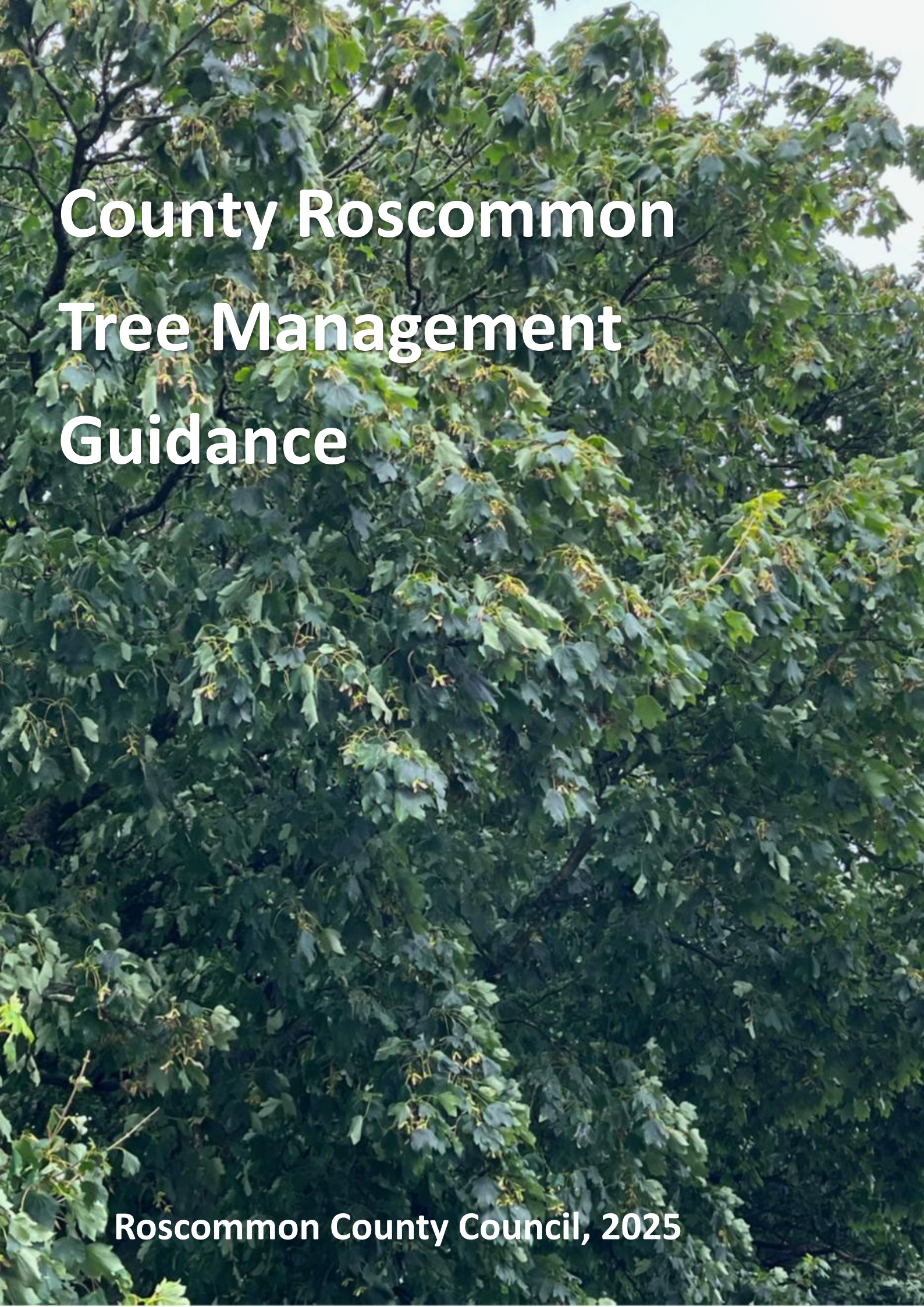

County Roscommon Tree Management Guidance

Roscommon County Council, 2025

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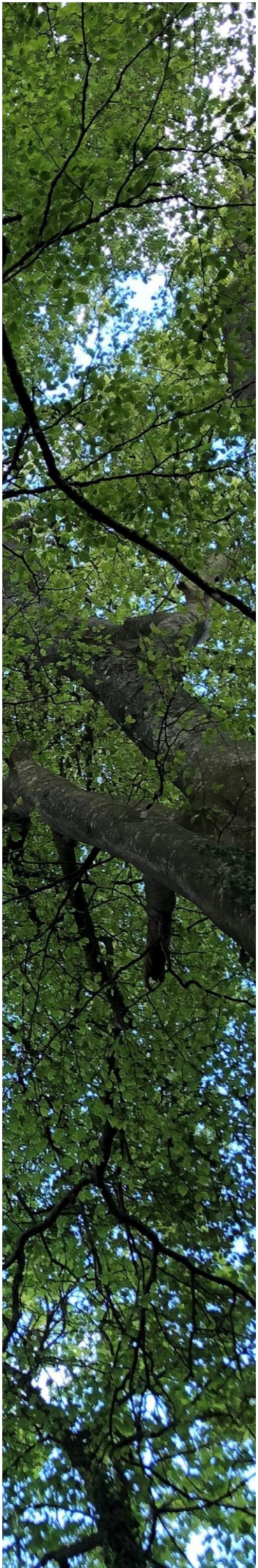
Fig Frontispiece: Sycamore, mature crown, summer
Fig 1Mature crown, plane tree in winter



Introduction

In the light of the climate emergency, trees outside the forest have taken on new scientific importance. Trees are now seen as fundamental for human health and well-being, and at the heart of the battle against climate change and biodiversity loss.

Seeking to enhance the county resource, in 2022, Roscommon County Council commissioned advice on the good management of trees. Prepared in association with University College Dublin through UCDConsult[1] amended and revised by Roscommon County Council.

The document sets out internationally-recognised 'best-practice' approaches that seek to enhance overall tree canopy and health through informed 'tree-positive' management[2]. Information is for the local authority and employees, as well as developers, consultants, contractors and interested members of the community. The aim is to raise awareness of trees as a precious living resource, of how they grow, why climate-appropriate management is important and what it involves.

The following pages provide context about Roscommon's existing trees, and technical guidance concerning:

- the care of existing trees
- the planting and growing of new trees
- planning for trees, protection of existing trees, and trees in development sites

Guidance concerns trees 'outside the (commercial) forest'. These are known as amenity trees. Such trees grow in many settings: on private and public land, on farmland, in towns and villages, woodlands and hedgerows, as free-standing individuals, in small groups and alignments, alongside rivers and roads, in town parks and street pavements, in school grounds and cemeteries, in commercial, industrial, and residential developments, and in front and back gardens.

Managing trees to enhance the county tree resource is an important climate action.

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1 see https://people.ucd.ie/sophia.meeres, and https://www.goodwin-arborist.com/
2 TDAG https://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_treestownscape2021.pdf

Fig 1 Mature crown, beech tree in early summer

Context

The aim is for Roscommon's communities to benefit from the full range of ecosystem services provided by healthy growing trees such as climate action, biodiversity enrichment, quality of public realm and amenity, and human well-being.

The following points of reference directed development of this guidance:

- The importance of trees and hedgerows in relation to climate change, biodiversity and green infrastructure;
- The management, conservation and augmentation of trees in urban areas, in accordance with good planning practice and climate change policy;
- The management, conservation and augmentation of trees on roadsides, to ensure maintenance of existing habitats without compromising road safety;
- Guidance in relation to tree planting in the planning and design of new housing developments;
- Guidance on appropriate tree planting along water courses, with emphasis on bank restoration, stabilisation, reduction of erosion and siltation, habitat creation/ preservation and general improvement in water quality;
- Tree survey recommendations;
- Guidance in relation to diseases such as Ash Dieback on publicly owned lands, and how affected/healthy trees may be managed;
- Guidance in relation to maturing trees causing damage to kerbing and footpaths;
- Consideration of and reference to other guidance documents such as "A Guide for Landowners to Managing Roadside Trees" and Department schemes such as "Woodland Creation on Public Lands Scheme".
- Guidance on the creation of native woodlands on publicly owned lands;
- Guidance for landowners on managing roadside trees;
- Guidance on planting in flood plains and flood relief zones;
- Cross-referencing with the All Ireland Pollinator Plan to ensure appropriate planting of species;

This document is prepared in support of actions referred to in the Local Authority Climate Action Plan 2024-29 (LACAP) and may inform preparation of a County Green Infrastructure Strategy, in accordance with the County Development Plan 2022-28 (CDP) and LACAP, and other future plans and strategies.

Policy context

This guidance sits within the existing policy context as supplementary guidance and potential input into future strategies to be prepared under existing statutory plans. These include, but are not limited to;

- Under the LACAP 2024-29, the development of nature-based solutions and biodiversity enhancement measures, implement Urban place-making initiatives, develop a GI strategy, habitat consolidation, climate aware management of LA assets and landbank, implement the tree management strategy to promote canopy health and expansion, and sustainable management of public open spaces guidelines, develop community based NBS, prioritise NBS and implement tree management in DZ.

- The strategic aims of the CDP 2022-28 include elements to improve the attractiveness of settlements, utilizing natural assets including heritage and landscape character to promote population and economic growth in appropriate areas. Objective 4.7 relates towns and villages and to the enhancement of the public realm in support of these strategic aims.

- In the rural area, specific Forestry objective 5.9 encourages the planting of diverse, native tree species in support of biodiversity.

- In terms of climate action, objective 8.2 seeks to positively contribute to climate action and urban and rural green initiatives in particular. Green infrastructure provision in the context of development is addressed at 8.15 &16. Objectives 8.22 – 25 address NBS through stakeholder engagement, awareness raising and integration into development for adaptation and mitigation measures and to protect the biodiversity and ecological value of wetlands throughout the County.

- Natural Heritage Objectives 10.1 & 10.2 ensure the protection, conservation and enhancement of biodiversity and the implementation of the biodiversity and pollinator plans at national and local level. 10.6 requires new developments to identify, protect and enhance ecological features, while 10.13-15 address the importance of hedgerows and the need for these to be maintained and enhanced with provision for road safety. 10.19- 20 refers to the protection and enhancement of biodiversity through maintenance and enhancement of the quality of riparian corridors. 10.26 refers to views and prospects/ landmarks and features in rural and urban areas and their protection. 10.28-31 relates to the preparation of a green infrastructure strategy.

- Social, community and cultural development objectives 11.14 – 17 refers to the protection, provision and quality of open space and amenity, incorporating sustainable management practices.

- Development management standards contain a range of provision relating to the preservation and enhancement of biodiversity and landscape quality in particular. Ch. 12 refers to the need for design statements addressing green infrastructure and open space provision, rural housing design taking into account landscape character, siting and integration. Visual impact statements, advice on backland development and urban character can all be potentially informed by the guidance in this document.


WARNING
CHRISTMAS LIGHTS
MAX. HEIGHT
14' 6"

PART ONE:

Trees in context

1 The importance of trees

In the past, trees outside the forest, or amenity trees, were valued as ornamental, and sometimes seen as a luxury. Today however, trees are recognized as essential for human well-being[3] for the health of the natural world and for their potential in moderating climate change and mitigating its effects.

Roscommon's trees:

- Are a part of our culture and heritage
- Create a sense of place in a neighbourhood
- Bring natural beauty and nature into towns and villages, mark the seasons
- Encourage outdoor exercise, improve health and well being
- Encourage children to play outside, to explore and learn about the natural world
- Provide habitat for wildlife, enrich biodiversity
- Help maintain soil and soil-life in good health
- Help clean, cool and oxygenate the air that we breathe
- Provide shelter, reduce storm water run-off and flooding.
- Sequester carbon, regulate microclimates and can help reduce costs of heating and cooling

The natural functions performed by trees, and their benefits, are often referred to as ecosystem services and benefits.

1.1 Community benefits

Time spent amongst trees helps reduce anxiety and depression. They help improve physical and mental health by encouraging walking, cycling and spending time outside[4]

Trees entice children to play outside. Studies consistently show that leafy green neighbourhoods are desirable and safe, that mature trees contribute to the value of houses, to the well-being of residents and to the richness and attractiveness of the local environment.

1.2 Environmental benefits

Trees help manage rain, they help reduce local flooding, soil erosion and pollution of watercourses. They humidify, cool and clean the air by trapping and filtering dust and pollution. They provide shelter from the sun, wind and rain, protect livestock in the field and help keep towns cool. Their leafy canopies provide privacy and can help baffle traffic noise.

Fig 4 Market Square, Roscommon Town

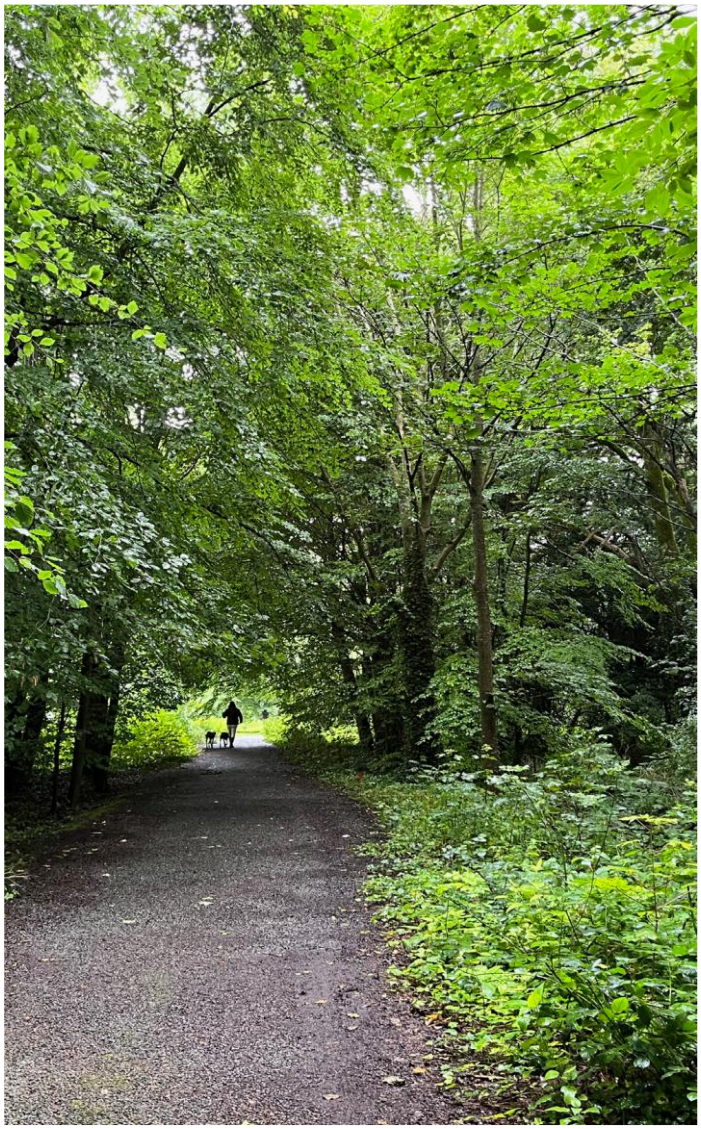

Fig 5 Woodland walk, Strokestown House

3 Turner-Skoff Jessica B, Cavender Nicole. ''The benefits of trees for livable and sustainable communities''. Plants, People, Planet. 1(4) (July 2019); 323–335. https://doi.org/10.1002/ppp3.39 ,

4 Fransen, Bas. "How trees benefit mental and physical health". Ecomatcher. September 11,.2023. https://www.ecomatcher.com/how-trees-benefit-mental-and-physical-health .

Fig 6. Apple Orchard, private garden

Fig 7. Native red squirrel

1.3 Financial benefits

Trees raise the value and attractivity of places too; they help raise property values. Their moderating influence helps regulate temperatures and reduce cost of heating and cooling. The Woodland Trust[5] estimates that savings of up to 60% in grass-mowing and maintenance costs can be made by growing woodland patches in residential estates and public parks.

1.4 Wildlife benefits

Trees, woodlands and hedgerows provide habitat for thousands of different types of bird, as well as bats, bees, butterflies, beetles, pollinating insects, other invertebrates and mammals. Red squirrels, pine marten, foxes, hare, shrew, badgers, even deer – all thrive where there are trees. Even the soil below teems with life – from fungal mycelium to earthworms, and burrowing rodents such as field mice.

Mature trees and hedgerows are especially valuable; in towns too, trees provide habitat for wildlife – even a tiny patch of urban woodland can be a biodiversity hotspot[6]

5 Woodland Trust. "Why we need trees". https://www.woodlandtrust.org. uk/trees-woods-and-wildlife/british-trees/benefits/

6 Croci, Solene., Butet, Alain., Georges, Anita. et al. "Small urban woodlands as biodiversity conservation hot-spot: a multi-taxon approach". Landscape Ecol 23, 1171–1186 (2008). https://doi.org/10.1007/s10980-008-9257-0

Fig 8 The Benefits of Treed (Image source: Dun Laoghaire-Rathdown County Council. A Climate for Trees. Tree Strategy 2024-2030

1.5 Why manage trees

Many of us imagine trees as growing naturally and thriving without human help, but most trees in Ireland today were planted and we are responsible for them. Today's trees must survive a difficult man-made environment that can radically shorten their lives – and yet, as research shows, the larger trees grow and the longer they live, the more ecosystem services and benefits they provide.

In towns, it can take decades for a street tree to become carbon neutral, and many more for it to deliver a full range of benefits; when planted and managed well, trees can live for hundreds of years and increase greatly in value as they mature.

It follows that good management seeks to ensure the healthy growth and long life of individual trees as well as the overall resource (resilience to climate change, pests and diseases) and minimal risk of damage where trees grow near buildings, roads or public areas.

Fig 9 Mature oaks, housing estate, Ryde.

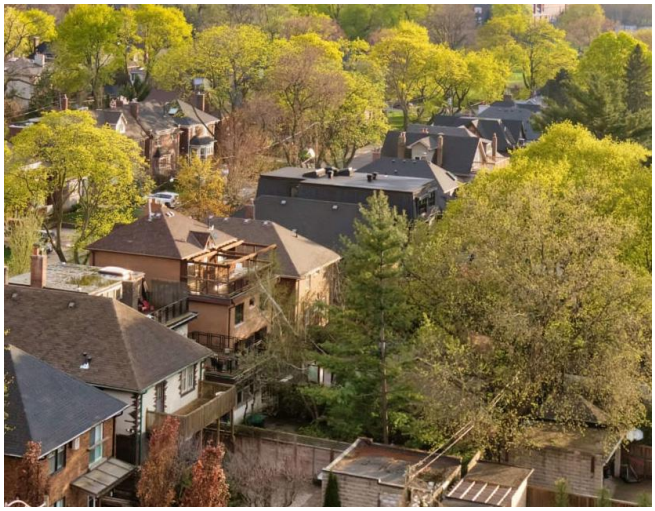

Fig 10 Urban forest, Toronto.

Fig 11 Clipped yew

2 Understanding trees

2.1 How trees grow

A tree is a free-standing woody plant that has the potential to grow to at least 5m in height. Most trees have a distinct crown and one or more well-developed stems (or trunks). A tree's trunk is anchored below ground by a branching root system; aboveground, it supports an intricate canopy of branches, twigs and leaves.

Trees grow in two ways: upwards and outwards. The tips of a tree's branches and roots lengthen (the tree becomes taller, spreads further, its roots reach wider) and, at the same time, a tree's branches, stem and roots all put on wood (they fatten). This process continues until a tree reaches maturity. When a tree stops growing in height and breadth, it simply puts on wood around its stems, branches and roots. The older the tree, the fatter the trunk. The age of a tree can be estimated from the girth of its trunk; once felled, the life story of a tree can be told by its "rings". Trees grow and adapt to their environment until they reach a balanced size and shape. Depending on growing conditions, management and a tree's tolerance to cutting, they can vary enormously in appearance: be clipped into hedges, cut into lollipops, grow as multi-stemmed clusters or into tall free-standing specimens.

Trees are evergreen or deciduous. Deciduous trees lose their leaves in the autumn and grow new ones in the spring. Evergreen trees renew their leaves continually and so always appear green.

Fig 12 Veteran trunk

Fig 13 Annual growth rings

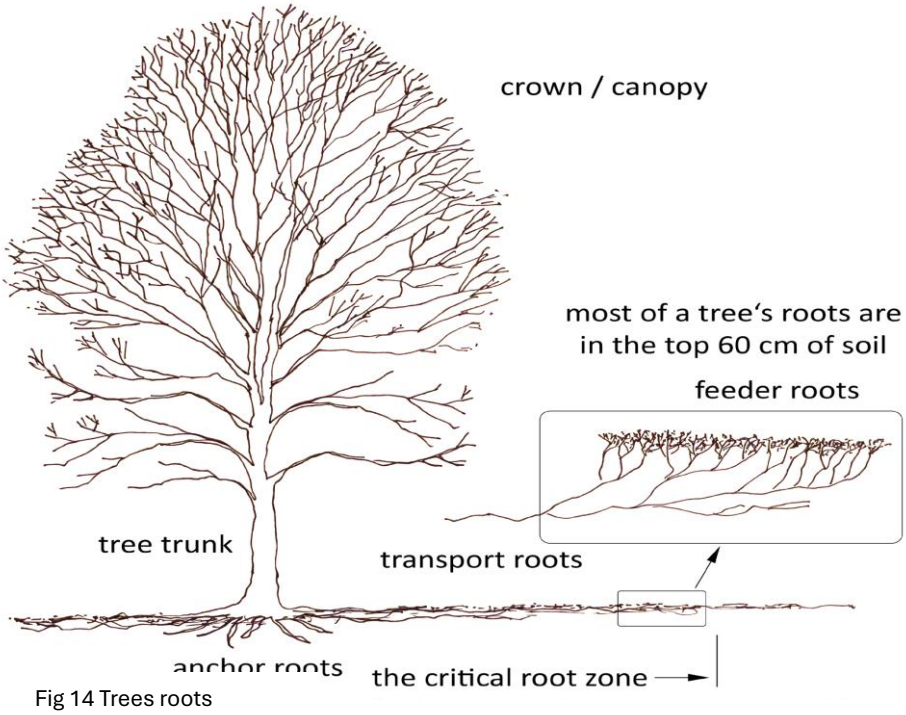

Fig 14 Trees roots

2.2 What trees need to thrive

Trees need soil, water, sunlight, air and space - above and below ground, for their canopies and roots.

Underground, trees form a large, complex, branching network of roots and fungi, that serves to hold the tree in place, and to uptake water and nutrients. A tree's roots will spread far in search of good soil, food, air and water in a system that is surprisingly shallow. Most roots are in the top 1m of soil, the further from the trunk- the finer, more branched and shallower they are. The better the conditions underground, the better the tree. The better the soil, the better the tree.

