Buffer Zones. Aggressive water seeker.
Arbutus unedo	Strawberry Tree	<ul style="list-style-type: none"> Slow growing, evergreen tree. Treat as a shrub.
Betula pendula	Silver Birch	<ul style="list-style-type: none"> Light crowned. Fast growing.
Betula pubescens	Downy Birch	<ul style="list-style-type: none"> Suitable for augmenting existing riparian corridors. Aggressive water seeker.
Corylus avellana	Hazel	<ul style="list-style-type: none"> Rarely offered as a tree and usually multi-stemmed. Include as a whip in buffer zone planting. Include in native hedgerow mix.
Crataegus monogyna	Hawthorn	<ul style="list-style-type: none"> Rarely offered as a tree and usually multi-stemmed when it is. Include varieties of the Crataegus species in tree planting schedules. Include in native hedgerow mixes.
Euonymus europaeus	Spindle	<ul style="list-style-type: none"> Treat as a shrub and include in planting matrix.
Fraxinus excelsior	Ash	<ul style="list-style-type: none"> No longer available.
Ilex aquifolium	Holly	<ul style="list-style-type: none"> Tolerant of exposure.
Malus sylvestris	Crab Apple	<ul style="list-style-type: none"> Species and cultivars are good for small gardens. Include in Public Open Space, Gardens and Streets.
Pinus sylvestris	Scot's Pine	<ul style="list-style-type: none"> A large tree that is valuable in exposed areas. Suitable for large POS.

Latin name	Common name	Notes
Populus tremula	Aspen	<ul style="list-style-type: none"> Suitable for augmenting existing riparian corridors. Aggressive water seeker.
Prunus avium	Wild Cherry	<ul style="list-style-type: none"> Prunus tends to have a shallow root system and roots can be damaged by a mowing regime. Locate in planting beds, away from services and hard surfaces.
Prunus padus	Bird Cherry	<ul style="list-style-type: none"> Prunus tends to have a shallow root system and roots can be damaged by a mowing regime. Locate in planting beds, away from services and hard surfaces.
Prunus spinosa	Blackthorn	<ul style="list-style-type: none"> To be included in native hedgerow mix. Not available commercially as a standard tree.
Quercus petraea	Sessile Oak	<ul style="list-style-type: none"> Include in buffer zone whip planting. Limited availability in sizes over 6–8cm girth.
Quercus robur	Pedunculatae Oak	<ul style="list-style-type: none"> Include in buffer zone whip planting. Limited availability in sizes over 6–8cm girth.
Salix alba*	White Willow	<ul style="list-style-type: none"> Readily available as a tree and whip. Consider it for inclusion in flood, buffer and attenuation zones. Aggressive water seeker. Do not position near services or raft foundations.
Salix aurita	Ear Willow	<ul style="list-style-type: none"> Readily available as a whip. Consider it for inclusion in buffer zone planting. Aggressive water seeker. Do not position near services or foundations.
Salix caprea	Goat Willow	<ul style="list-style-type: none"> Readily available as a whip. Consider it for inclusion in buffer zone planting. Aggressive water seeker. Do not position near services or foundations.
Salix cinerea	Grey Willow	<ul style="list-style-type: none"> Readily available as a whip. Consider it for inclusion in buffer zone planting. Aggressive water seeker. Do not position near services or raft foundations.
Sambucus nigra	Elder	<ul style="list-style-type: none"> Valuable for pollinators and birds. Include in planting schemes as a large shrub.
Sorbus aucuparia	Rowan	<ul style="list-style-type: none"> Readily available in a wide range of varieties. Beneficial to pollinators and birds.
Sorbus hibernica	Whitebeam	<ul style="list-style-type: none"> Closely allied to Sorbus aria. Not readily available to the market. Consider using it in Buffer Zones as a whip. Use S. aria instead as a street tree.
Taxus baccata	Yew	<ul style="list-style-type: none"> Good tree for exposed sites. Poisonous.
Ulmus glabra	Wych Elm	<ul style="list-style-type: none"> Not for sale. Dutch Elm disease is still eradicating any saplings.
Viburnum opulus	Guelder Rose	<ul style="list-style-type: none"> Valuable for pollinators. Include in planting schemes as a large shrub.

* Salix alba has been included in this list as it is the only Salix readily available as a standard tree.

1.9 Native shrubs

Latin name	Common name	Notes
<i>Cornus sanguinea</i>	Dogwood	Tolerates inland exposure and damp soil.
<i>Cytisus scorparius</i>	Common Broom	Tolerates coastal exposure.
<i>Euonymus europaeus</i>	Spindle	Tolerates inland exposure and damp soil.
<i>Frangula alnus</i>	Alder Buckthorn	Pollution tolerant. Tolerant of coastal and inland exposure.
<i>Ligustrum vulgare</i>	Native Privet	Tolerant of coastal and inland exposure. Evergreen.
<i>Rosa canina</i>	Dog Rose	Tolerant of coastal and inland exposure.
<i>Rosa rubiginosa</i>	Wild Rose	Tolerant of coastal and inland exposure.
<i>Viburnum opulus</i>	Guelder Rose	Tolerates some exposure.