Above ground, the natural size and shape of a plant depends as much on environmental conditions (light, wind, shade, soil, space) as it does on the genetics of that species of tree. The most important consideration when planting new trees is to identify sites where trees will thrive and grow naturally. This means choosing sites that suit the needs of the trees and choosing trees that will thrive in the conditions provided by each site[7]

7 Collins, Kevin (ed). "Amenity Trees and Woodlands." Dublin: Tree Council of Ireland, 2010, 7-14.

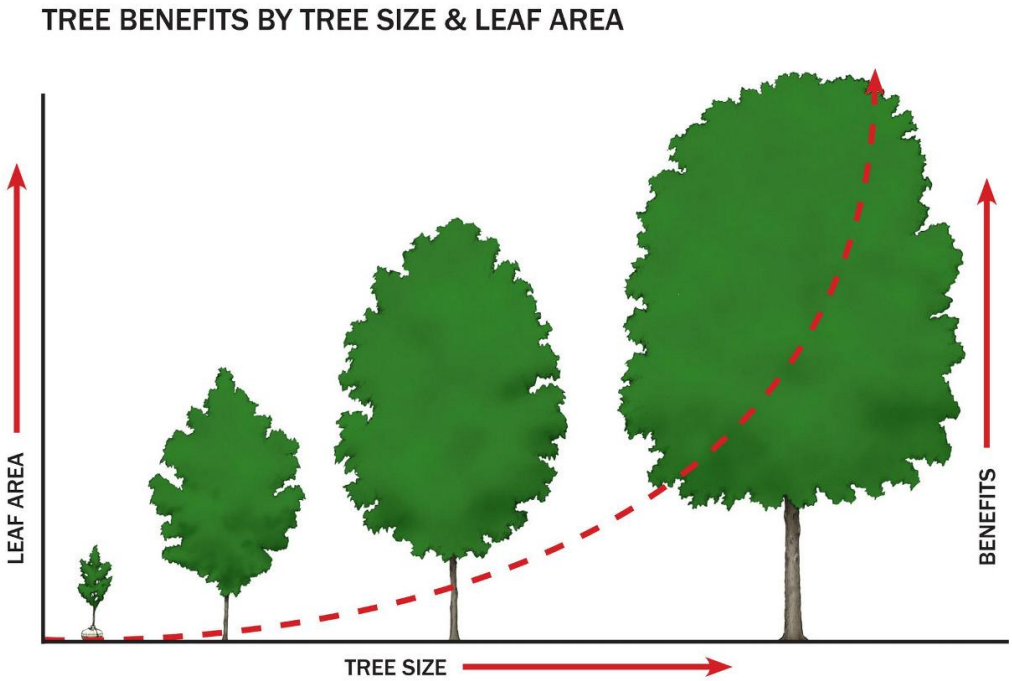

Fig 15 Canopy matters (image source Dr Andy Kenney)

2.3 Canopy matters

The canopy is the green layer of leaves and branches formed by a tree's crown. The canopy area of a tree is equal to the area of ground under its crown[8].

Research shows that new trees often live short lives. Planting trees is pointless if they die within a few years or fail to thrive and for this reason, measurement of the overall canopy provided by the trees in a place is considered more important than numbers of trees. Canopy area is linked to the value of ecosystem services, and often used as a proxy for the benefits that flow from trees.

Trees in private gardens, school grounds, church yards and the public realm all contribute towards a town's canopy cover. Canopy is not related to land use – lots of different activities can take place beneath trees.

A public street or car park can benefit from tree canopy cover, it depends on the presence of maturing large-growing trees[9]

Fig 16 Over pruned street trees, Arklow

Fig 17 Leafy green avenue, Dublin

8 Forest Research. "Tree Canopy Cover Leaflet". https://cdn.forestresearch.gov.uk/2022/02/fr_fc_treecanopydata_leaflet.pdf .

9 Doick, Kieron. "Defining Urban Tree Canopy Cover". GreenBlue. October 18, 2018. https://greenblue.com/gb/ discussing-urban-tree-canopy-cover/

Roscommon County trees: baselines and trends

3.1 Tree 'canopy' cover

In the past, there was no record of trees outside the forest. However, in 2023, in a commitment to its trees, Roscommon County Council purchased the county portion of the Bluesky National Tree Map (NTM). This digital map, based on high-resolution aerial photography, locates trees of 3m in height and can be viewed on the County website[10]

The location, height and canopy area of every tree, including trees in the forest, is recorded in the Roscommon County Tree database (NTM). This allows canopy to be measured for the whole county, for an entire town, a neighbourhood or single site. The database identifies almost 4 million trees in County Roscommon. Altogether, the canopy of these trees covers almost 13% of the land.

There are approximately 30,000 trees on council land; these grow alongside the motorways (M7, M8), in other pockets of rural land and in the urban public realm: in public parks, streets and other open spaces such as council owned cemeteries and housing estates. Overall canopy on council land is 12%.

3.2 'Urban forest'. Canopy by settlement

The urban forest includes any trees that grow within the boundaries of towns and villages, on public land as well as private land and in gardens. Tree canopy cover has been mapped and calculated for each settlement (Appendix 1).

Canopy in Roscommon settlements averages 12.5% but this figure varies considerably between and within settlements. Strokestown has an overall canopy of 25%, Roscommon town 9%. A closer assessment reveals that Strokestown trees grow mainly in the historic demesne; in the rest of the town's public space, tree canopy cover is low (as low as 3%).

A pattern is repeated across the county; trees are often present in fields and hedgerows, in the gardens of older properties, in historic demesnes and in golf courses. Smaller settlements tend to benefit from 'borrowed' views of the surrounding landscape. However, trees and hedgerows were often removed to facilitate development during the Celtic Tiger, and many newer residential areas still lack canopy.

10 https://roscoco.maps.arcgis.com/apps/instant/media/index.html?appid=9a01a4a02da34848a248d4b8731a6319

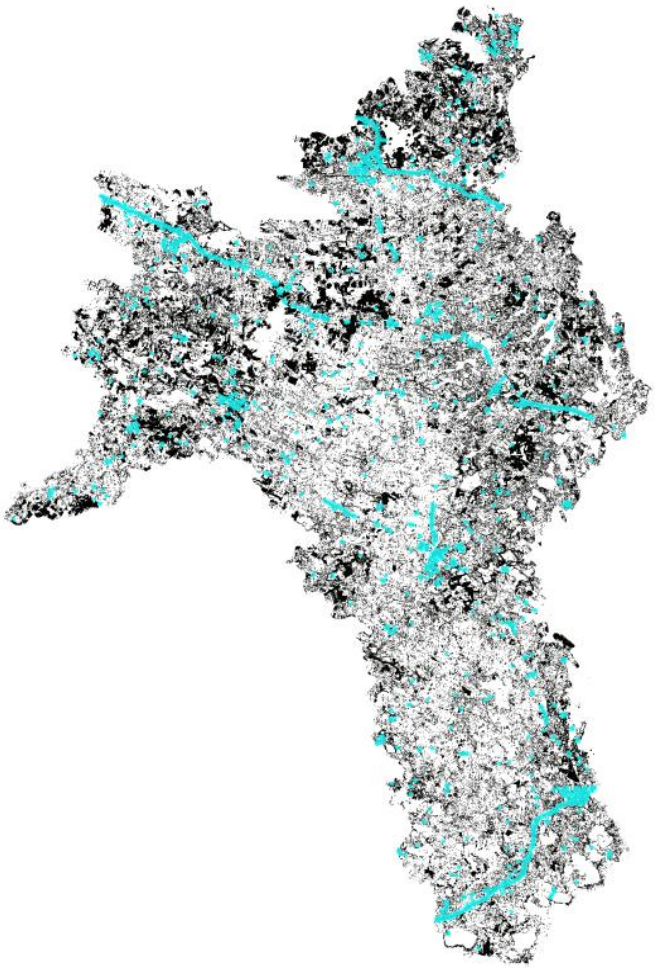

Fig 18 Roscommon in trees shown in blue (2019)

3.3 Trends affecting the urban forest

As land is developed, opportunities arise to incorporate mature trees, hedgerows and even tiny patches of woodland into urban and suburban sites. It is not always an obvious choice and, in the past, financial and technical constraints led to the loss of trees and hedgerows as a normal consequence of development. This is no longer the case today; in new development, remaining trees are valued, and attempts are always made to conserve them.

In the context of urban regeneration and town and village renewal, many new public realm trees have been planted. There is no longer any question about the value of trees in urban areas and there are further opportunities for improvement. Availing of them would help realise the potential benefits of trees, and their ecosystem services.

In many towns and villages, however, commercial development has created almost entirely treeless zones. There are few trees in purpose-built shopping centres, even fewer in industrial areas, and many more opportunities to upgrade the environment. Case-by-case study is required to identify them.

Fig 19 Roscommon: Commercial and Industrial zones lack trees

Fig 20 Roscommon: Shopping centre – room for more trees

Trees planted in residential development twenty or thirty years ago should be large and healthy by now, new areas of housing should be leafy and green. There are notable exceptions, but green open spaces are too often dominated by grass, with trees planted in the wrong place, or in poor conditions, in small pits, beside pavements, with insufficient root space and in compacted soil. Small-growing short-lived species (such as birch) have been preferred over large, long-living species (such as oaks, lime or beech).

There are opportunities for canopy improvement in almost every residential, commercial and industrial neighbourhood. Further study is required to identify them, and so help realise the potential benefits of trees[11].

11 https://iucn.org/our-work/topic/iucn-global-standard-nature-based-solutions

3.4 Community planting schemes

Several small success stories demonstrate the desire of communities to improve their environments.

A tiny new woodland supported by the DAFM[12] (Department of Agriculture, Forestry & Marine) Neighbourwood scheme has been created in Elphin where almost 5,000 oaks, Scots pine, birch, alder, hazel, rowan, lime and holly trees were planted by a team of community volunteers. There are opportunities for such initiatives in almost every neighbourhood, with funding available across a number of areas[13]

12 https://www.teagasc.ie/news--events/daily/forestry/palace-neighbourwood-park--connecting-a-community-with-their-environment. php .

13 https://www.teagasc.ie/crops/forestry/grants/neighbourwoods/

3.5 Trees in the countryside

Roscommon is a rural county, it includes extensive areas of open pasture in addition to wetlands, peatlands, bogs, mountains and lakes that present a unique natural heritage not usually associated with woodland. The countryside nevertheless includes significant areas of commercial forest, as well as important protected woodlands in addition to tiny pockets of mixed, deciduous and native woodlands scattered across the county, mainly on private land.

At 2.6 ha. St Johns Wood[14], part of the Lough Ree Special Area of Conservation (SAC), is one of the Ireland's largest surviving ancient woodlands. Ancient woodlands are defined in Ireland as areas that have been wooded since 1660.

Several other woodlands associated with demesnes: Rockingham, now part of the Lough Key Forest[15]
Kilronan Castle and Strokestown House, as well as Coillte-owned broadleaved woodlands at Mote Park[16]
Loughglinn and Drumalagagh have all been under continuous woodland since the 1830s and are defined as "long-established"[17]

In addition to woodlands, Roscommon contains exceptional individuals that are identified as county and national 'Champion Trees'. A lime tree at Strokestown Park stands at 25m tall with a girth of 9m and is recorded as one of the largest trees in Ireland. Other ancient or 'Veteran' trees, of noted heritage and historical importance, have also been included in the Tree Register of Britain and Ireland (TROBI)[18], the Tree Register of Ireland (TROI)[19] and the Heritage Tree database[20]

14 https://www.nativewoodlandtrust.ie/st-johns-wood
15 https://www.coillte.ie/site/lough-key-forest-park/
16 https://www.coillte.ie/site/mote-park/
17 https://www.npws.ie/research-projects/woodlands
18 https://www.treeregister.org/
19 https://www.treecouncil.ie/tree-register-of-ireland
20 https://data.gov.ie/dataset/heritage-trees-of-ireland

Fig 23 Bluebell walk, Mote park

Roscommon is also home to hundreds of thousands of isolated trees, small groups of trees and woodland fragments as well as thousands of kilometres of hedgerows. Roscommon's hedgerow network is an asset to the county in terms of agriculture, landscape, wildlife, water quality, carbon sequestration, employment, and as a material resource. Foulkes and Murray's 2004 survey estimated a total length of approximately 15,500 km of hedgerow. However, only 5% of these hedges were found to be "species rich", with almost two-thirds unmanaged and a significant proportion under threat of abandonment[21].

Although protected under the 2014 Forestry Act, and linked to farm payments, mature trees, groups of trees, and hedgerows are vulnerable to gradual removal, and permanent loss.

New funding opportunities encourage agroforestry and the planting of small woodlands, including areas of trees on private and public land[22], however, outside urban areas, grants are linked to soil-type. Trees should not be planted on peat, and efforts are being made to remove spontaneous woodlands growing on cutaway bogs[23]. Examples are Drumalogh Bog, Cloonshanville Bog and Lough Ree Bog whch are all actively being restored[24]. Nevertheless, there are opportunities for woodland, hedgerow and tree planting (outside the forest) all across the countryside, see for example the Native Tree Area Scheme[25].

21 Foulkes, Neil and Murray, Anja. "County Roscommon Hedgerow Survey Report". The Heritage Office, Roscommon County Council. 2005
22 https://www.teagasc.ie/crops/forestry/grants/
23 www.raisedbogrestoration.ie
24 Giorra Environmental Services and Fuller, J., 'Nature and Wildlife in Roscommon, Action for Biodiversity.', Roscommon County Council, 2012
25 https://teagasc.ie/crops/forestry/grants/native-tree-area-scheme/

Fig 24 Roadside hedgerow tree

3.6 Ash dieback

Ash dieback disease threatens to wipe out 90% of Ireland's ash trees within the next twenty years[26]. The loss of ash in hedgerows, woodlands, parks and gardens will have a major impact on the wildlife, biodiversity and character of the countryside. Most ash trees beside roads and other occupied areas are on privately owned land, and the management of these trees is a concern. Large dead and dying ash trees could present a danger to road users, nevertheless the large-scale removal of healthy ash is neither desirable nor advised. Disease tolerant trees will help create the gene bank that returns ash to Ireland's countryside. Heavily infected ash trees should be removed if they present a potential risk to the public, but felled trees should be replaced. See section 1.11 for guidance concerning ash.

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26 https://www.teagasc.ie/crops/forestry/research/ashforfuture/

Fig 25 Street tree, Stroketown

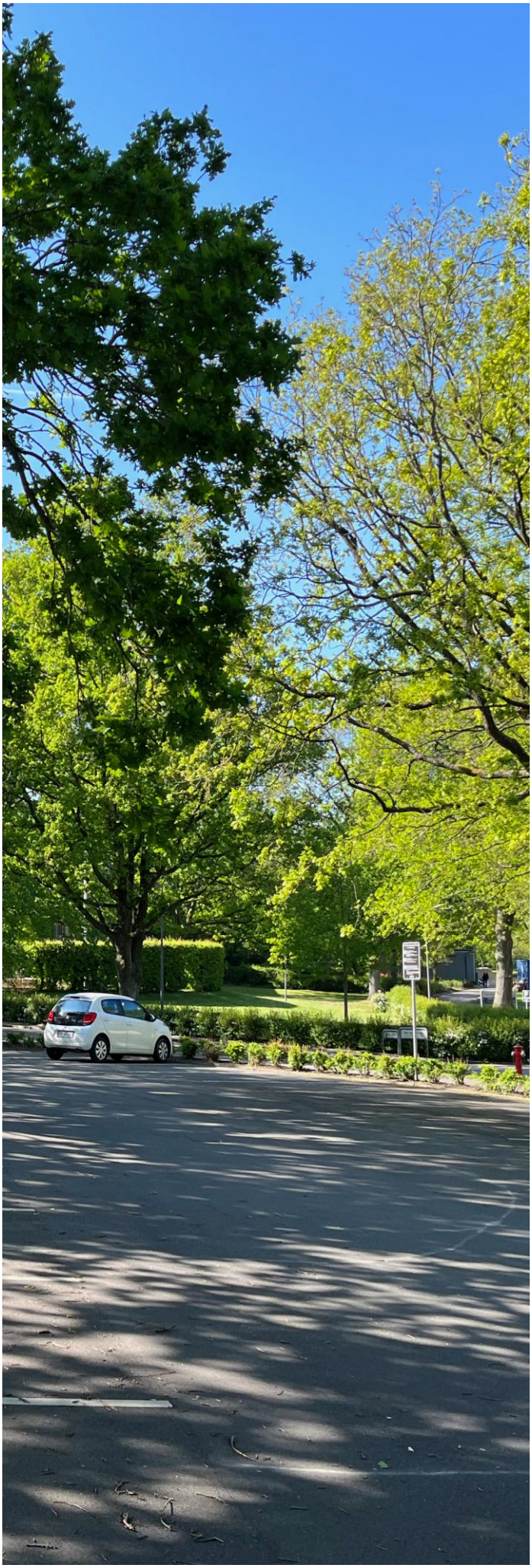
3. 7 Summary

Tree canopy is not evenly distributed across the county, in either urban or rural situations. Closer study is required to understand causes (soil, ground water, land-use) and identify opportunities to increase canopy, particularly in urban areas.

- Most trees in Roscommon's towns and villages are privately owned (they grow in gardens). In the countryside this is also the case, trees grow mainly on farmland, in hedgerows, including roadside hedgerows.
- Ash is Ireland's most common large native tree, it comes second to hawthorn as the most frequently planted hedgerow tree. Ash dieback will fundamentally alter the ecological health and character of the Roscommon countryside.
- Across Roscommon' settlements, canopy tends to be concentrated in sites that are associated with historical demesnes.
- Trees in towns face obvious challenges including competition for space, compacted soil, vandalism, poor design and planting practices and insufficient aftercare.

The following section offers simple technical advice to do with tree care. It sets out the basis of a consistent best-practice approach that aims to enhance overall tree canopy and health through well-informed, climate appropriate management and is useful for anyone that has (or wants) trees on their land.

Fig 26 Urban canopy, Roscommon Town



PART TWO:

Guidance

1 Managing Existing Trees

In the light of climate change, international best-practice advice is to shift away from a problem-driven, reactive approach towards a more coherent, systematic approach to management that focuses on the value and benefits of healthy growing trees. A climate positive response entails a planned, proactive and positive approach to the growing and conservation management of trees; it maximises the services and benefits that trees provide by promoting safe healthy growth.

This chapter sets out the main priorities and technical principles that describe best-practice management of existing trees. The section commences with general principles that apply to trees in all settings, before considering trees in specific settings. The final section is specific to ash, which because of ash die-back disease, requires annual monitoring where trees grow alongside roads or in or beside other spaces that are accessible to the public (streets, parks, schools etcetera).

1.1 General best practice principles

In the immediate future, conserving existing trees will more effectively mitigate the current climate and biodiversity crises than planting new ones. Replacing the carbon stored in a single large tree can require the planting of several thousand new ones and a large area of land. Young trees can take decades to become carbon neutral and many more to match the climate and other benefits of mature trees. Therefore, conserving mature trees and the root-soil systems upon which their health depends is key to climate appropriate management.

- Good management assesses trees knowledgeably and implements the minimum necessary intervention. The principle is set out in the British Standard BS 3998: 2010 Tree Work – Recommendations[27]
- The risk of mature trees causing injury or damage is extremely low and can be kept minimal by routine monitoring (see Section 1.2).
- The first principle of good management is to avoid removal of mature and semi-mature trees, wherever possible and sensible. Tree removal (felling) should normally occur only where obvious and immediate instability of a tree has been identified, and removal is unavoidable for public safety; where appropriate this should be on the advice of a qualified arboriculturist. Reasonable solutions that remove injured or unhealthy parts of a tree rather than the whole tree are always to be preferred.
- Most mature trees do not require repeated pruning; unnecessary pruning wastes resources and damages and devalues the trees. The benefits of pruning should always outweigh the damage and expense of undertaking it. When such pruning is undertaken, whether by in-house or by outside contractors, it should be by properly trained operatives, to accepted technical standards. All tree works should be undertaken in accordance with BS 3998[28] and the European Tree Pruning Standard (EAS, 2021)[29].

27 The British Standards Institution. ''BS 3998:2010 – Tree work - Recommendations''. December 2010. https://www.westberks.gov.uk/media/50570/CD17-2-BS3998-2010-Tree-Work-Recommendations/pdf/CD17.2_BS3998.2010_Tree_Work__Recommendations.pdf
28 'BS 3998:2010 – Tree work – Recommendations'
29 European Arboricultural Standards (EAS). "Tree pruning. European Tree Pruning Standard". 2021. https://files.site.forpsi.com/45/ad/45adb65a-ded2-4fdf-8024-f7b9dee9b9ad.pdf

- Trees should not be felled or pruned in response to minor issues.
- When the council receives a request to cut trees under its management, the matter should be investigated by a suitably qualified Council employee or professional arboricultural expert.
- Tree works that may have a significant impact on the character of a local area, including the felling of healthy trees, for any reason, should be carefully considered with the benefit of appropriate professional advise
- Non-urgent tree works must be planned to take place outside the bird nesting season. It is an offence (Wildlife Act 1976) to damage nests that are in use or being built between March and September, and to interfere with vegetation that may house nesting birds during the spring and summer months. Such vegetation includes trees, hedges, woody shrubs, climbing and rambling plants such as brambles or ivy.For this reason, non-urgent tree works must be planned to take place outside the bird nesting season.

Required arboricultural expertise

- When important trees are in question, recognised professional arboricultural expertise should be employed to assess, inform and advise on best-practice management options.
- Similarly, where tree work is required, and there is no suitably qualified in-house staff available to undertake the work, approved reputable tree surgeons / tree work companies should be employed to undertake pruning, cabling, soil amelioration or felling (removal) works.

Approved consultants/contractors

- Consultants should be recognised, professionally qualified arboriculturists, with a level-8 (university) qualification in arboriculture and/or meet the requirement for Professional membership of the Arboricultural Association[30].
- Consultants should be independent of tree surgery or landscaping contractors.

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30 The Arboricultural Association;
https://www.trees.org.uk/Branches/ Ireland

1.2 Monitoring and assessment of trees

When the condition of a tree is assessed competently, informed decisions can be reached. On the foot of an assessment, no further action may be required, further expert assessment may be required and/or tree work may be recommended. A short written and photographic record should be kept of all assessments.

In addition to informal (passing, or passive) observations, there are 3 levels of assessing the condition of trees.

Level 1

- Level 1 is a basic assessment that can be undertaken by a trained Council employee or other individual as part of routine monitoring or in response to a notification from the public. This is a brief visual check for any obvious and immediate danger such as a partially collapsed, split or dead stem or large branch. A Level_1 assessment may be carried out from a vantage point, or as a drive-by, but is preferably undertaken on foot. Any trees of concern or doubt should be noted for a level_2 assessment.

Level 2

- Level 2 is a professional (standard survey) level inspection of each individual tree of concern. This may be undertaken by a Council employee with at least basic tree risk assessment competence training or, more usually, by a technician-level arboriculturist or forester. A senior consultant arboriculturist is employed if the trees are of special importance and value, critically located, or contentious.

Level 3

- Level 3 is a detailed expert assessment. Rarely required, an expert assessment may be recommended on the foot of a level 2 inspection if further information is essential to reach a decision about a tree of special importance and/ or critical location. An expert assessment may involve diagnostic equipment such as acoustic tomography, or motion sensor testing, or employ air-spade excavation or aerial inspection, for example.

Note

When assessing tree condition, the following should be remembered:

- Trees are living organisms which reach and maintain a relatively stable height and crown size at maturity. At maturity, the diameter of the stem (trunk) and main roots and branches slowly continues to increase.
- Healthy trees are normally well-adapted to their environment and maintain perfectly adequate factors of safety relative to the mechanical loading they normally experience (weight of branches, wind, snow). This situation can be disrupted by certain conditions or injuries, or sudden changes in their above or below ground environment.
- There is considerable variability in longevity and size between species, and between different individuals of the same species.
- The roots of most mature trees stay within the upper 2m of soil, the vast majority within 1m. The morphology (form) of root systems varies with species, but its depth and lateral extent is largely a function of site soil conditions. Roots breathe; therefore, the roots of most species cannot survive prolonged water-logging, or severe soil compaction.

1.3 Tree works (best practice)

Felling

- Trees (on public land) are normally felled only where an informed arboricultural and engineering decision deems it necessary for health and safety and/or the most reasonably practicable intervention in the circumstances
- Removed trees are replaced by new tree planting if appropriate to the setting, where adequate future-growth space above and below-ground is present, informed by a site assessment and decided on a case-by-case basis.
- Healthy, intact trees (on public land) are not removed as an expediency, or in response to complaints.

Crown lifting

- For security or pedestrian clearance the lowest crown branches may sometimes need to be removed. This is best undertaken when trees are young; a minimum crown of 2/3 of the total height of the tree should be maintained. Semi-mature trees may require gradual crown-lift pruning, undertaken in two or three phases over ten years, reducing and removing the lowest temporary crown until the permanent lower crown is at the required height above ground for pedestrian (2 m) or vehicular (5 m) traffic.
- Otherwise, only occasional minimal management intervention is normally required; for example, pruning to remove larger unstable dead branches or branches broken in storms.

Topping

- Trees are sometimes perceived as being 'too big' or 'too tall' and pruning to reduce their height can be requested by individuals. Reduction pruning is very rarely justified and is often counter-productive, it generates significant expense, disruption and emissions. Trees reach and then maintain a natural mature height and size relative their wind and soil environment.
- **Trees should not be topped** (except in very rare circumstances as advised by an arboriculturalist).
- Reduction pruning is an expert activity, it is not the same as 'topping', but a severe height reduction risks initiating decay and disease. If it doesn't kill the tree, it often results in a spurt of bushy growth as most trees will eventually grow back to their earlier size.

Cyclical pruning

- Cyclical pruning of trees should be avoided unless arboricultural advice dictates otherwise.

Thinning

- The removal of trees in poorer condition or form can allow remaining trees more space to grow to maturity. In the long-term this should result in a larger, higher mature canopy.

Trees damaged by past mismanagement and/or vandalism

- Sometimes it may be better to replace trees that have been badly damaged in the past. Trees that have been subjected to drastic mismanagement or vandalism should be assessed so that informed decisions can be made.

Veteran trees, or trees or exceptional significance

- The management of ancient and veteran trees, or other trees of exceptional importance and value, should be undertaken as recommended by an expert arboricultural consultant. In certain circumstances, where expert advice informs, exceptional trees with severely impaired basal stability for example, but remaining healthy and with potential longevity may require a cycle of pruning as an alternative to removal.

Protection of trees (unauthorised work by the public)

- Other than branches overhanging private property, any unauthorised pruning, cutting or felling of public trees represents criminal damage and those responsible may be prosecuted. In such cases, a council may employ an arboriculturist to evaluate the affected tree/s using an accepted methodology[31]. A significant monetary valuation can be assigned to a mature street tree and the court may award damages equal or above its calculated loss and replacement value[32]. In addition, the removal or cutting of trees may require legal permission under the Forestry Act 2014[33] and/or the Planning & Development Act 2000[34].
- Any permission from a council staff member to a member of the public to work on a publicly owned tree (or a tree covered by a protection order or other statutory protection) should be recorded in writing, detailing the exact nature of the works proposed, the parties involved and what works have been agreed to and permitted.
- Open green spaces in housing developments are not normally maintained by the council, but they are taken in charge and so belong to the council. Residents' associations may engage companies to cut the grass in communal green areas, but should be aware that the permission of the Council is required to cut or fell any trees.

31 Arboricultural Association. ''CAVAT Full method'' August 2023. https:// www.trees.org.uk/News-Blog/Latest-News/CAVAT-Full-Method-a-lowdown-on-the-refresh
32 LTOA London Tree Officers Association. "CAVAT news". March 2023. https://www.ltoa.org.uk/resources/cavat
33 https://www.irishstatutebook.ie/eli/2014/act/31/section/17/enacted/ en/html https://www.irishstatutebook.ie/eli/2014/act/31/section/17/ enacted/en/html
34 https://www.irishstatutebook.ie/eli/2000/act/30/enacted/en/print

1.4 Trees in green open spaces and parks

Trees in green open spaces should fulfil their genetic potential and grow to their full natural size, thereby providing the most benefits to residents and the public. Trees improve air quality, reduce storm water runoff, mitigate wind, hot and cold temperatures, reduce stress and crime rates, improve psychological well-being and local property values, and help define the unique character of their location. More climate, biodiversity and community benefits flow from large trees.

Best practice management

- For trees in green open spaces and parks, including the communal areas of housing estates, minimal intervention is generally appropriate.
- Where larger mature or semi-mature trees stand within falling distance of roads, paths or buildings, it is prudent to periodically check them for any obvious or immediate instability and potential danger. Management therefore focuses on monitoring (see section 1.2).
- Because of ash dieback disease [Hymenoscyphus fraxineus] ash trees (Fraxinus excelsior) in public spaces should be monitored annually (see section 1.11)
- Past planting mistakes sometimes resulted in the growing of trees too close to each other, or in the choice of less suitable species. Semi-mature trees in groups may become crowded and in such cases thinning may be beneficial (see Section 2.3)
- Immediately unstable or dying trees should be removed where deemed appropriate and unavoidable for public safety. In parks and woodlands, however, deadwood and other natural features beneficial to wildlife and biodiversity may be retained, if safe to do so.
- As a simple safety precaution, parks and woodlands should be closed to the public during extreme weather events such as storms with an orange-and red-status wind warning.
- Where public complaints or requests for tree work arise, a responsible staff member responsible should review the request. Only where valid, appropriate and justified, should professional arboricultural expertise be employed to undertake an assessment and recommend works, if any, that are genuinely necessary for reasons of public health and safety or general good management. Assessors should always be independent of contractors.

1.5 Street and roadside trees, on public land

Street trees are especially important to the urban realm and provide the same innumerable benefits as trees in open spaces. When properly sited and planted, risks and disadvantages are rare and the primary element of management is monitoring either on a planned periodic basis or in response to a specific notification, on foot of which issues can be dealt with through minimal priority tree works as and where required.

Best practice management

- For larger mature trees, on council-owned streets in towns and beside National and Regional roads, a proactive programme of systematic checks (surveys) is recommended.
- Checks should be undertaken and recorded by suitably qualified council staff or consultant arboriculturists. Frequency should be determined by risk-zoning based on the level and nature of vehicular and pedestrian traffic, and on the tree stock. Large trees – where they exist – should be the priority. Subsequent management decisions should seek to balance risks and benefits, on a case-by-case basis.
- Each sweep should issue a schedule of any priority tree works required, to be carried out subsequently by approved contractors. Priority tree works should address only genuinely critical health and safety matters and/or the long-term improvement of a particular tree population. The council should keep a digital record of all surveys and tree works. In the future these records should be incorporated into a fully computerised tree management system.
- Council roads engineers and other responsible staff should be trained in basic (Level 1) tree assessment[35]. Wherever there is any doubt, or where important trees or tree groups are involved, inspections and assessments should be referred to and undertaken by professionally qualified and experienced arboricultural consultants, with recognised expertise.
- Because of Ash dieback disease [Hymenoscyphus fraxineus] trees in public spaces should be monitored annually (see section 1.11)

Tree works (best practice advice)

See Section 1.3.

Pruning of street trees

- Cyclical pruning of trees in should be avoided unless arboricultural advice dictates otherwise.

On informed assessment, street trees may be pruned in such circumstances as:

- » Branches obstructing road signs, traffic lights, critical entrance sight lines, or street lighting
- » Branches in physical contact with adjacent buildings
- » Branches encroaching on or into overhead wires

The above issues generally arise where the tree has been planted without sufficient future (above ground) growth space. In circumstances where a tree requires regular crown pruning to maintain a restricted crown size, an informed decision should be made as to whether it is sustainable and justified to do this or remove and replace the tree.

Pollarding of street trees

- Pollarding is a pruning system involving the removal of the upper branches of a tree, it promotes the growth of a more compact head of smaller branches and foliage.
- If planned, and deemed appropriate, pollarding may be carried out cyclically, from an early age, by an experienced contractor. The technique can be useful in rare circumstances when new large growing trees are planted deliberately in restricted formal locations close to buildings or in pavements.

35 See 1.2 Monitoring and aassessment of trees

1.6 Trees in pavements

A healthy 20-year-old tree should be tall, strong and vigorous. If planted in good conditions, with space both overhead and underground, a newly planted tree should live and grow for a hundred years. Unfortunately, newly planted street trees often have a greatly reduced lifespan; when planted in poor compacted soil in small pits, they struggle to breathe and grow.

Tree damage to footpaths is technically complex and requires expert professional advice, this section attempts a very brief overview.

Standard methods of pavement construction involve compaction of the sub-soil. This often forces 'shallow' or surface rooting of trees planted in or beside a pavement. Where trees' roots grow into the layer directly beneath the paved surface, they may cause displacement and crack and lift the pavement. The larger the tree's basal stem diameter and the closer it is planted to the pavement, the higher the risk of displacement damage.

Most street trees cause no or minor damage, with only a small proportion causing displacement sufficient to create a trip hazard. In 2009, street tree surveys in Dublin indicated that about 6% of trees are associated with pavement cracking and lifting damage[36]. Occasionally, pedestrians can trip and fall, but fear of litigation should not cause removal of street trees nor avoidance of future planting. The fundamentally positive role of street trees has fuelled research into methods of tree planting that prevent pavement damage whilst promoting healthy growth. Numerous methods are being trialled internationally; these include:

- » Suspended pavements, soil cell systems, and the Stockholm method, among others. These methods employ trench excavation and construction of the footpath above uncompacted soil.
- » Porous pavements and deeper coarse gravel sub-base, these methods reduce moisture and temperature on the underside of the pavement slab, conducive to root growth.

Best practice management

- Where mature street trees are shown to be the likely cause of significant pavement damage, they should not be removed, unless for example, repair cannot be achieved without unacceptable injury to the tree, or unacceptably high probability that damage will reoccur in the short-term. Alternatives to removal should always be considered and expert technical arboricultural and engineering advice always sought before reaching a final decision.
- Repairs that reduce the risk of repeated pavement displacement damage include:
  - » Enlarging the opening around the base of a tree and relaying the extended area around the tree base with an un-bound or semi-bound surface or porous asphalt, as appropriate.
  - » kerb-side build out (often as part of traffic calming) which can be extended to include an entire parking space, for example.
- During repairs, root injury must be avoided as it can directly affect tree health and stability. Acceptable engineering solutions can often be found with the help of qualified arboricultural advice. The value of a tree, and sustainability of a solution, may justify any additional costs entailed by specialist engineering methods. It should be noted that:
  - » root barriers have limited application and efficacy
  - » properly installed pipes and ducting is seldom penetrated by tree roots

36 Dublin City Council. "Urban Tree Survey of the South Central Area of Dublin City. Final Project Report". 2009. https://www.dublincity.ie/sites/ default/files/2020-05/dccurbantreesurveycentralarea2009.pdf

1.7 Trees in cemeteries & graveyards

Some of Ireland's most beautiful burial grounds have big trees in them, as do many famous cemeteries around the world. Mature trees are particularly important in graveyards and should be monitored by qualified staff (or an arboriculturist) as resources allow and/or on foot of genuine issues notified to the council.

Best practice management

- As a rule, minimal intervention is appropriate for healthy trees but where larger trees are within falling distance of roads, paths or buildings, it is prudent to periodically check them for any obvious or immediate instability and potential danger. Good management focuses on monitoring (see Section 1.2).
- Management is similar to that of trees in open spaces generally (see Section 1.4). Requests for pruning or removal (felling) of trees within burial grounds and churchyards should be investigated initially by the council staff member responsible.
- Pruning or felling should be considered only if recommended as unavoidable for health and safety reasons after a technical assessment and report issued to the council by a professionally qualified (and insured) arboriculturist. Root growth generally stabilises and slows at maturity, but where roots are physically displacing gravestones the relevant engineer should make decisions informed by qualified arboricultural advice. The severing of roots may cause the accidental death of a tree.
- The removal or cutting of trees may require permission under the Forestry Act 2014. For the planting of new trees in burial grounds[37], see Section 2.5

37 The planting of trees in closed (old) burial grounds is not advised because of the prescence of unmarked graves

1.8 Roadside trees and hedgerows, on private land

Roadside trees are an invaluable feature of the Irish countryside. Their conservation is important. Much of the native tree stock exists in hedgerows and, in addition, hedgerows form vital corridors for biodiversity. Even without tall or significant trees, hedgerows are often centuries old and may contain genetically unique species and forms of woody plants in combination with other plants, soil flora, fungi and fauna.

Most roadside trees do not present a danger to road users, and can and should be managed conservatively in an informed and cost-effective way[38]

Except for street trees, most trees alongside public roads are privately owned and the responsibility for privately owned trees rests with the landowner. However, councils commonly receive complaints from residents concerned about private trees on neighbouring land. It is important to remember that, as the local Roads Authority, the council's only legal responsibility in relation to trees on private land is in relation to the public road, as covered by the Roads Act 1993. Appendix 6 (p91) further details discretionary powers granted under the roads Act 1993.

Best practice management

- As a rule, minimal intervention is appropriate for healthy trees but where trees may fall into roads it is prudent to check them periodically. Good management focuses on monitoring (see Section 1.2).
- Roadside trees should be periodically checked so that trees that represent an immediate danger or obstruction can be dealt with by the landowner. If it comes to the attention of the council that privately owned roadside trees represent a risk, the council may request the landowner to have trees checked.
- Only when trees have been confirmed as a genuine danger should tree works (pruning or felling) be undertaken (see section 1.3). Where hedges are growing out into the road or obstructing traffic sight lines, cutting may be requested, in some circumstances it may be undertaken by the Council on behalf of the landowner.

38 DAFM. Tree Council of Ireland. "A Guide for Landowners to Managing Roadside Trees". October 2021. https://assets.gov.ie/200912/a9389fb2-0697-4b0f-bc82-f58d12f5693a.pdf

- Mature roadside trees rarely need to be cut but they do need to be monitored. Employing a brief survey check and undertaking minimal priority works, if any are recommended, for genuinely hazardous trees, is legally sufficient; it also avoids unnecessary expense (and loss of trees).
- The indiscriminate removal of roadside trees and hedges is neither desirable nor necessary. The lopping back of healthy overhanging branches from roadside trees is also seldom necessary. However, growth obstructing carriageways, critical road signs or sight lines at junctions should be pruned back. Unless immediately hazardous, hedgerow trees and the hedges themselves must be cut outside the bird nesting season.
- Under the Roads Act 1993, the local authority has discretionary powers to issue notices to landowners to ensure they manage trees and hedges potentially hazardous to road users.
- Tree works must take account of legal restrictions under the Forestry Act 2014 and Wildlife Acts (as regards habitats, protected species and nesting birds, etc.). Under the Roads Act 1993, however, trees deemed dangerous by a local authority roads engineer – or certified and accepted by such on foot of a report by an arboriculturist – may be pruned or felled at any time if required for public safety. In such circumstances, records should be kept.
- **Because of Ash dieback disease [Hymenoscyphus fraxineus] roadside ash should be monitored annually (see 1.11).**
- To allow the checking of the basal condition and stability of roadside trees, where ivy growth is heavy, careful removal of basal ivy can be undertaken prior to surveying; elsewhere ivy should be kept as a valuable habitat and food source for native wildlife, including pollinators.
- Wherever safe to do so, hedgerows should be left uncut for several years to allow growth and improve biodiversity habitat. Traditional hedge laying should also be considered; correctly done, this can result in improved long-term structure, habitat value and stock-proof quality when compared to tractor-mounted flail or disc hedge cutting.

Local Authority responsibility

There is no duty or requirement for a local authority to inspect trees on private land. Where privately owned trees are alleged to be a nuisance or danger to neighbouring private property, it is a private matter: the local authority has no responsibility.

Where the council has been notified that trees may be a potential danger to public road users, it may be prudent to visit the site and review the matter. Where deemed appropriate and prudent, the council can issue an advisory letter to the landowner, recommending that their trees be checked and any necessary and permitted works be undertaken.

Only where an obvious and/or potentially imminent danger to road users from specific trees is identified, should the Roads Authority exercise their discretionary power to a serve Section 70 Notice to the land owner to have those specific trees cut.

The local Roads Authority does not have legal liability for private trees.

1.9 Trees in development sites

Mature trees and hedgerows define the nature and character of a site and bestow great added value. The successful retention of mature trees is a benchmark of good development, it also contributes to climate action; the retention of a single large tree can go a long way towards satisfying tree canopy targets and preserving biodiversity.

New legislation concerning "no net biodiversity loss" is expected in Ireland; such advice already forms part of the governmental planning guidelines[39]. Meanwhile, the requirement for "net biodiversity gain" is under consideration internationally. In future, increasing efforts will be made to protect biodiversity and ensure the retention of existing habitats as part of development. The biodiversity value of existing trees or hedgerows (even if of low aesthetic value) is not readily replaced by new planting.

In the immediate future, the County Tree Map (NTM) database that locates all trees across the county) can be used to monitor existing tree cover and losses and gains relating to development. Monitoring of canopy change could usefully inform policy concerning the protection of landscapes, trees, hedgerows and wildlife habitats (for biodiversity).

Best practice management

See Guidance

- Chapter 2. Planting and Growing New Trees
- Chapter 3 : Trees and Development Planning[40]

39 Government of Ireland. Department of Housing, Local Government and Heritage (DHLGH) "Development Plans - Guidelines for Local Planning Authorities". June 2022. https://www.gov.ie/pdf/?file=https://assets.gov.ie/228826/6e26204a-ffd0-42a4-b868-097d647e537f.pdf

40 The British Standards Institution. ''BS 5837:2012 - Trees in Relation to Design, Demolition and Construction - Recommendations". April 2012. https://beta.bathnes.gov.uk/sites/default/files/2020-01/BS5837%202012%20Trees.pdf

1.10 Trees on riverbanks, alongside canals

A watercourse is any natural or artificial channel through which water flows. The character of different water courses can be diverse as it is determined by factors such as land use, bank profile, geology and soil.

The benefits of a natural waterway and natural riverside vegetation to wildlife and flood management are well documented[41]. Studies have shown that riparian corridors with native trees, grasses and other woody plants, are effective in improving water quality, in regulating water flow and holding sediments in place. The far-reaching roots of trees help bind the soil, help stabilize natural riverbanks and reduce bank erosion. Very rich in biodiversity, such riparian habitats are natural buffers between riverine and terrestrial systems.

- Tree management depends on the immediate context of each watercourse but, generally, good management focuses on monitoring. (See Section 1.2).
- In urban contexts, where larger trees are within falling distance of roads, paths or buildings, it is prudent to periodically check them for any obvious or immediate instability and potential danger. Trees of concern should be assessed by suitably qualified staff or consultant arboriculturists; informed management decisions should seek to balance risks and benefits, on a case-by-case basis.
- In parks and woodlands, wherever possible, naturally established riparian vegetation should be retained or allowed to establish. Native trees such as birch, poplar, willow, alder that thrive in wet soils should be encouraged.

41 Inland fisheries Ireland. "Planning for Watercourses in the urban environment. A guide to the protection of Wtarecourses through the use of Buffer Zones, Sustainablke Urban Drainage Systems, Instream Rehabilitation, Climate/ Flood Risk and Recreational Planning". https://www.fisheriesireland.ie/sites/default/files/migrated/docman/IFIUrbanWatercoursesPlanningGuide.pdf

1.11 Monitoring and management of ash trees

Caused by a fungus named Hymenoscyphus fraxineus, ash dieback (ADB) is an infectious disease that affects ash trees (*Fraxinus* species). A significant percentage of ash trees, once affected, will decline and die as a result. There is no cure for the disease which is already present in all regions of Ireland where ash grows.

Ash is present in woodlands, fields, hedgerows, parks and gardens, in both urban and rural landscapes. The loss of these trees will have a major impact on the wildlife, biodiversity and character of many of the urban and rural green spaces that we enjoy.

The future of ash

A proportion of our native ash trees have, or may develop, tolerance to the disease. The conservation of these surviving trees is key to the future of the Irish ash tree.

Symptoms of the disease

The principal symptom is wilting and loss of foliage (leaves), with progressive dieback of branches. A tree's crown will become sparse and dead branch tips bare. During dieback, new shoots often develop further back along the branches, towards the middle of the crown; in most cases these too will become infected and die. Symptoms are most easily identified in the summer months (June-August).

Once a tree displays significant dieback symptoms (more than 50% of the crown is dead), mortality is likely. Dead branches and stems naturally become brittle and the risk of fracture and collapse increases. Dieback progresses each year, with some young trees dying within two years; some larger, older trees may take over five years, others may take decades.

Best practice management

- A small proportion of trees will have 'genetic tolerance' to the dieback disease and these trees could survive to reproduce. Therefore, landowners should protect resistant or healthy trees, wherever possible and safe to do so.
- By retaining trees with little or no signs of ash dieback, owners can help precious disease tolerant trees live and reproduce.
- Ensuring public safety is a priority when assessing how to manage ash trees, however, tree owners should take an informed approach and manage risk in a reasonable and proportionate way.

Monitoring for ash dieback

The health of an ash tree is judged by the percentage of the crown that is missing.

An unaffected tree (= stage 0) will have a full healthy green crown in the summer.

At stage 1, a tree may have lost up to 25% of its crown. At stage 2 it will have lost up to 50%. At more than 50% crown loss (stages 3 and 4) mortality is likely, although some trees will decline more slowly than others.

- Landowners should check trees in the summer, when trees are in leaf. The state of the crown should be noted, and a record (a photograph) kept.
- As trees can decline over one or two seasons, large ash trees that could present a danger to the public, to passers-by, road users, or to property should be checked annually.

Landowner's responsibilities

A tree is the responsibility of the owner of the land upon which it grows.

- Healthy and stable trees pose a very low overall level of risk to human safety and should be retained in-situ. The felling of healthy and otherwise stable trees is not desirable, neither is it permitted without a license (except in certain circumstances).

Options for managing infected ash trees

Ensuring reasonable public safety is the priority when assessing how to manage infected ash trees. Levels of risk range from low to high and depend on location.

- Wherever diseased trees pose a low risk, for example in fields with no public access, far from any public road, or building, they should be left to decline and die naturally. Such trees continue to provide biodiversity benefits even after their death.
- Where trees may pose a risk to public safety, or to property, dead or dying trees, and trees with more than 50% crown loss should be assessed by an arboriculturalist and, if necessary, marked for felling, and replacement.
- Unless trees require urgent safety work, felling must be undertaken outside bird nesting season (ie from 1st September to the end of February).

Replacement trees

Lost ash trees should be replaced by other species.

- Where space allows, two or three new trees should be planted to replace each mature ash tree. Native and naturalized species suitable to the soil conditions and location should be chosen, not ash.
- No single species replaces the biodiversity value of ash, however **sycamore, aspen, alder, field maple, birch, rowan, oak** are all good choices for hedgerow trees.
- In urban parks, where space allows, beech, lime and many other species are also good alternatives.

Teagasc's 'AshforFuture' project[42]

This project aims to breed disease tolerant ash trees. The project calls on landowners to contact them about healthy trees. Tolerant trees will be propagated through grafting and seeds from healthy ash serve in progeny trails. These efforts will contribute to the establishment of a resilient ash population capable of withstanding the challenges posed by Hymenoscyphus fraxineus.