1.10 Cultivars of native herbaceous species

The following are examples of cultivars of our native species. In some instances, it is difficult to source native plants commercially. Often, cultivars are more capable of meeting the public's expectations of public space. Thinking laterally and considering cultivars of our native species will create more opportunities to create a perennial scheme with native characteristics.

Latin name	Common name
<i>Achillea millefolium</i> 'Terracotta'	Yarrow
<i>Ajuga reptans</i>	Bugle
<i>Anemone nemerosa</i>	Wood Anemone
<i>Anthriscus sylvestris</i> 'Ravenswing'	Purple Cow Parsley
<i>Armeria maritima</i>	Sea Thrift
<i>Betonica officinalis</i> 'Hummelo'	Betony
<i>Centaurea nigra</i>	Greater Knapweed
<i>Crambe maritima</i>	Sea Kale
<i>Digitalis purpurea</i>	Foxglove
<i>Geum rivale</i>	Water Avens
<i>Leucanthemum</i> 'Snow Lady'	Ox-eye Daisy
<i>Leucojum aestivum</i>	Summer Snowflake
<i>Lythrum salicaria</i> 'Blush'	Purple Loosestrife

1.11 Bulbs

The following bulbs can be incorporated into a meadow to increase the visual impact and increase foraging opportunities for pollinators.

Latin name	Common name
Crocus spp. in variety	Spring Crocus
Allium spp. in variety	Ornamental Onion
Eranthis hyemalis	Winter Aconite
Anemone nemerosa	Wood Anemone
Galanthus spp. in variety	Snowdrops
Ornithogalum umbellatum	Star of Bethlehem
Colchicum spp.	Autumn Crocus
Fritillaria meleagris	Snake's head Fritillary
Nectaroscordum siculum	Sicilian honey garlic
Gladiolus communis subsp. byzantinus	Gladioli
Camassia leichtlinii	Squamash
Muscari ssp. In variety	Grape Hyacinth
Leucojum aestivum	Summer Snowflake
Erythronium ssp. In variety	Dog's Tooth Violet
Hyacinthoides non-scripta	Bluebell

2. Grass seed mixes

2.1 Grass seed mixture for informal lawn areas

%	Cultivars	Common name	Species
30%	Bellevue	Perennial Ryegrass	Lolium perenne
30%	Amadeaus	Perennial Ryegrass	Lolium perenne
10%	Lobi	Chewings Fescue	Festuca rubra commutate
25%	Moccasin	Slender Creeping Red Fescue	Festuca rubra litoralis
5%	Highland	Browntop Bent	Agrostis castellana

2.2 Grass seed mixture for low maintenance lawn areas

%	Cultivars	Common name	Species
35%	Moccasin	Slender Creeping Red Fescue	Festuca rubra litoralis
30%	Crystal	Hard Fescue	Festuca longifolia
20%	Quatro	Sheeps Fescue	Festuca ovine
10%	Elysee	Smooth Stalked Meadow Grass	Poa pratensis
5%	Highland	Browntop Bent	Agrostis castellana

Some suggested further reading

British Standards

BS 3882: 1994	Specification for Topsoil
BS 3936: Part 1: 1992	Nursery Stock Part 1. Specification for Trees and Shrubs
BS 3998: 1989	Tree Work
BS 7370: Part 1: 1991	Grounds Maintenance Part 1. Recommendations for Establishing and Managing Grounds Maintenance Organisations and for Design Considerations Related to Maintenance
BS 1722: 1999	Fences
BS 5837: 2005	Trees in Relation to Construction – Recommendations

Design Manual for Quality Housing, Department of Housing, Local Government and Heritage.

Ciria; Case Study: Grey to Green Phase 1, Sheffield; www.susdrain.org

Planting Green Roofs and Living Wall (2013), Nigel Dunnett and Noel Kingsbury. Timber Press.

Rain Gardens: sustainable rainwater management for the garden and designed landscape (2008), Nigel Dunnett and Andy Clayden. Timber Press.

Stormwater Management Policy, Dún Laoghaire-Rathdown County Council.

Sowing Beauty: designing Flowering Meadows from Seed (2017), James Hitchmough. Timber Press.

The know maintenance perennial garden (2019), Roy Diblik. Timber Press.

www.greytogreen.org.uk



clúid housing

Clúid Housing

159–161 Sheriff Street Upper
Dublin D01 R8NO
Ireland

Phone: 01 707 2088

Email: cluid@cluid.ie

www.cluid.ie

Clúid Housing Association CLG (Clúid) is registered in Ireland
Registered Company Number 212249
Registered Charity Number 20029975
CHY Number 11171
PSRA Licence Number 001415