For information, see https://www.teagasc.ie/crops/forestry/research/report-a-healthy-ash-tree/

42 https://www.teagasc.ie/crops/forestry/research/report-a-healthy-ash-tree

Fig 28 Valuable roadside hedgerows and private trees

2 Planting and Growing New Trees

'Understanding the limitations and opportunities of a given landscape to sustain plant growth will ultimately determine the success or failure of any landscape design.'[43]

Planting a tree is seldom the simple act it appears. If a young plant succeeds, it will outlive us, possibly by centuries and directly or indirectly affect thousands of people in many ways. The point is not that we plant trees, but that we grow them. It follows that understanding the potential of a particular site to sustain healthy plant growth and knowing how to select the right trees for that site will determine the success or failure of a planting project.

This chapter sets out some technical principles that should be considered before planting new trees.

The first section summarizes five steps that apply to every tree planting project; subsequent sections consider issues and principles that are relevant in different scenarios.

2.1 Best practice when planting new trees

Essentially, our towns and villages need big, beautiful trees. These are species that live long and grow large; such trees contribute the most to the character of a place, and more environmental benefits flow from them.

Growing the largest trees suitable for a chosen site means selecting appropriate species and planting young trees in conditions that will allow them to grow to their full natural size. How large a tree can eventually grow depends only partly on the genetic potential of its species, it also depends on site-conditions and the soil that the tree must root in. Trees unsuited to their site experience stress, disease, a shortened lifespan and are costly to maintain (or replace).

When trees are chosen to suit local conditions, the site will provide for the trees. A healthy tree in the right site requires little maintenance once it has established itself (usually 3-5 years after planting).

Assessing site conditions, selecting the right species, variety and cultivar, is best left to professionals with knowledge and experience of different trees and their needs. It is especially important to seek advice where large numbers of trees are to be planted, or trees of significance to the urban realm to be planted close to pavements, buildings, roads and other structures[44].

Five steps to growing healthy trees

1. Assess site conditions
2. Select appropriate tree species and specify healthy planting stock
3. Prepare the planting area and ensure suitable uncompatced soil volume
4. Plant a healthy tree and water it
5. Provide aftercare for at least three summers

2.1.1 Assess site conditions

The basic question is how well will trees fit into the available space when they reach mature size? Growing space is critical, both above and below ground. If space is limited, and cannot be enlarged, smaller tree species or cultivars (cultivated variety) must be chosen to fit. In some spaces, it may be better not to plant trees. Wherever necessary, seek professional guidance[45].

The following are relevant considerations in relation to below ground conditions:

- Is there space for a tree to develop a healthy natural root system?
- Is there a sufficient area of soil? If so, what are the local soil conditions?
- Which trees are best suited to those conditions?

Below ground considerations include soil and subsoil types, soil compaction, pollution, water content, drainage, as well as the possible presence of underground utilities (water, gas etc) that must not be damaged or disrupted. A survey of soil conditions may be necessary to help inform decision making.

43 Bassuk N & Trowbridge P. "Trees in the Urban Landscape: Site Assessment, Design and Installation". John Wiley & Sons. New Jersey, USA (2004).

44 Trees and Design Action Group (TDAG). "Trees in Hard Landscapes. A guide for delivery" September 2014. https://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_tihl.pdf

45 Trees and Design Action Group (TDAG).). "Trees in the Townscape. A guide for decision makers" 2021. https://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_treestownscape2021.pdf

The following are relevant considerations in relation to above ground conditions:

- Is there space for new trees to develop their full natural crowns?
- Will new trees block a view, for example at a road junction or drive-way? Are there telephone wires or power cables overhead? Or lampposts?
- Are there nearby structures that will affect a trees growth or be affected by the trees? Will a low-spreading canopy interfere with tall vehicles as they pass?

2.1.2 Select appropriate tree species[46] and specify healthy planting stock[47]

It is important to seek competent professional advice regarding tree selection. Poor species choice for a site is a common source of failure. The first and most important criteria in selecting species is suitability to the specific site and soil conditions.

Site conditions guide and limit the choice of suitable species, tree size and shape, but there remain many other qualities to consider once a primary selection has been made:

- Is leaf size important? Or flowers? Smell? Autumn colour? Winter foliage? Dappled shade? Must trees be native? Are more ornamental exotic species acceptable?
- Ireland has a very limited range of native tree species. Native species are ideal for rural, riparian and woodland planting, and for parks, together with long-established naturalised species.
- In difficult urban sites, in streets, carparks, close to buildings, for example, and in pavements, more tolerant or ornamental non-native species may be more appropriate. There is a larger variety and choice of non-native trees that grow well in Ireland. They are also of value to indigenous wildlife, have good resilience to climate change and tolerate urban conditions (such as pollution, drought).
- Another key factor is the need for species diversity, which is important for biodiversity itself and as security against future disease. The preference is to plant trees in groups of multiple species. A mix of species can work well even in formal avenue plantings.
- Carbon sequestration varies with species but is largely linked to how well they grow and the size they attain. The resilience and adaptive capacity of each species to long-term future climate conditions (hotter, drier, wetter, windier) also needs to be considered[48].
- Specification concerns tree species, cultivar, habit, girth size, root system and crown. Planting stock is divided into three different sized groups: transplants and whips, standards, semi-mature. The smallest sizes are supplied bare-rooted, larger standards are root-balled or containerised. Semi-mature trees are usually prepared with root-balls.
- Young trees have a better chance of surviving the shock of transplanting and generally grow more quickly and successfully. They are also much cheaper. Occasionally, for example in town centre schemes, larger nursery stock (trees) may be required for instant impact (35/40cm girth). Planting larger stock such as 'semi-mature' trees requires specialist contractors with suitable expertise and experience.
- Specifying planting stock requires expertise. Good quality stock is crucial. Healthy root systems are as important as stem and crown, but defective roots are quite common and can be hidden within a root ball or container. Stem girdling roots, for example, that circle the trunk, can gradually strangle a tree and lead to collapse decades after planting. Stock quality should be specified in as much detail as possible or necessary and root condition checked either at the nursery or on delivery prior to planting. Trees that do not meet the specified quality should always be returned to the supplier.
- Biosecurity is essential in preventing the import of potentially epidemic diseases; reputable nurseries will be used that can guarantee that plants are pest and disease free. If possible, specifiers should visit the nursery to select trees, and carry out quality checks, including root checks on a sample tree.
- Best-practice advice is to develop relationships with reputable nurseries that can provide what a council requires. For larger projects, a council may consider cost-effective growing contracts. If using landscape contractors to plant trees, their ability and performance should be vetted and monitored – not every contractor knows how to plant trees correctly.

46 Barcham. *Species selection. A guide to informed decision making.* 2019. https://www.barchampro.co.uk/wp-content/uploads/2019/05/Species- Selection-FINAL.pdf

47 Barcham. *Planting Guide. A guide to tree longevity in the landscape.* https://www.barchampro.co.uk/wp-content/uploads/2019/07/Planting-guiude-2019-v6-AW.pdf

48 Janoviak, Maria et al. 'Climate adaptation actions for urban forests and human health" US Forest Service 2021. www.fs.usda.gov/treesearch/pubs/62807

2.1.3 Prepare the planting area and ensure suitable uncompacted soil volume

Below ground preparation is specific to the soil type, conditions and location, the most important requirement being an adequate volume of good (ideally free draining and friable) non-compacted soil. This is usually easier to provide in a green open space (trees thrive best when planted in natural spaces) nevertheless, even in open green spaces some preparatory work may be required (eg ripping to break up compacted soils).

- Ensure an uncompacted soil volume as indicated in Table 01 below. Use in-situ soils where possible, and prepare and amend the soil as appropriate (this may require soil testing).
- The volume of soil required by a growing tree depends on the mature size and form of the tree. With most of a tree's roots remaining in the top 1m of soil, optimum conditions translate to a roughly equivalent soil surface area. Ideally, the surface of a tree planting pit is left open to the air, allowing exchange of oxygen and water.
- Where trees are planted into grassy areas, leave surface areas natural and open so that the soil can breathe. No need to demark pits or add artificial materials or apply weedkiller. Planting pits should preferably be located at least 2m from nearby hard surfaces such as pavements and kerbs to avoid risk of root disturbance.
- Where trees are planted into or close to constructed load-bearing surfaces (pavements, cycle paths, car parks etc.) engineered tree planting pits and rooting media (such as structural soils, or raft-and-crate systems) must be used to support the load-bearing surfaces whilst allowing soil beneath to remain uncompacted.

potential mature tree height	minimum suitable soil volume	minium soil surface area
very small tree less than 5m	$6m^3$	$6m^2$
small tree up to 10m	$12m^3$	$12m^2$
medium tree up to 15m	$20m^3$	$20m^2$
large tree up to 20m	$28m^3$	$28m^2$
largest tree over 25m	$36m^3$	$36m^2$

Table 001: Suitable Soil Volume[49]

- Ensure rainwater can run into the tree rooting area but provide drainage to prevent waterlogging.

2.1.4 Plant a healthy tree and water it

Deciduous trees are usually planted during the winter months (October to March) when they have no leaves. Bare-rooted and root-balled trees suffer damage when lifted from the ground and so require time to adapt to new sites before the next growing season.

Container-grown plants are grown in large plastic pots and once the root systems are properly established, they can be planted all year round, although trees planted in late spring and summer will require watering if the weather is hot and dry.

The digging of a pit is the most common method of planting trees in green spaces. It can be quite a simple act and is a prime opportunity for community engagement - where the local community (including the young) lead in the planting of trees (usually bare-rooted stock).

The planting pit should be large enough to accommodate the young tree's roots in terms of depth and spread.

The sides of the pit should be gently broken up, but not the base to avoid settlement (sinking) of the tree. It is essential that trees are not planted too deep - they should sit at (or slightly above) the original soil level. The original soil level is usually visible on the stem (above the root collar) and should be level with the final ground surface of their new location.

Transplants and whips do not require staking, but all larger stock will require some support, usually one or more timber stakes that are dug into the pit before placement of the tree. Stakes and attachment should be placed as low as possible. In most other cases, a competent contractor is required. There are too many technicalities to describe here, but many references and technical guides[50, 51]

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49 Trees and Design Action Group (TDAG). "Trees in Hard Landscapes. A guide for delivery" September 2014. https://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_tihl.pdf

50 TDAG. *Tree Species Selection for Green Infrastructure. A guide for specifiers.* 2019.https://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_speciesguidev1.3pdf.pdf

51 Arboricultural Association. *An Introductory Guide to Young Tree Establishment.*May 2022. https://www.trees.org.uk/Trees.org.uk/media/Trees-org.uk/Documents/Tree%20Aftercare/YoungTreeEstablishmentGuide-web.pdf

2.1.5 Provide aftercare for at least three summers

Aftercare and future maintenance must be considered. Depending on the type and size of tree nursery stock, aftercare for up to five years may be required. This includes watering for the first few summer/s (especially in hot dry spells) and removing stakes and ties after 2 - 3 yrs. Little or no pruning is generally needed.

- For street trees, phased crown-lift pruning (See Section 1.3) should be programmed as necessary to ensure a required final crown height above ground for the clearance of pedestrians or vehicles.
- Only in special and rare instances should species be chosen for planting where their future mature size is such that they require regular pruning maintenance to contain and limit their size.

2.2 Planting trees in green open spaces and parks

Many housing estates contain large areas of grass that require regular mowing. Whilst retaining areas for play, grassy areas are prime candidates for tree planting with openings and glades through which paths can be mowed; elsewhere both grass and flowers can be left to grow for biodiversity and pollinators.

Best practice

- In green open spaces, wherever adequate future growth space exists, large maturing tree species should be planted as the main framework species. These should be allowed to grow to reach their mature size, without cutting.
- Small-maturing species can be used as infill planting, professional advice should be sought as required to assist with soil assessment, species selection, spacing and grouping (including incorporating open space), stock size, soil preparation and support (staking).
- Nursery stock planted in open spaces and parks often do not need to be 'clear stemmed' (lower stem clear of branching for 1.5 or 2 m), they can be 'feathered' with lower branching allowed to develop as a natural and attractive feature, whilst still allowing visibility for security; such low crown branching also aids tree health and stability. Where suited to the setting, 'multi-stemmed' plants can be particularly successful. These usually have three or five stems that grow from the base to form a wider, bushier tree. They may not suit all types of space - if visability is a security concern for example.
- Where support is required, stakes should generally be short above ground and attached as low as possible to the tree stem (to allow movement and encourage healthy stem taper and root development).
- Wherever possible, an open circle of mulch should be applied around the base of planted trees – a shallow < 10 cm layer is ideal, but not directly against the tree stem base. Mulch material can be easily sourced from local tree works. Replenished annually, it is a natural OG fertiliser, partial weed suppressant (reducing need for chemical herbicide application), retains moisture, makes mowing easier and avoids mower or strimmer injury to the tree stem.

2.3 Planting trees on streets and in pavements

For street trees the criteria for species selection differs from those for open spaces and parks. Scale is a key design consideration, together with both below and above ground constraints. Above ground, constraints may include requirements for physical clearance from traffic, overhead wires, building façades, CCTV and entrance sight lines. Below ground, soil volume and compaction is always a concern.

Best practice

- Species choice for planting street trees must be paired to site design, verge width and available soil volume. In some situations, small maturing trees are appropriate but, in general, large-maturing species are preferred.
- The size of nursery stock planted is normally from 14cm up to a maximum of 45 cm girth, with a clear stem of 2 m. Above ground staking is used where appropriate as preferable and less expensive than underground guying systems, which remain left in place around the root ball and do not biodegrade.
- Decorative (cast iron) tree grilles and guards can be problematic (and expensive). Grilles and guards must be removed after several years (and can be reused) but often are not, and as the tree increases in size, they become embedded in the stem. Such damage usually leads to loss of the tree.
- Root barriers are of limited efficacy and often undesirable. Where the ground below the tree has been excavated and good quality soil installed in engineered rooting media, root barriers are usually unnecessary to divert root growth. Where excavation and good soil are not present below, encircling the tree's root ball in a root barrier will merely stunt growth and result in early mortality of the tree (if the barrier remains intact and not breached).
- Where trees are planted in grassy strips between kerb and footpath, the choice of species depends on the width of the (grass) verge and volume of available soil. Healthy mature trees typically require between 30 - 40 m3 of soil (c. each m3 of soil supporting 2.2 m2 of canopy area). To avoid pavement displacement, a minimum verge width of 3m is required. Verges of less than 3m in width are not generally suitable for trees, even small-maturing species, unless engineered planting pits are installed. If insufficient room for trees, shrubs and/or herbaceous perennials are a better choice.

- New roads and streets designed for the local authority or privately built but to be taken in charge by the council, should respect the following:

  » Grass verges for medium to large tree planting must be at least 3m wide (dimensions dependent on the species of tree).

If minimum sufficient verge widths cannot be provided, either:

» Grass verges beside street pavements should be omitted, and the equivalent area of ground provided in one or more plots each of minimum 10 m2 in which large-maturing trees can be planted, or

» An engineered (load-bearing) rooting media such as stone-based structural soil, or raft and crate (soil cell) systems, shall be installed.

- A variety of engineered techniques[52,53,54] are available to minimise the risk of future pavement damage whilst maximising healthy tree growth. Expert advice should be sought on the suitability of such methods for new street planting projects. Methods involve trench excavation to create the necessary volume.
- Above ground staking is preferable to underground guying wherever practicable.
- Wherever possible, tree pits and the surfaces around trees should form a part of the SUDS (Sustainable Urban Drainage System). If left open, the porous surface of a continuous trench excavation can tie in with SUDS requirements. In all cases, whatever engineering solution is chosen, the principle is to provide sufficient soil to support tree growth whilst at the same time minimising potential conflict with adjacent pavement and other underground infrastructure.
- Stone-based structural soil systems (eg. Stockholm method) are used in preference to sand-based media. They are less expensive than soil cell (crate) systems, but hold less soil per m3, so require a greater footprint (excavation area). Soil cell systems hold more soil per planting area but may occasionally make re-excavation to access underground services more difficult.

52 https://stockholmtreepits.co.uk/
53 International guides eg Toronto: https://www.toronto.ca/services-payments/streets-parking-transportation/enhancing-our-streets-and-public-realm/green-streets/green-streets-projects/tree-planting-in-hard-surfaces/
54 Urban Tree Manual – Forestry Commission: https://www.forestresearch.gov.uk/tools-and-resources/fthr/urban-tree-manual/

2.4 Planting trees as part of development

Many trees that are now part of the public realm were originally planted on private land - as part of private development. Such trees line the roadsides of many residential estates.Whilst the roads and pavements of private developments are often taken in charge, green open spaces are often not. Many green open spaces are often little more than mowed grass - that is expensive to maintain, and so they present good opportunities for tree planting.

Urban councils across Europe are starting to agree tree canopy targets, Ireland's towns may follow. Meanwhile, local authorities may encourage best practice.

Best practice

See

- 2.1 Best practice principles
- 2.2 Planting trees in green open spaces
- 2.3 Planting trees on streets and in pavements

2.5 Planting trees in parks, woodlands (and burial grounds)

Overall, the issues and methods for planting new trees in parks are similar to those for open spaces. Parkland, with single specimen trees and clusters, groups and woodland groves of trees intertwined with open spaces, is in many ways the ideal public landscape or parkland 'treescape'.

Existing woodlands generally have limited space for new planting, but new trees will spring up spontaneously whenever gaps appear in the overhead canopy. Often the process of natural regeneration (self-seeding) is the least interfering and most cost-effective approach (see Section 3.6).

Best practice

- Parks provide the most straight forward opportunity to plant large maturing trees:
  - » singly, with no other trees within 20-30 m they can be fully appreciated as special individual specimen.
  - » or in mixed groups, or clumps, or alignments (classically for example, around perimeters).
- Existing woodlands generally have limited space for new planting, but new trees will spring up spontaneously whenever gaps appear in the overhead canopy. Often the process of natural regeneration (self-seeding) is the least interfering and most cost-effective approach (see 2.6).
- Generally, the planting of trees in closed (old) burial grounds is not advised due to the presence of unmarked graves.
- New tree planting in burial grounds should be located so as to avoid the disturbance of graves by growing roots The use of engineered tree pits can prevent such problems, otherwise trees should be planted 3-4m from the nearest grave.

2.6 Natural regeneration of trees

Planting trees is one way to help Ireland's tree canopy expand. However, allowing nature to take its course can be a more effective and efficient method of increasing tree cover.

Natural regeneration is the process by which trees and shrubs self-seed and spread. Given the right conditions, most native (and naturalized) trees and shrubs will readily colonize if allowed to do so. Tree seeds can travel great distances by wind, water and via birds and other animals. Native trees are also found in hedgerows, which form an important natural seed source (especially in the absence of nearby trees).

The advantages of natural regeneration are multiple. Naturally regenerated trees are adapted to local conditions and often survive better than planted trees; as they spend their whole lives on one place they are not damaged by transplantation. Natural regeneration often creates a more natural species mix, more beneficial to wildlife. Naturally occurring trees often have healthier rooting fungi, which improves water and nutrient uptake. Natural regeneration is cheap – it involves no plastic tree guards, although it may require fencing to protect land from grazing, pests and lawn mowers.

Best practice

- Where there is an existing seed source of suitable tree species, natural regeneration can help establish a semi-natural woodland. Fencing may be needed to exclude grazing animals and/or pests, or mowing.
- Slow-growing, large-seeded trees such as oak may need assistance to establish themselves amongst faster growing pioneer species– they may need to be planted and protected. Oak is light demanding and so struggles to seed under shade. Many species are shade tolerant when young, but not oak.

2.7 Planting new urban woodlands

Even the tiniest urban woodland can become a biodiversity hotspot – and enchanting place. There has been a resurgence of interest in urban woodlands, particularly tiny ones, as a way of engaging communities in the planting and growing of their own patches of woodland to replace lawn. There are more ways than one to establish a new woodland, but most require specialised knowledge to prepare and implement a successful project. The choice of woodland type must suit local soil conditions.

Best practice

Forestry planting techniques may be appropriate, with seedlings generally planted in rows, in overturned sods of earth. Thinning is required after some years, but otherwise aftercare is minimal (watering may be necessary in the first few summers). Growth of young trees is surprisingly rapid and the success rate is high when professionals are involved.

The so-called Miyawaki method[55] has been adapted and become popular recently as a way of forcing particularly rapid growth and the production of a tall biodiverse woodland patch no larger than a tennis court. This is the original "tiny forest", but this and other similar methods are experimental and not recommended for larger areas. The method requires preparation of the soil under professional advice but can achieve exceptionally fast results in urban centres. Such projects are impressive, but trees planted in this way are not destined to become large specimen, they grow tall and skinny because of crowded conditions. There is a lot of debate about the Miyawaki and similar methods, the main problem being one of longevity - what will become of these patches after twenty years?

Natural regeneration occurs where ever there is a local seed source, and young trees can grow without being eaten, trampled, or mown down. Succession may may be slow, and take place over many years, but the natural process is made visible. This is a cheap method of establishing new woodlands, or allowing existing woodlands to expand, although fencing may be required. Ash and sycamore may dominate at first, and may have to be removed if oaks are to be encouraged. (See 2.6)

55 https://treecouncil.org.uk/wp-content/uploads/2023/08/SOF-TOW_Miyawaki-Method-Handbook-KCC-Aug-23.pdf

2.8 Planting trees in flood plains

On floodplains, woods and trees can mitigate the effects of large floods, absorbing and delaying release of flood flows. The width of a buffer, slope, gradient, amount of vegetation and leaf litter, and soil type will all influence the time taken for water to pass through a buffer. Upstream, carefully sited woods and trees can help to phase release of waters, reducing peak flows and reducing floods. Professional advice may be required.

Best practice

- Where there is a nearby seed source of suitable trees, it can be worth trying natural regeneration to establish a semi-natural woodland. Fencing may be needed to exclude grazing animals and/or pests, if practical. Slow-growing, large-seeded trees may need assistance to establish themselves amongst fast growing pioneer species such as willow and alder – they may need to be transplanted and protected.
- Where natural regeneration is unsuitable, appropriate native tree stock should be planted. Planting in irregular small groups replicates natural forest structure. Species with light foliage will enable development of dappled shade [56, 57].

56 Inland Fisheries Ireland. *Planning for Watercourses in the Urban Environment. A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate/Flood Risk and Recreational Planning*. https://www.fisheriesireland.ie/sites/default/files/migrated/docman/IFIUrbanWatercoursesPlanningGuide.pdf

57 The Woodland Trust *Trees for water. Factsheet 1, 2 and 3*. https://dnu7gk7p9afoo.cloudfront.net/wt-trees-for-water-leaflet.pdf

2.9 Planting trees along waterways

The combination of trees and running water, whether in an urban or rural contexts, creates a popular and pleasing environment. However, natural riverine woodland is now quite rare in Ireland. Most watercourses have been straightened and in urban situations they have been separated from their floodplains.

Best practice

- Generally, the choice and location of plants will depend on specific site conditions and context, and in particular the configuration of the bank (height, slope, construction).
- Trees rooted into natural riverbanks help hold soil in place and protect from erosion. Where there is an existing seed source of pioneering tree species, for example willow, alder, or birch, natural regeneration should be allowed to occur. Issues are similar to planting in floodplains (See Section 2.6).
- In the case of urban, and artificial watercourses, the situation is more complex. Engineering and arboricultural advice may be required. Issues are similar to planting in pavements (See Section 2.3)

3 Planning for trees

In response to the current climate and biodiversity crises, best practice seeks to raise urban tree-canopy cover from a current average of less than 10%, to an average of at least 20%. Urban tree-canopy cover is a measure of canopy (crown) area and is a proxy measurement for the ecosystem services provided by trees.

This final chapter considers planning of the "future tree resource'' and is divided into three sections.

Section 3.1 considers the place of trees within spatial plans. Together these documents set out policies that (may) conserve existing trees and (through zoning, development management standards and other regulations) plan and designate space for future ones.

Section 3.2 considers the steps necessary to ensure that trees retained and planted as part of development planning thrive as promised.

Section 3.3 describes the design of optimal conditions for new tree planting. It sets out concepts and technical principles that are considered best practice when planting and growing trees in all types of development.

The information contained in this chapter may be considered in preparation of future plans and strategies, for example, a green infrastructure strategy, to be prepared under the Roscommon County Development Plan (2022-2028) and Climate Action Plan (2024-2029).

3.1 Trees in spatial planning documents

A local authority is charged with powers to regulate development under the Planning and Development Act 2000[58]. Accordingly, the County Development Plan[59] 2022-2028 (CDP 2022-2028) details a strategy for the proper planning and sustainable development of the county over a 6-year period. This document shapes the future of the local environment, identifying (amongst other things) areas suitable for different types of development, as well as areas and features of local, national or international significance (natural or cultural heritage, sites, views and habitats, including trees, woodlands and hedgerows) which are be listed for protection. Wherever development takes place, it should do so whilst protecting listed features from harm or loss.

European and National Designated Sites

Certain sites can be afforded statutory protection because of their ecological, amenity or environmental importance. Trees and woodlands formally protected in the CDP 2022-28 belong to exceptional sites that are considered important for wildlife at a European as well as Irish level. These are the Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs) and Nature Reserves (See Map 10.1, pp 140).

Woodland sites that may benefit from limited legal protection because listed as proposed Natural Heritage Areas (pNHA) are also drawn in Map 10.1 (CDP 2022-2028).

Tree Preservation Orders and Trees of Local Significance

Under Section 205 of the Planning & Development Act 2000, exceptional trees may be subject to Tree Protection Orders (TPO). A Council may list trees formally protected by TPOs as well as others that benefit from limited legal protection because identified as Trees of Local Significance[60]. Such trees, for example Heritage and Champion trees, may be included in the Tree Register of Ireland (TROI)[61].

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58 https://www.irishstatutebook.ie/eli/2000/act/30/section/205/enacted/en/html
59 https://www.rosdevplan.ie/roscommon-county-development-plan-2022-2028/
60 https://www.gov.ie/en/publication/f9aac-development-plans-guidelines-for-planning-authorities/
61 https://www.treecouncil.ie/tree-register-of-ireland

Key findings

- The CDP 2022-2028 states clear objectives to protect, conserve and enhance biodiversity. Trees, woodlands and hedgerows are mentioned for their contributions to landscapes, to visual amenity or to habitat.

- Because trees outside forest areas were unmapped prior to 2020, neither the scale of loss of mature trees and hedgerows nor the success of new planting can be quantified.

- With the purchase of the Bluesky Tree Map, County Roscommon now has a detailed spatial database of all its trees, including urban and roadside trees. Further studies are required to understand species distribution, age and health of the Tree Resource.

- Trees of "local importance"[62] would be identified in town and village plans, and particularly in land zoned for development. Such mapping does not confer statutory protection, but it can clarify a Council's intention to conserve mature trees and hedgerows where possible; it raises awareness of their existence.
- The County Tree Maps (NTM database) can serve to monitor existing tree cover as well as losses and gains relating to development. Monitoring of canopy cover change could usefully inform policy concerning the protection of trees and hedgerows

- The services performed by trees and woodlands are often referred to as 'ecosystem services'. These services are recognised as vital for the healthy functioning of the natural world and for quality of life.
- In best practice, the mapping and monitoring of the local resource requires case-by-case studies to ascertain the species and condition of trees and woodlands as well as other living features and habitats of local importance. Trees are a fundamental building block of green infrastructure planning,

- A TPO, made by a County Council, confers statutory protection on trees or tree groups, making it an offence to damage, cut or remove them without authorisation. A TPO ensures the proper longterm conservation of significant trees. A review of trees worthy of protection could be undertaken with specialist and public involvement.

- In accordance with government guidelines,[63] trees and groups of trees of "local importance" can be identified as such, on both public and private land, including on land zoned for development.
- It is not possible to retain every tree during development, but the landscape, ecological and societal benefits provided by a mature tree cannot be reproduced by new planting for many decades.
- Several thousand new trees may be required to replace the climate and other benefits of a single centenary oak. Thus, efforts to retain healthy existing large growing trees are becoming a priority, particularly in built-up settings where opportunities for new planting is limited. A firm presumption against the removal of mature trees and hedgerows to facilitate development, unless agreed otherwise with the local authority, is in the public interest.

62 https://www.gov.ie/en/publication/f9aac-development-plans-guidelines-for-planning-authorities/

63 https://www.gov.ie/en/publication/f9aac-development-plans-guidelines-for-planning-authorities/

- International best practice recommends an overall urban tree-canopy of 20 to 30%. Through both the development planning process and through tree planting projects on public land.
- Suitable sites for tree and woodland planting are ideally identified in collaboration with local communities.
- New trees are strategically chosen and sited to become the remarkable trees of the future, growing to occupy vistas, create ambiance and provide ecosystem benefits. In addition to trees in new development, parks, open public spaces and roadsides, large´-growing trees strategically planted in housing estates, churchyards, graveyards and schoolgrounds (for example) all contribute to the urban forest.
- In the immediate future, the Roscommon County portion of the National Tree Map (NTM) can serve as a basis for monitoring changes in tree and hedgerow canopy. Regular updating of the NTM (every 5 years) would allow monitoring of tree gains and losses during development.

Best practice tree management

- Best practice requires that healthy mature trees (and hedgerows) be retained, properly protected and integrated into development unless their removal is in the public interest and agreed with the local
- authority. See Appendix 5 for description of tree protection.
- When conserving hedgerows, tree protection measures apply. Where there are no trees, a 2m buffer strip measured from the centre of the hedgerow should remain undisturbed (both sides).

Why tree protection measures matter:
A tree protection plan is critical for successful tree conservation on a development site. This is because modern construction (unless controlled) is highly destructive of the upper metre of soil on development sites. It is within this upper - living and breathing – layer of soil that a tree's root-soil system is found, and on which its life depends. The soil around the roots of a tree should be considered as part of the tree.

3.2 Trees to be retained and planted in development sites

During the development management process, a local authority assesses information concerning an undeveloped site, and its proposed development. The authority may grant or refuse permission for a development or may grant permission subject to conditions. Conditions may include, for example, the conservation of a mature tree, or the planting of new trees in accordance with best practice guidance.

As a rule, planning permission requires development to take place in accordance with approved documents. When best practices are observed, planning applications state how mature trees will be protected during development and how new trees will be planted, cared for and replaced if they die within an explicit period; certain conditions must be complied with before work starts on site; others take effect once the development has commenced, or later.

- An understanding of trees is necessary to identify the conditions and layout required to successfully retain mature trees in situ, and to ensure the healthy growth of large, long living new trees. Best practice recommends qualified and experienced arboricultural knowledge with the scope to advise the team throughout an iterative design process as essential.
- If removal of a mature tree is unavoidable, it should normally be replaced by trees of equivalent value. A range of best practice methods is available for calculating replacement value of amenity trees (eg CAVAT[64]) so that trees can be assigned a value case by case.
- As a guide, replacing the canopy of a centenary oak may require the planting of several thousand young trees at an estimated value of 150,000 euros (excluding value of any land upon which those trees are planted).

64 https://www.southampton.gov.uk/moderngov/documents/s15821/Members%20Room%20Document%202.pdf

3.3 Designing for new trees in development

When planted in the right conditions, most trees have a potential lifespan longer than most of the infrastructure that surrounds them, including buildings. More ecosystem benefits are delivered by trees that live through maturity (which can be several hundred years) than by young short-lived trees.

When basic planting conditions are not met, new trees in hard landscapes can die before they become carbon neutral (which may require 40 years). Therefore, new trees should be planted in optimal conditions that increase their chances of reaching their full potential.

General best practice considerations to do with the planting of trees are described in Guidance Chapter 1 (Planting and Growing New Trees) which should be read in conjunction with this section that considers new sites as opportunities to "design-in" optimal conditions.

Best practice design

- Wherever possible, larger areas of "green space" (and good soil volumes) should be designated for new trees to be planted in groups of large-maturing species. Preferably, areas of green space and their trees should contribute towards sustainable urban drainage (SUDS) .
- Small "leftover" areas of grass should be designed-out of future sites wherever possible. Where such areas are unavoidable, more suitable plants (flowering perennials, or annuals) should be planted. Only where sufficient good soil rooting volumes and above ground space are available, and minimum distances from kerbs can be respected, should trees be planted, subject to professional landscape advice.
- Where trees are to be planted in or beside pavements, underground services should be in shared ducts. Where space allows, beds (minimum width 3m) above tree rooting trenches may be designed as pollinator-friendly planting beds. Consider replacing grass with other types of plants, including pollinator-friendly flowering shrubs and perennials, which work well with the chosen trees.
- Verges or strip planting-beds of less than 3m in width are generally not suitable for trees. Smaller plants are a better choice.
- Where trees are to be planted in roadside verges (strip beds) beside footpaths and/or between kerbs, the choice of species depends on the width of the planting bed and volume of root soil available. Healthy mature trees typically require between 30 - 40 m3 of soil (c. each m3 of soil supporting 2.2 m2 of canopy area).
- New roads, streets and carparks designed for the local authority or privately built but to be taken in charge by the council, should respect the following recommendations:
  - » Grass verges (strip planting-beds) for medium to large tree planting should be at least 3m wide. The required soil volume depends on the species of tree (see Section 3.1.3). If minimum strip planting-bed widths cannot be provided, either:
  - » Tree-planted verges beside street pavements or in carparks should be omitted, and the equivalent area of ground provided in one or more plots each of minimum 10 m2 in which large-maturing trees can be planted,

Or

- An engineered (load-bearing) rooting media such as stone-based structural soil, or raft and crate (soil cell) systems, should be installed.
- When planting new trees in pavements, expert input should be sought on design of the below-ground rooting environment, tree placement and treatment of the surface opening and tree species selection. Involving tree specialists at an early stage of design can help avoid conflicts with infrastructure, provide the correct conditions and ensure that existing and new trees live long and grow large, maximising the benefits that they provide.

Fig 29 A young oak, 25 years after planting in good conditions (university parkland campus).

Appendices

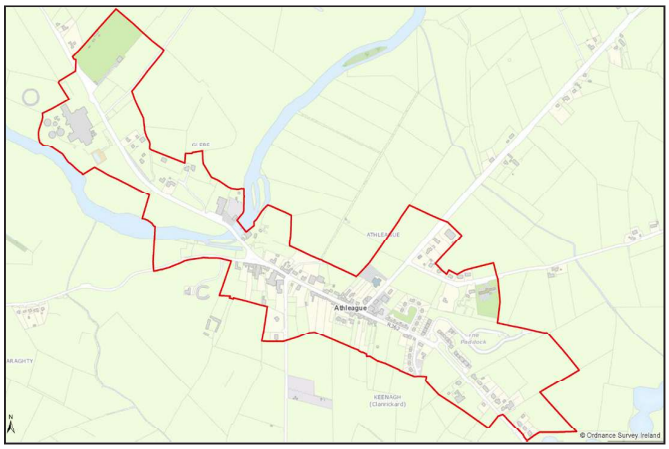
Appendix 1

TREE CANOPY by SETTLEMENT

TOWNS	town urban area m2	CSI area (km2)	canopy area m2	canopy %	Trees	Pop (2016)	Pop (2022)	m2/ Tree	Trees/ Inhabitant
Athleague	587.631	0,18	78.378	13,34 %	1.149		296	511,4	3,9
Athlone (Westmeath)		17,31					22.869		
Ballaghaderreen	1.879.464	1,68	165.638	8,81 %	2.475	1808	2.387	759,4	1,0
Ballinameen	224.425	0,16	31.273	13,93 %	521		223		
Ballinasloe (Galway)		8,88					6.597		
Ballinlough	343.824	0,37	36.270	10,55 %	574	300	343	599,0	1,7
Ballintober	275.821	0,18	28.016	10,16 %	527	147	199	523,4	2,6
Ballyfarnon	276.914		33.619	12,14 %	585	187 est	187	473,4	3,1
Ballyforan	342.157	0,15	52.862	15,45 %	634	200	227	539,7	2,8
Ballanagare	190.838	0,13	23.180	12.15 %	323		162	590,8	2,0
Boyle	3.560.814	5,40	427.523	12,01 %	6.671		2.915	533,8	2,3
Carrick-on-Shannon (Leitrim)		5,24					4.743		
Castlerea	2.566.045	2,26	530.142	20,66 %	6.766	1192	2,348	379,3	2,9
Cloonfad	308.694	0,22	31.020	10,05 %	594	308	376	519,7	1,6
Cootehall	554.542	0,30	52.845	9,53%	906	184	287	612,1	3,2
Elphin	812.068	0,71	99.432	12,24 %	1.409	556	715	576,3	2,0
Frenchpark	330.414	0,44	31.732	9,60 %	542		572	609,6	0,9
Knockcroghery	314.101	0,29					388		
Monksland/ Bellanamullia	3.880.834		330.858	8,53 %	5.609	4195 est	4.195	691,9	1,3
Lanesborough Ballyleague		1,56				1454 (dual)	1.733		
Loughglinn	612,1	0,15	23.740	14,71 %	406		231	397,6	1,8
Rooskey	429.566	1,03	71.463	16,63 %	1,103		787	389,4	1,4
Roscommon	6.311.157	7,00	565.174	8,96 %	7.618		6.555	828,5	1,2
Strokestown	1.354.893	0,78	306.569	22,63 %	3.492	825	850	388,0	4,1
Tarmonbarry	491.616	0,72	36.970	7,52 %	666		699	738	1,0
Tulsk	311.503	0,10	26.682	8,57 %	475		191	6562	2,5
settlement average				**12.29 %**					
COUNTY all land	2.547.136.217		322.644.685	12,67 %	4.452.933				
COUNCIL owned land	11.650.600		1.426.045	12,24 %	27.546				

Table 02 Tree canopy by settlement

Name:	Athleague	
Population:	296	CSI:2022
Area:	0.58 km²	
Number of trees:	1,149	
Total canopy:	78,378 m²	
Canopy cover:	13 %	



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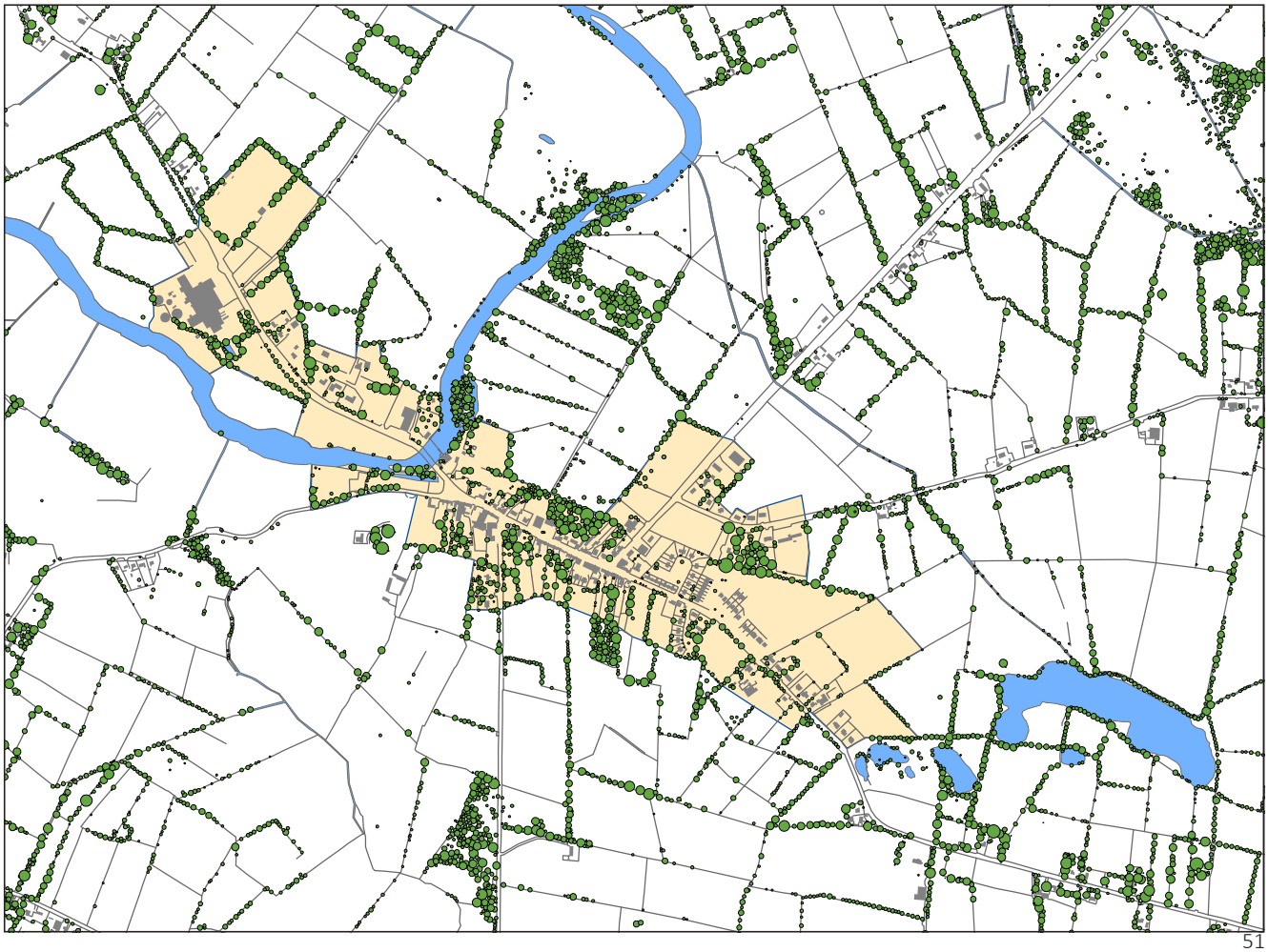
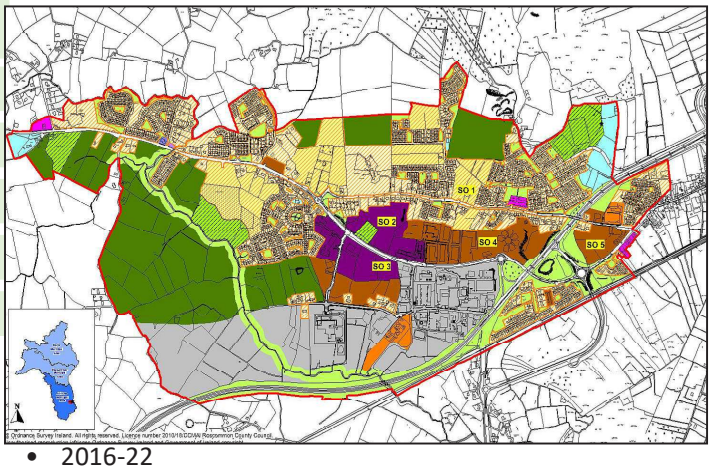


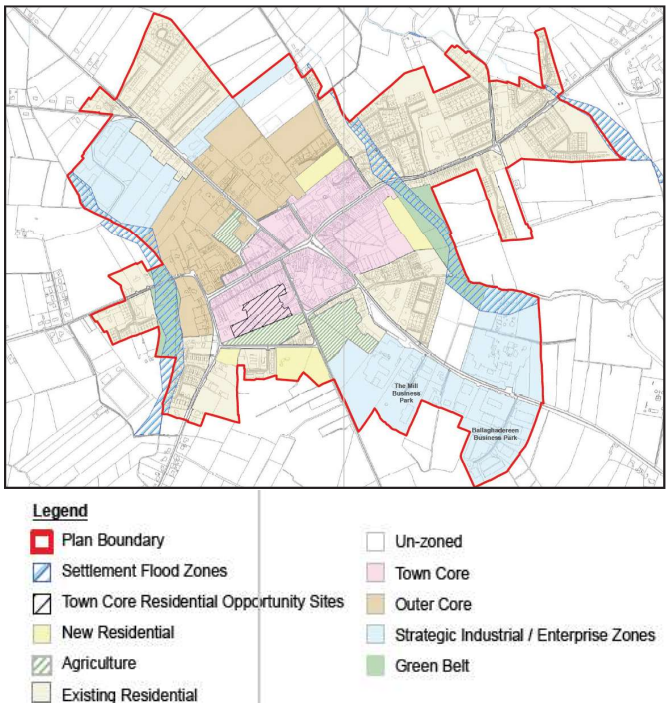
Name:	Bellanamullia
Population:	4,195 CSI:2022
Area:	3.88 km²
Number of trees:	5,609
Total canopy:	330,858 m²
Canopy cover:	9 %



- 2016-22

Scale 1: 20,000

Name:	Ballaghaderreen	
Population:	2,387	CSI:2022
Area:	1.88 km²	
Number of trees:	2,475	
Total canopy:	165,638 m²	
Canopy cover:	9 %	



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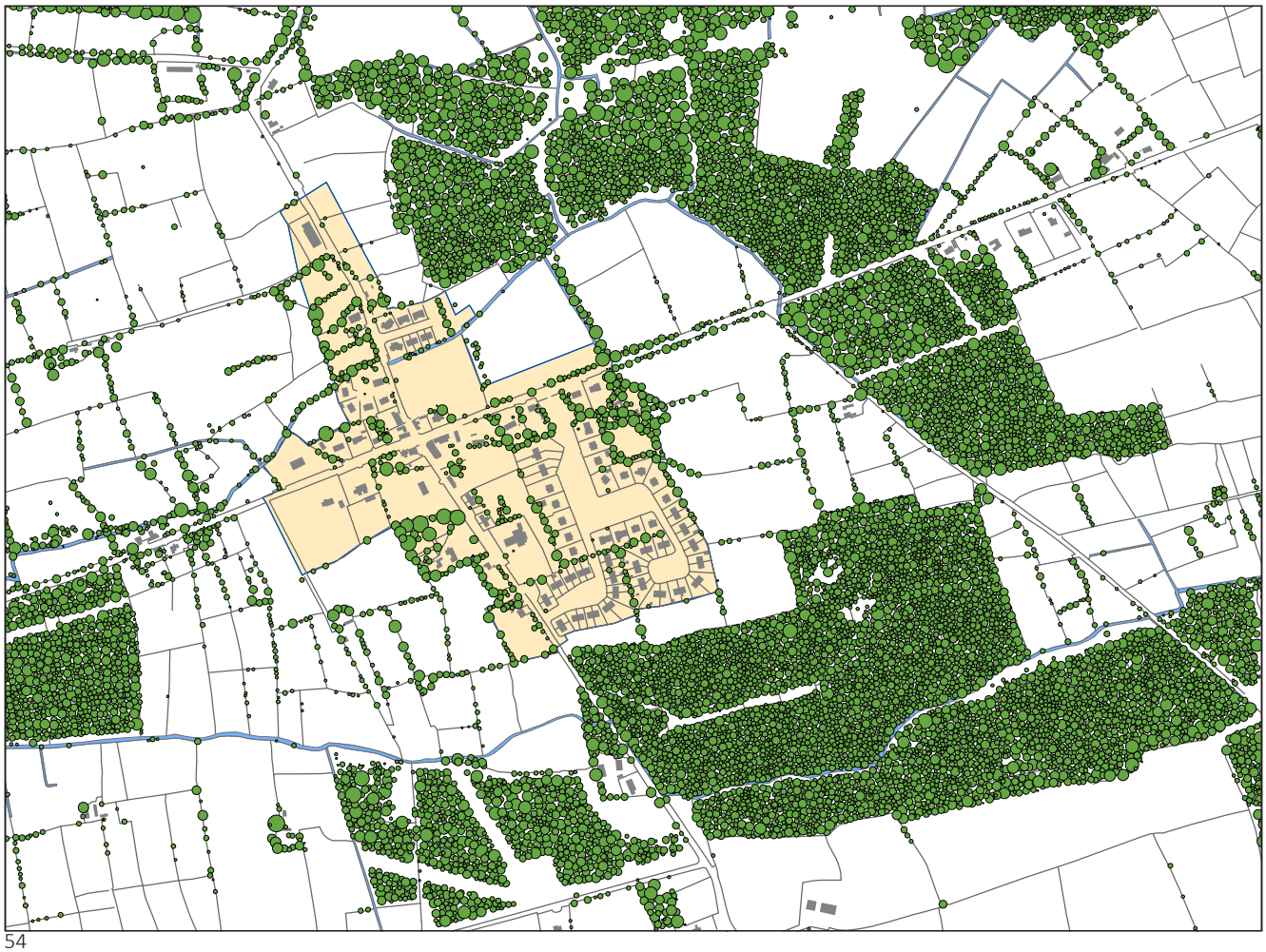
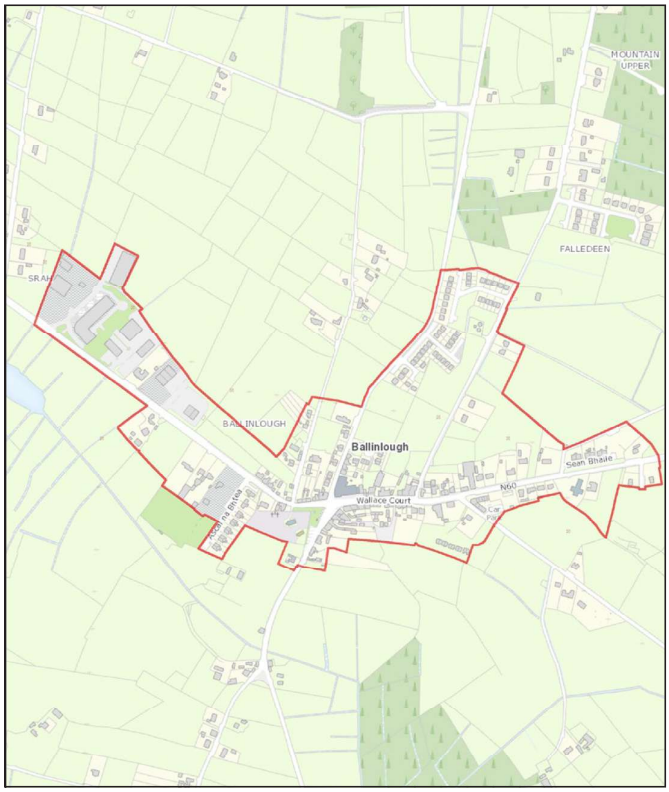
Name:	Balinameen	
Population:	223	CSI:2022
Area:	0.22 km^2	
Number of trees:	521	
Total canopy:	31,273 m^2	
Canopy cover:	14 %	

Scale 1: 10,000



Name:	Ballinlough	
Population:	343	CSI:2022
Area:	0.34 km^2	
Number of trees:	574	
Total canopy:	36,270 m^2	
Canopy cover:	11 %	



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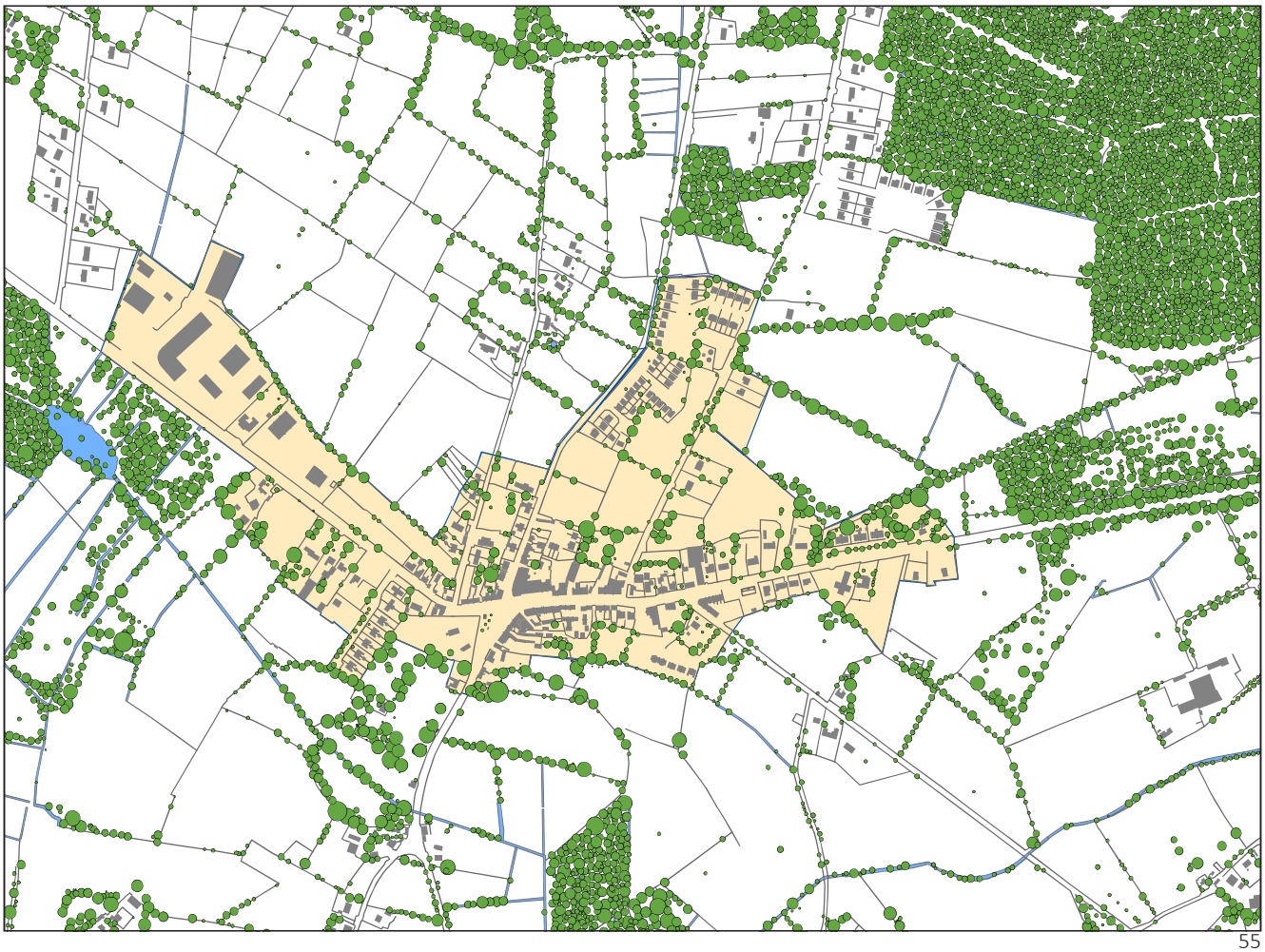
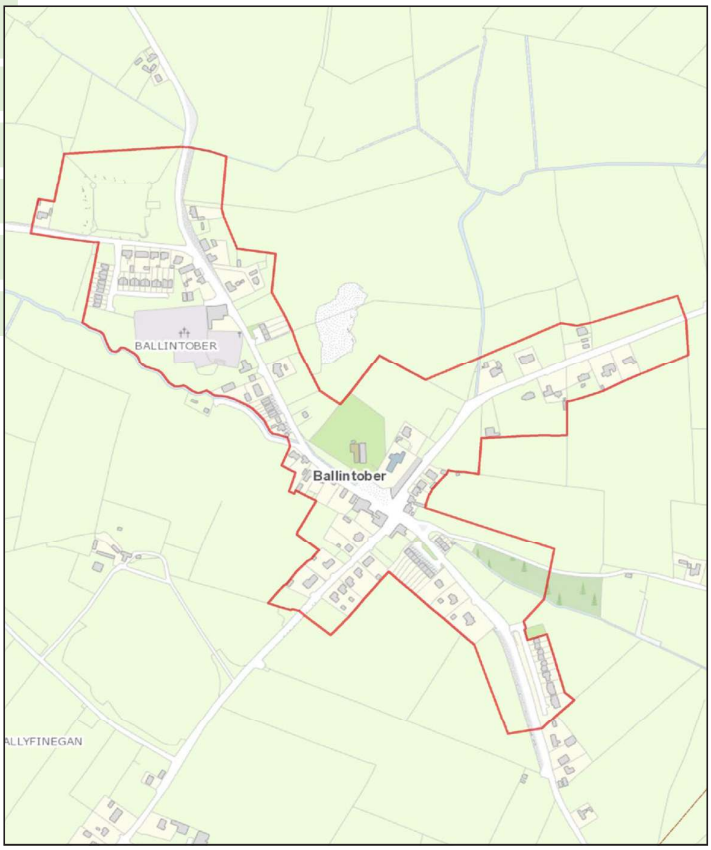


Name:	Ballintober
Population:	199
Area:	0.28 km^2
Number of trees:	527
Total canopy:	28,016 m2
Canopy cover:	10 %



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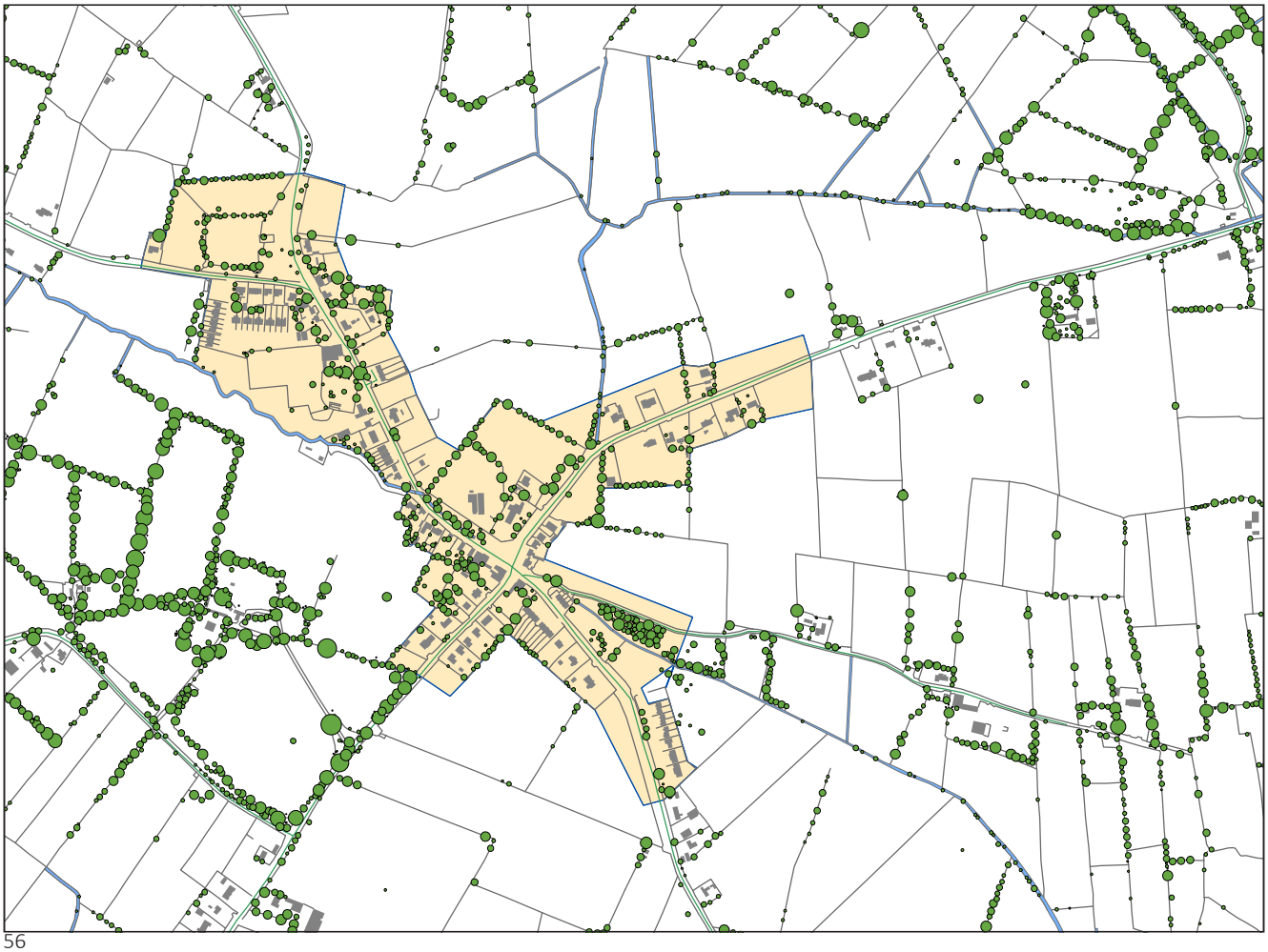
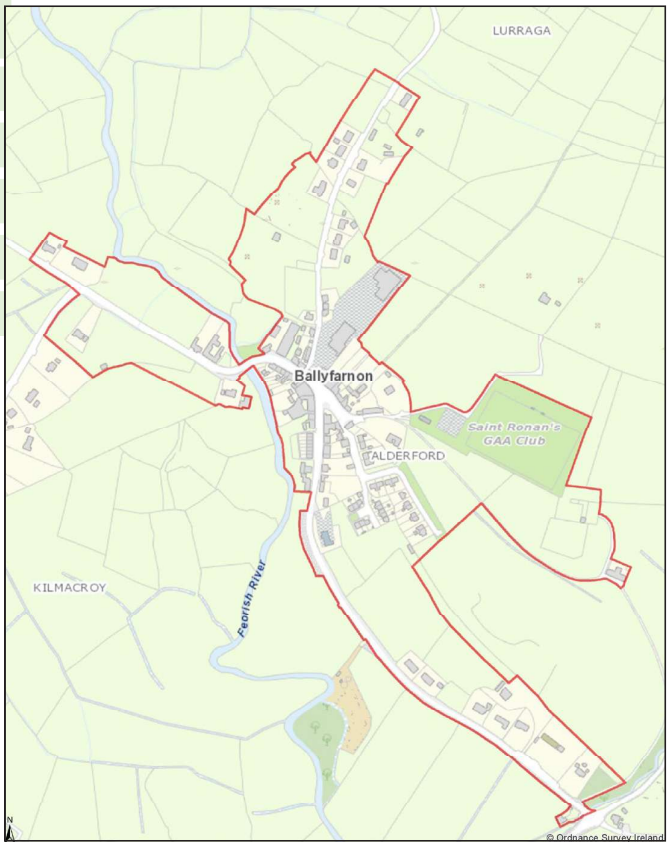


Name:	Ballyfarnon
Population:	187 (2016)
Area:	0.28 km^2
Number of trees:	585
Total canopy:	33,619m2
Canopy cover:	12 %



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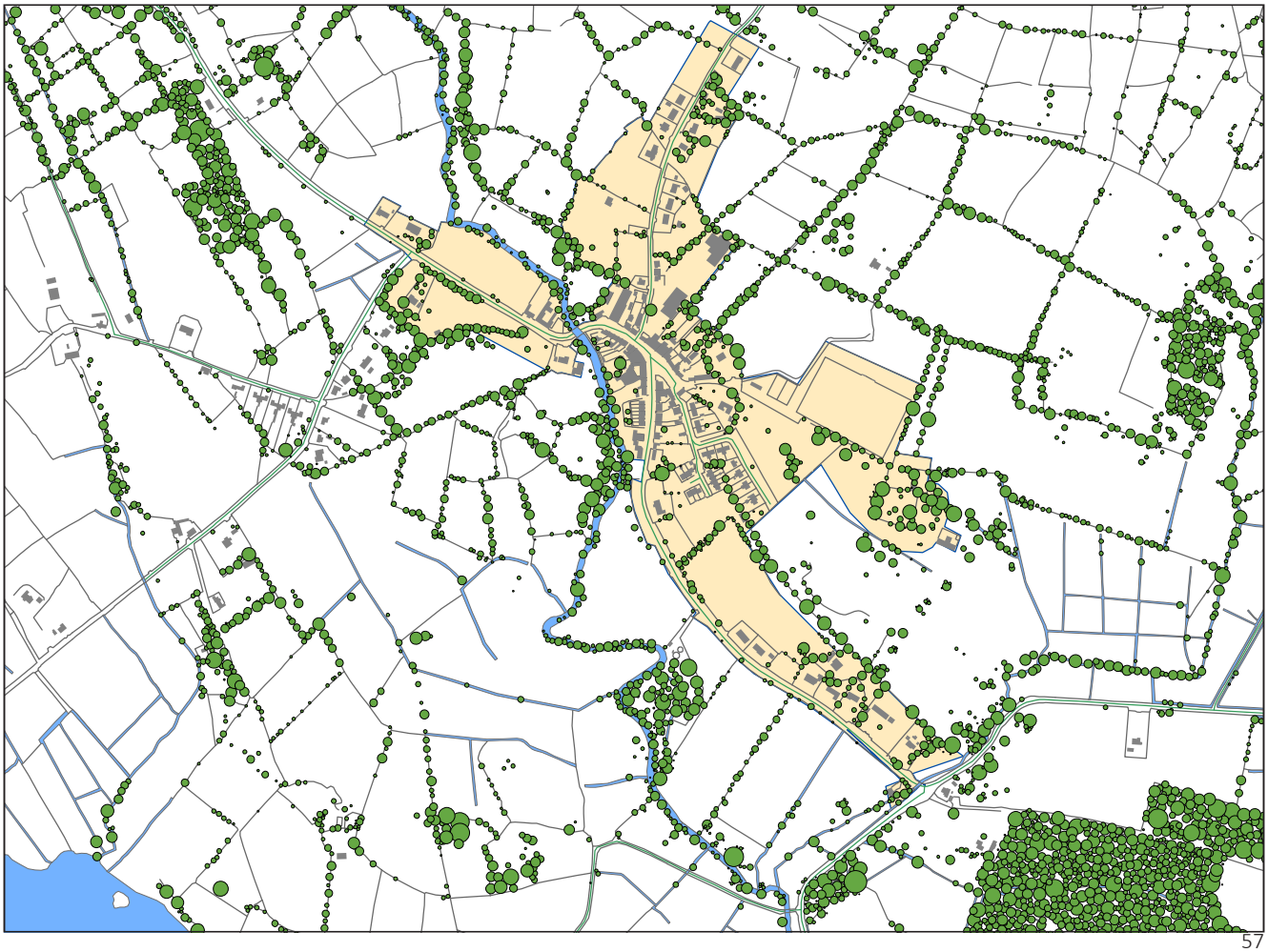
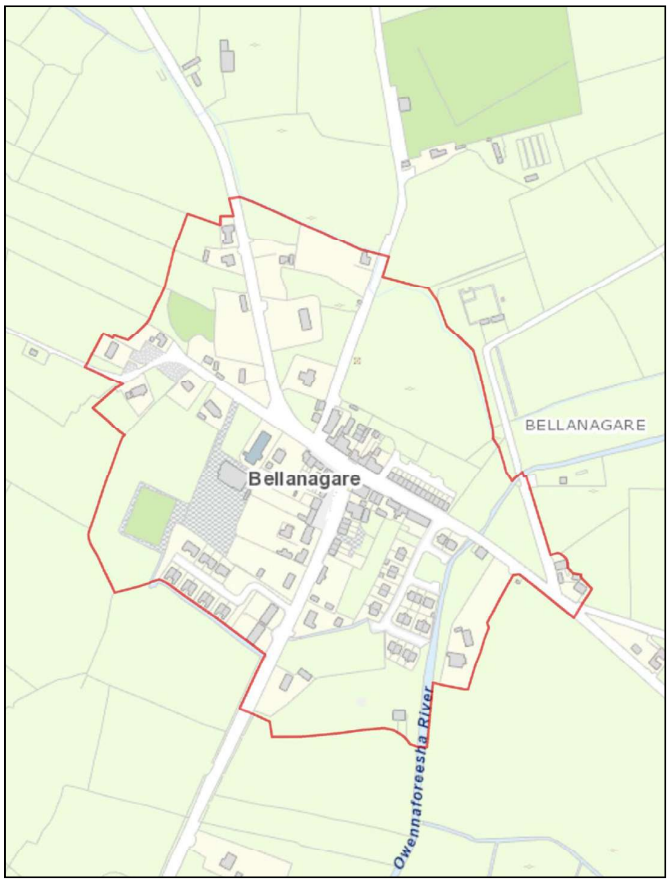


Name:	Ballyforan
Population:	227
Area:	0.34 km2
Number of trees:	634
Total canopy:	52,864 m2
Canopy cover:	15 %

Scale 1: 10,000

Name:	Bellanagare
Population:	162
Area:	0.19 km2
Number of trees:	323
Total canopy:	23,180 m2
Canopy cover:	12 %



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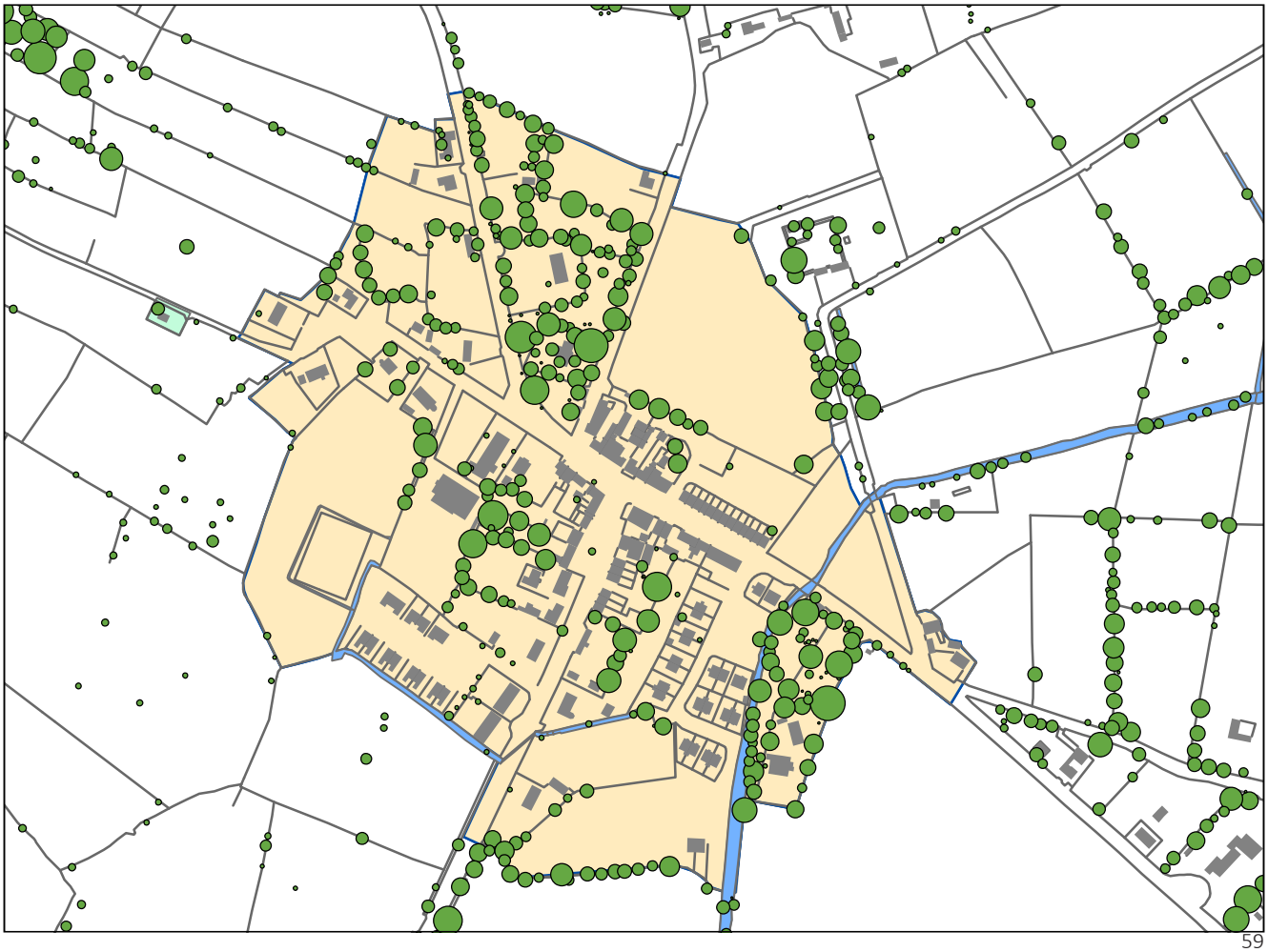
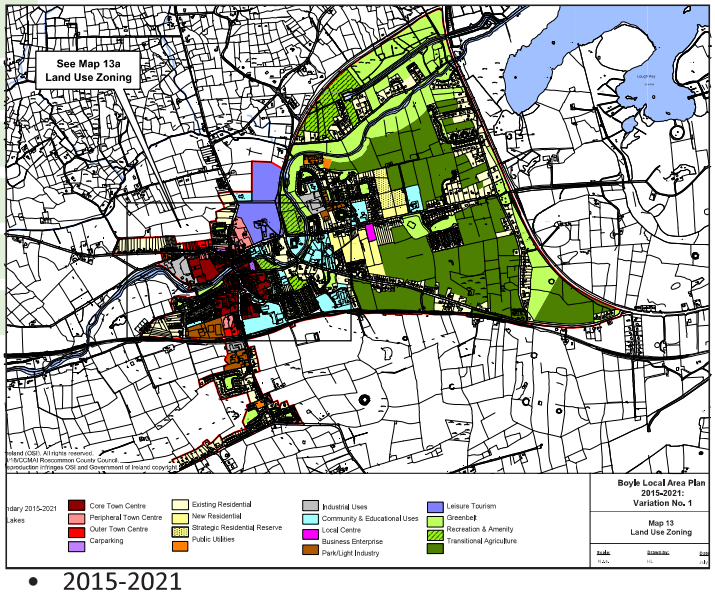


Name:	Boyle
Population:	2,915
Area:	3.56 km2
Number of trees:	6,671
Total canopy:	427,523 m2
Canopy cover:	12 %



- 2015-2021

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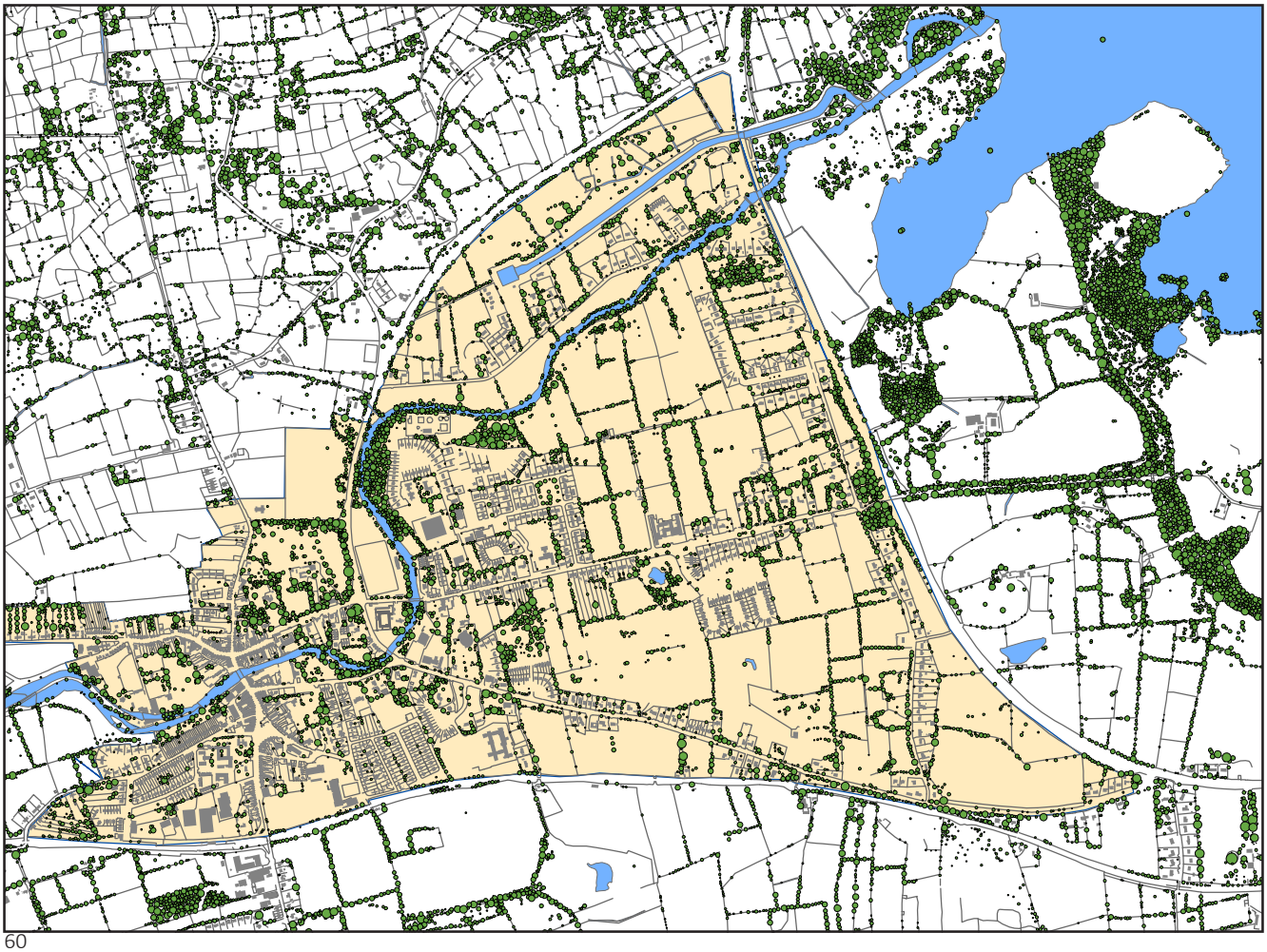
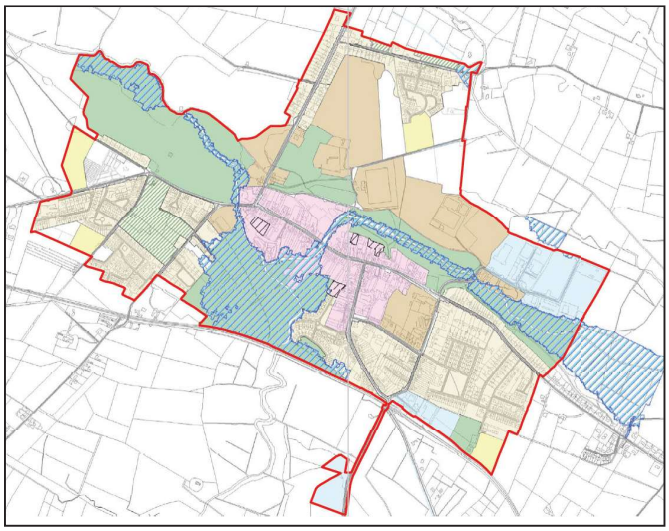


Name:	Castlerea
Population:	2,348
Area:	2.57 km2
Number of trees:	6,766
Total canopy:	530,142 m2
Canopy cover:	21 %



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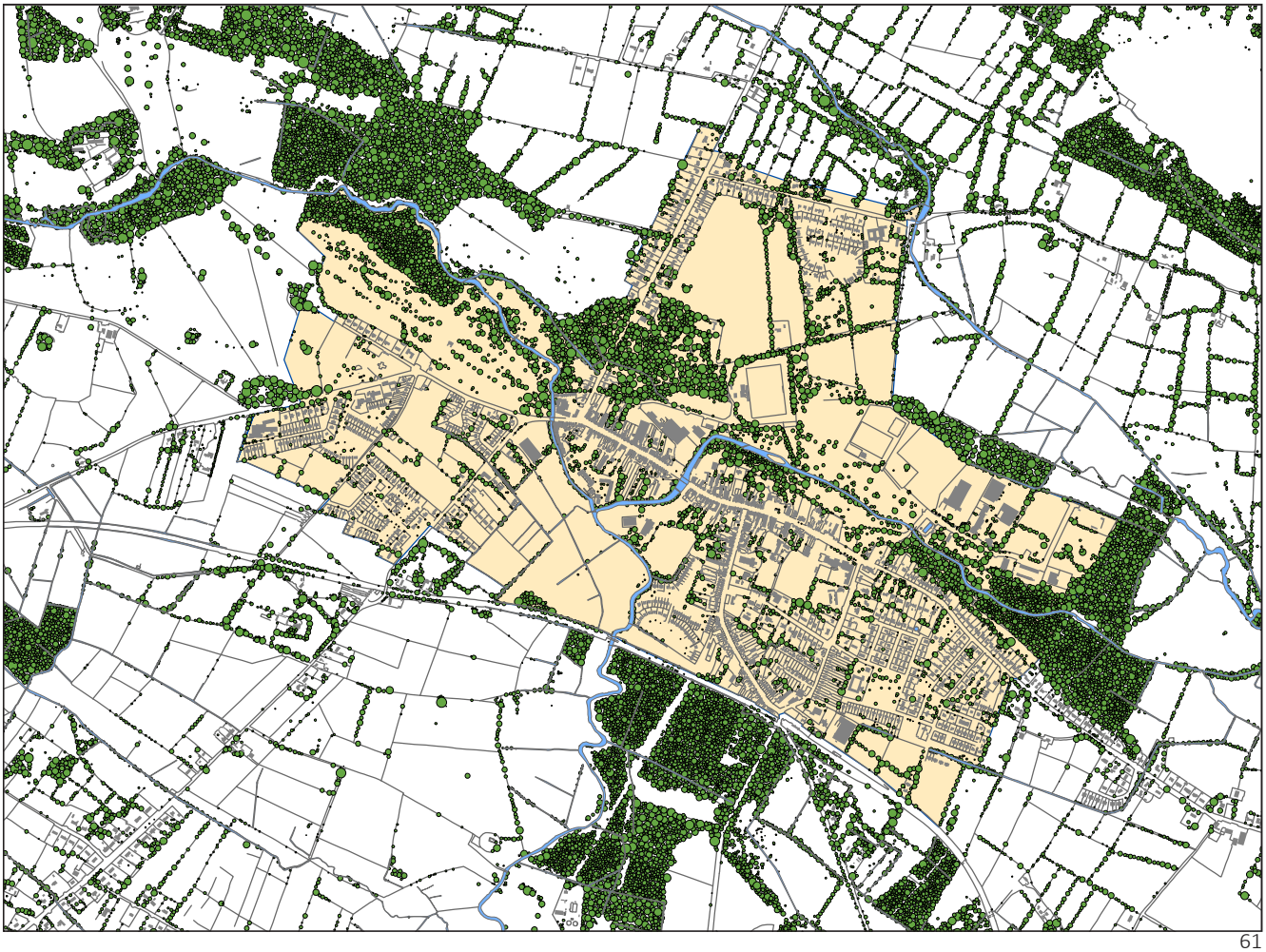
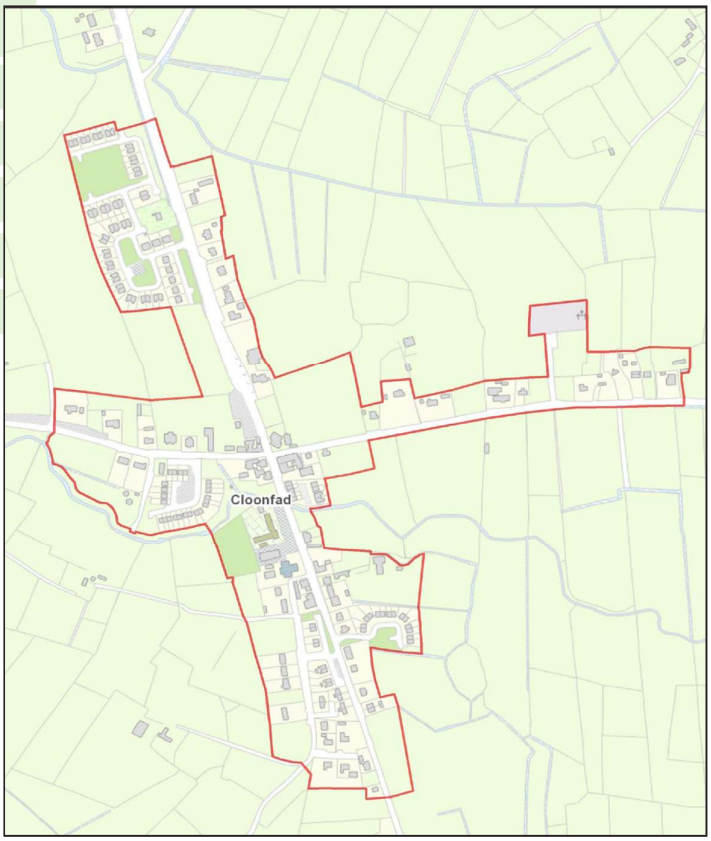


Name:	Cloonfad
Population:	376
Area:	0.31 km2
Number of trees:	594
Total canopy:	31,020 m²
Canopy cover:	10 %



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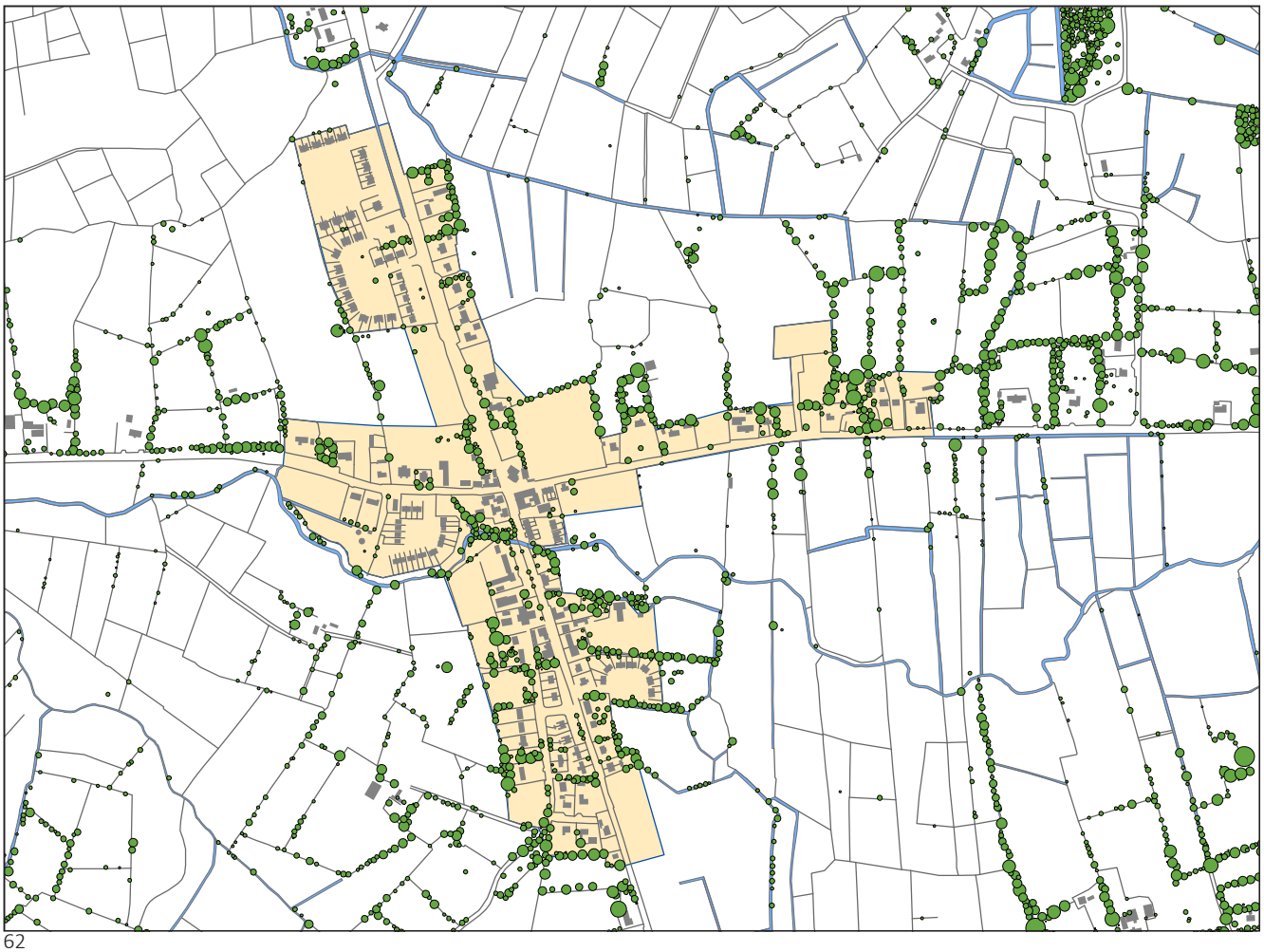
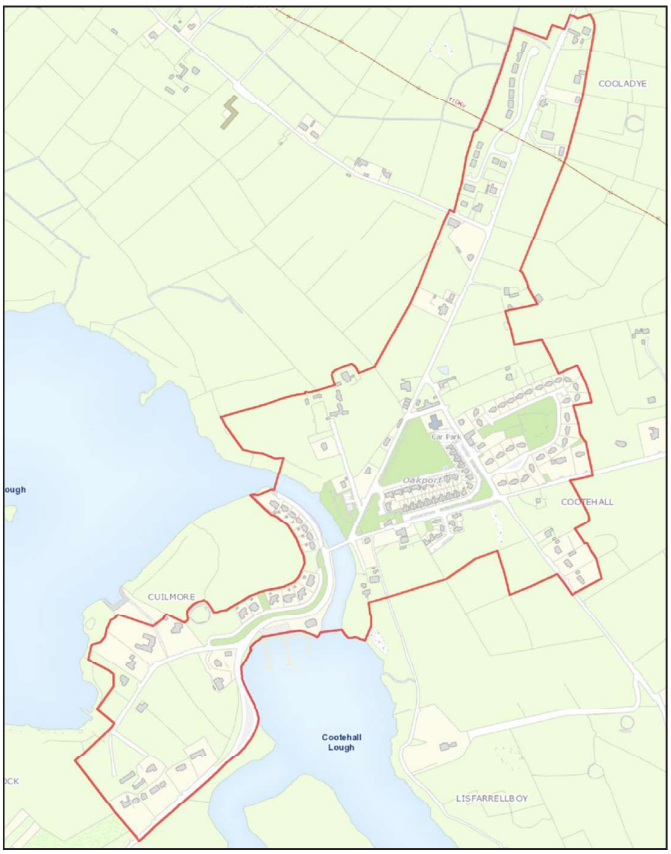


Name:	Cootehall
Population:	287
Area:	0.55 km2
Number of trees:	906
Total canopy:	52,845 m2
Canopy cover:	10 %



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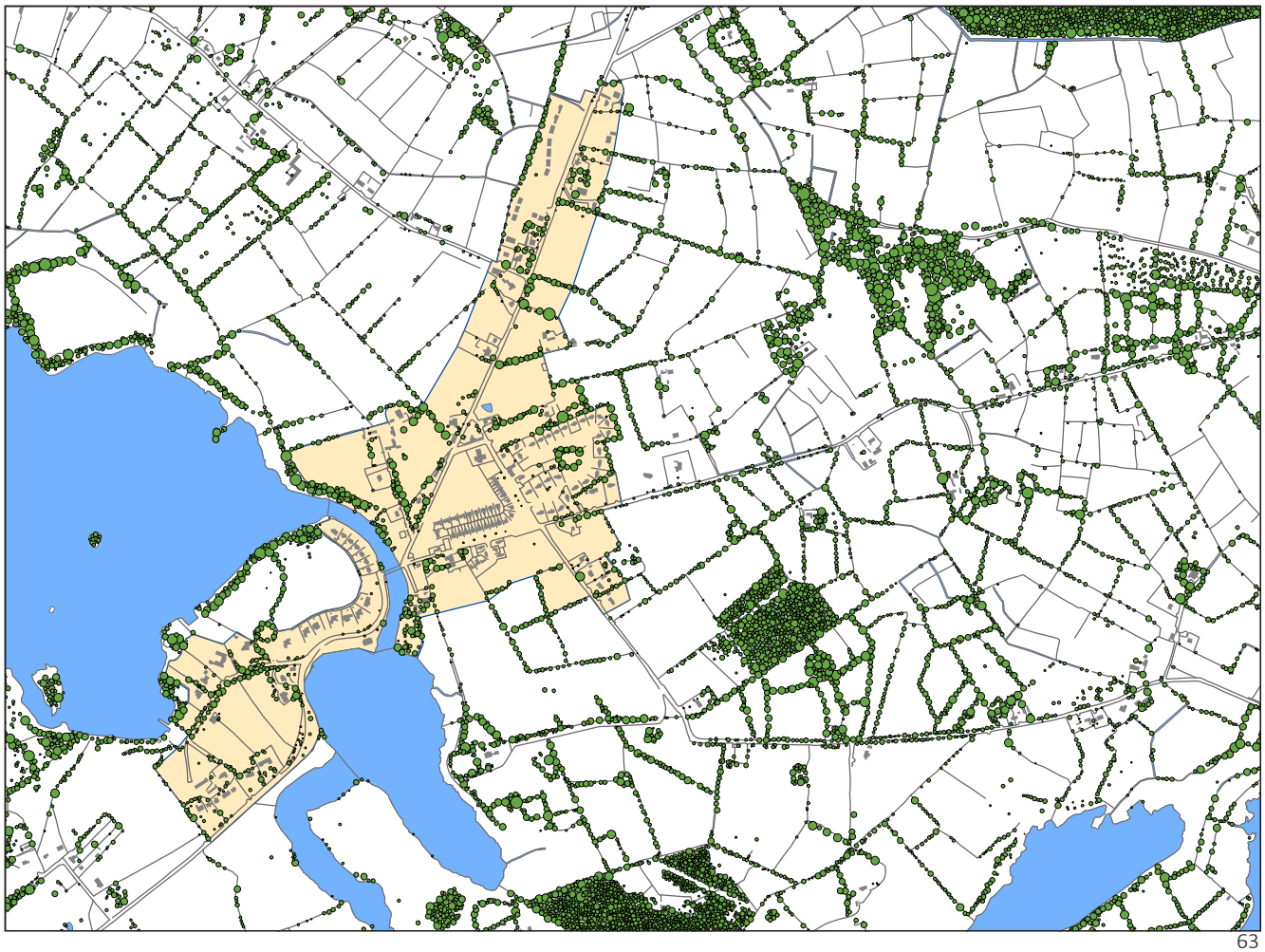
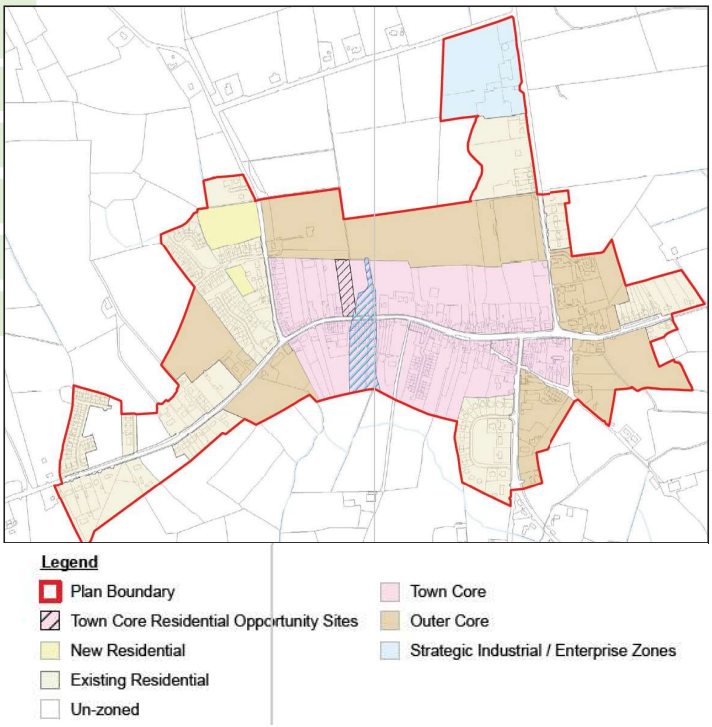


Name:	Elphin
Population:	715
Area:	0.81 km2
Number of trees:	1,409
Total canopy:	99,432 m2
Canopy cover:	12 %



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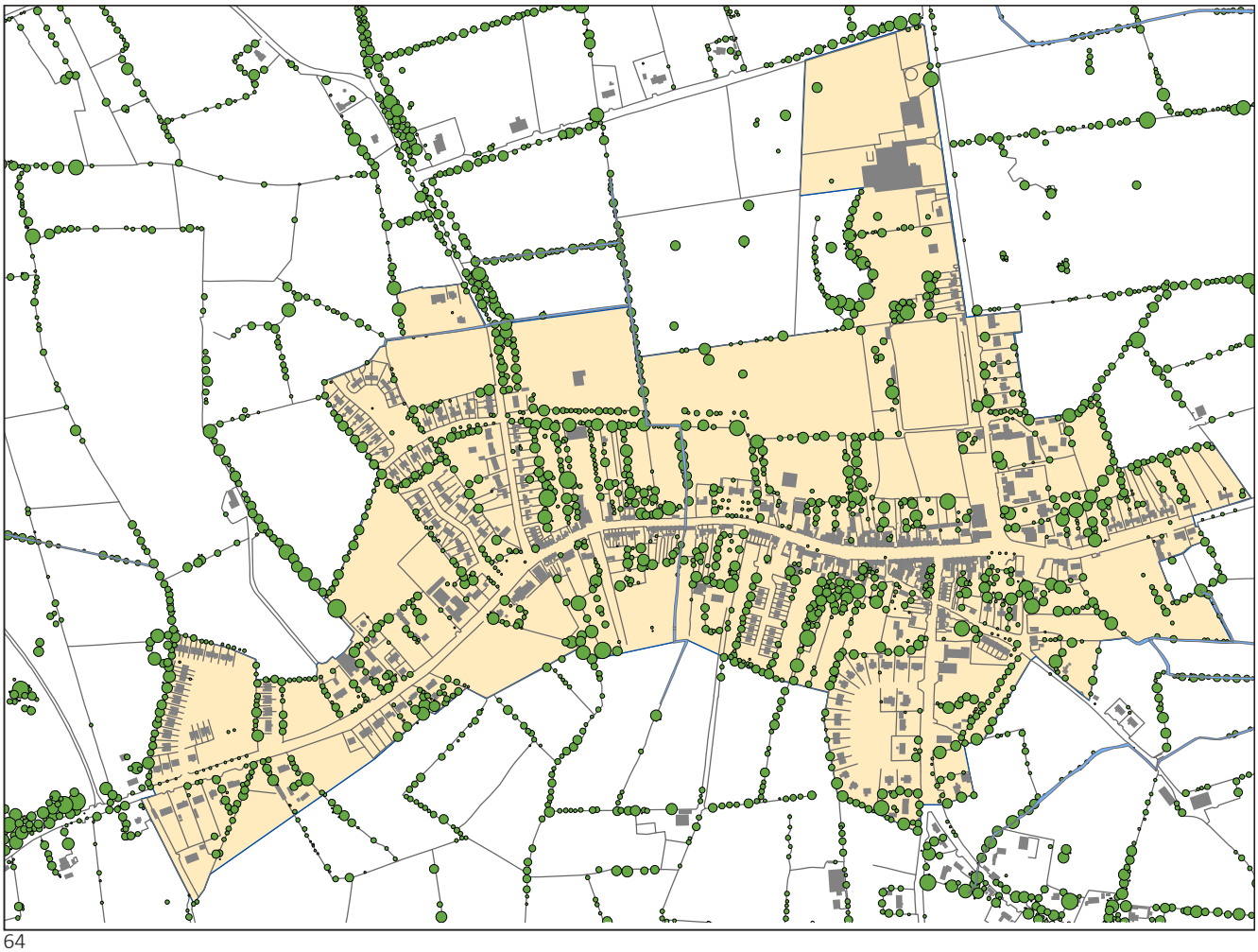
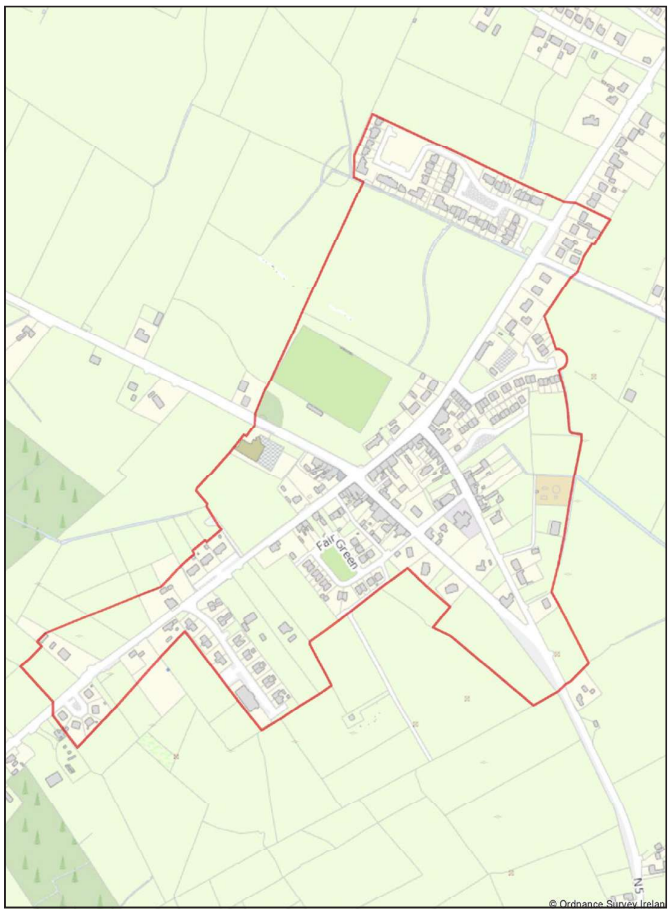


Name:	Frenchpark
Population:	572
Area:	0.39 km2
Number of trees:	542
Total canopy:	31,732 m2
Canopy cover:	10 %



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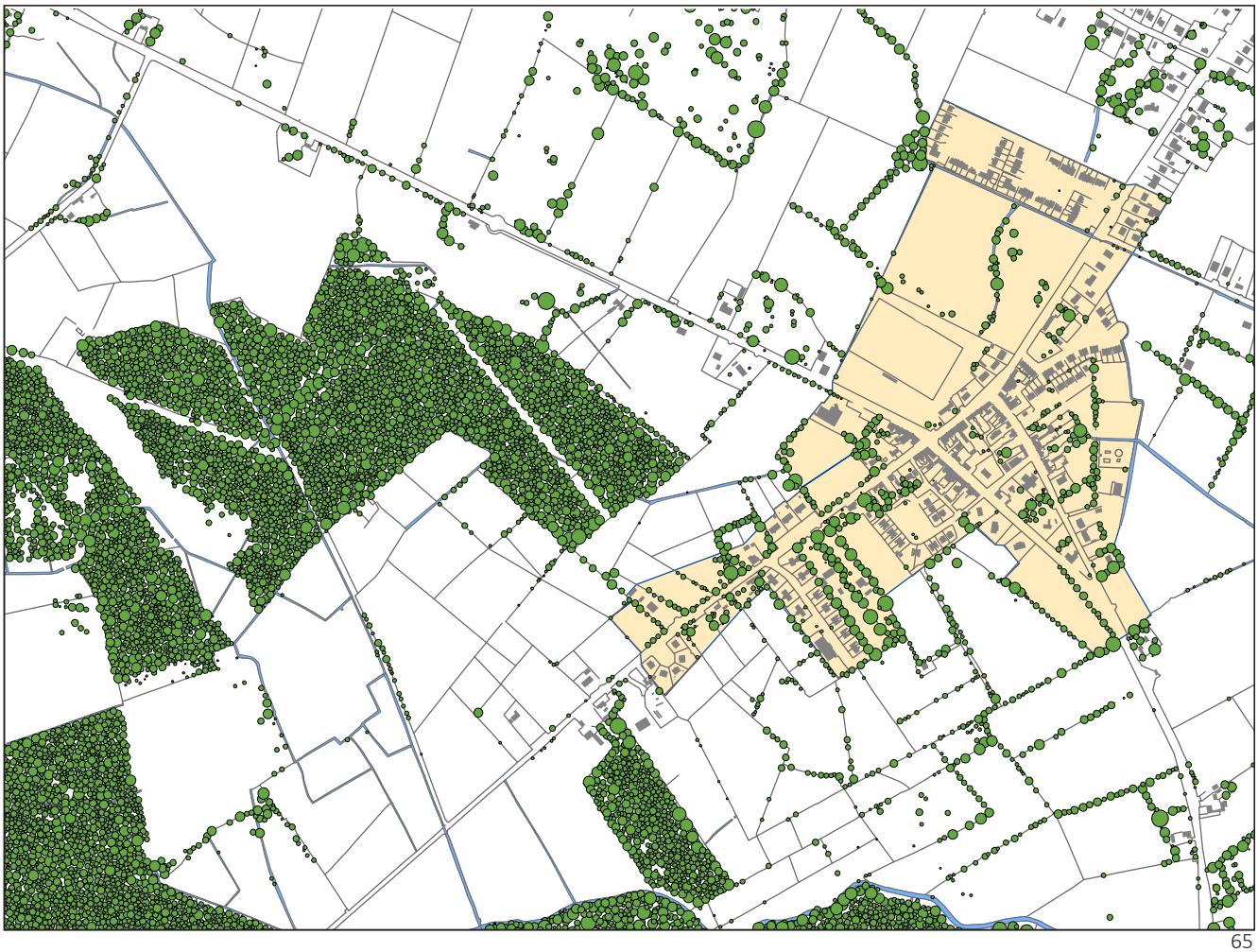
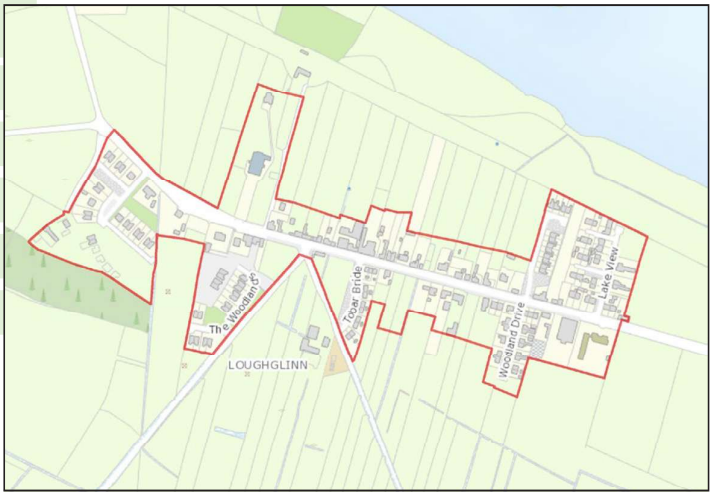


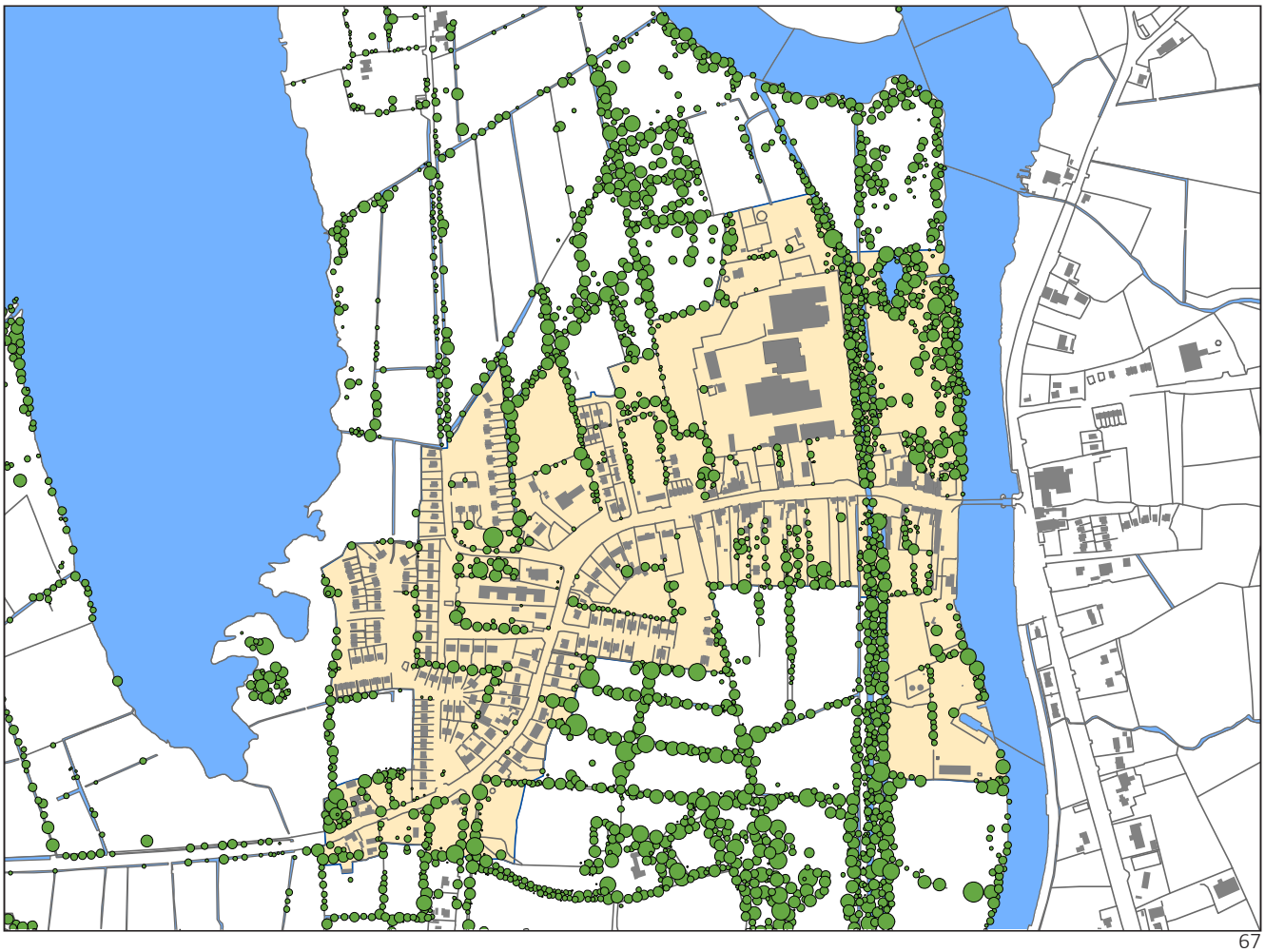
Name:	Loughglinn
Population:	231
Area:	0.16 km2
Number of trees:	406
Total canopy:	23.740 m2
Canopy cover:	8 %



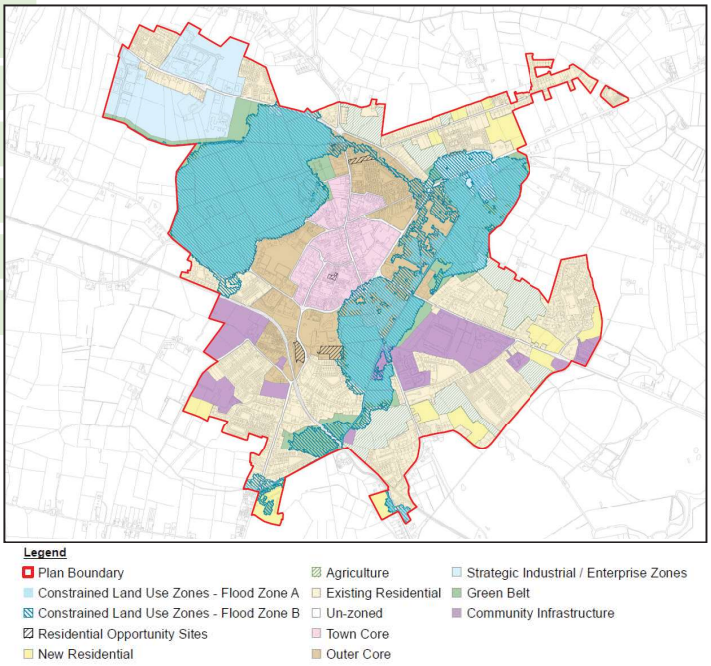
Scale 1: 7,500

Name:	Rooskey
Population:	787
Area:	0.43 km2
Number of trees:	1103
Total canopy:	71.463 m2
Canopy cover:	17 %

Scale 1: 10,000



Name:	Roscommon
Population:	6,555
Area:	6.31 km2
Number of trees:	7,618
Total canopy:	565,174 m2
Canopy cover:	9 %



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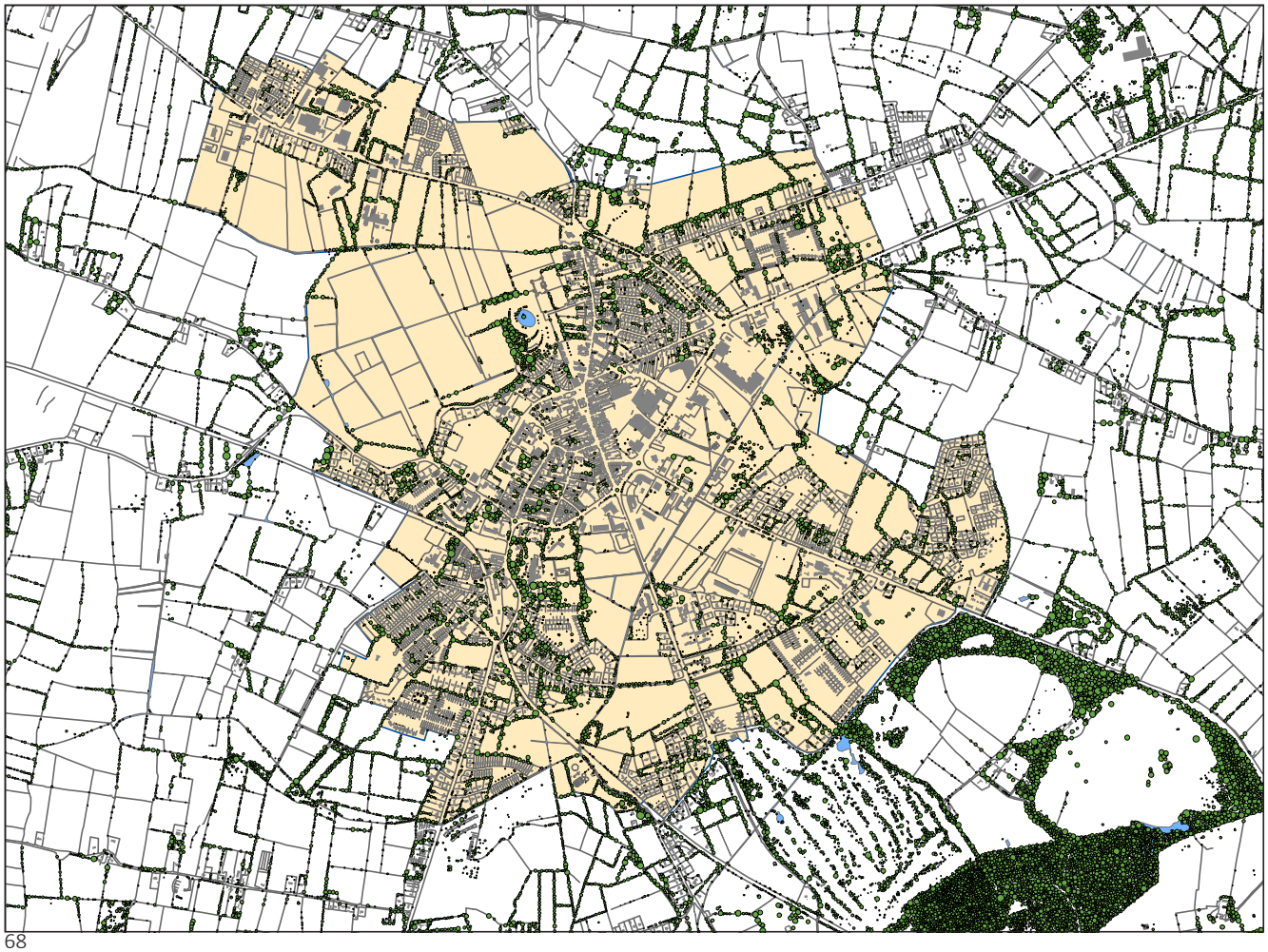
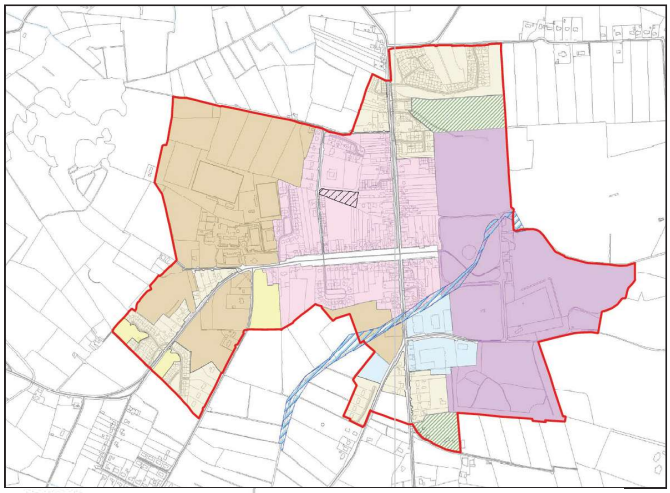


Name:	Strokestown
Population:	850
Area:	1.35 km2
Number of trees:	3,492
Total canopy:	306,569 m²
Canopy cover:	23 %



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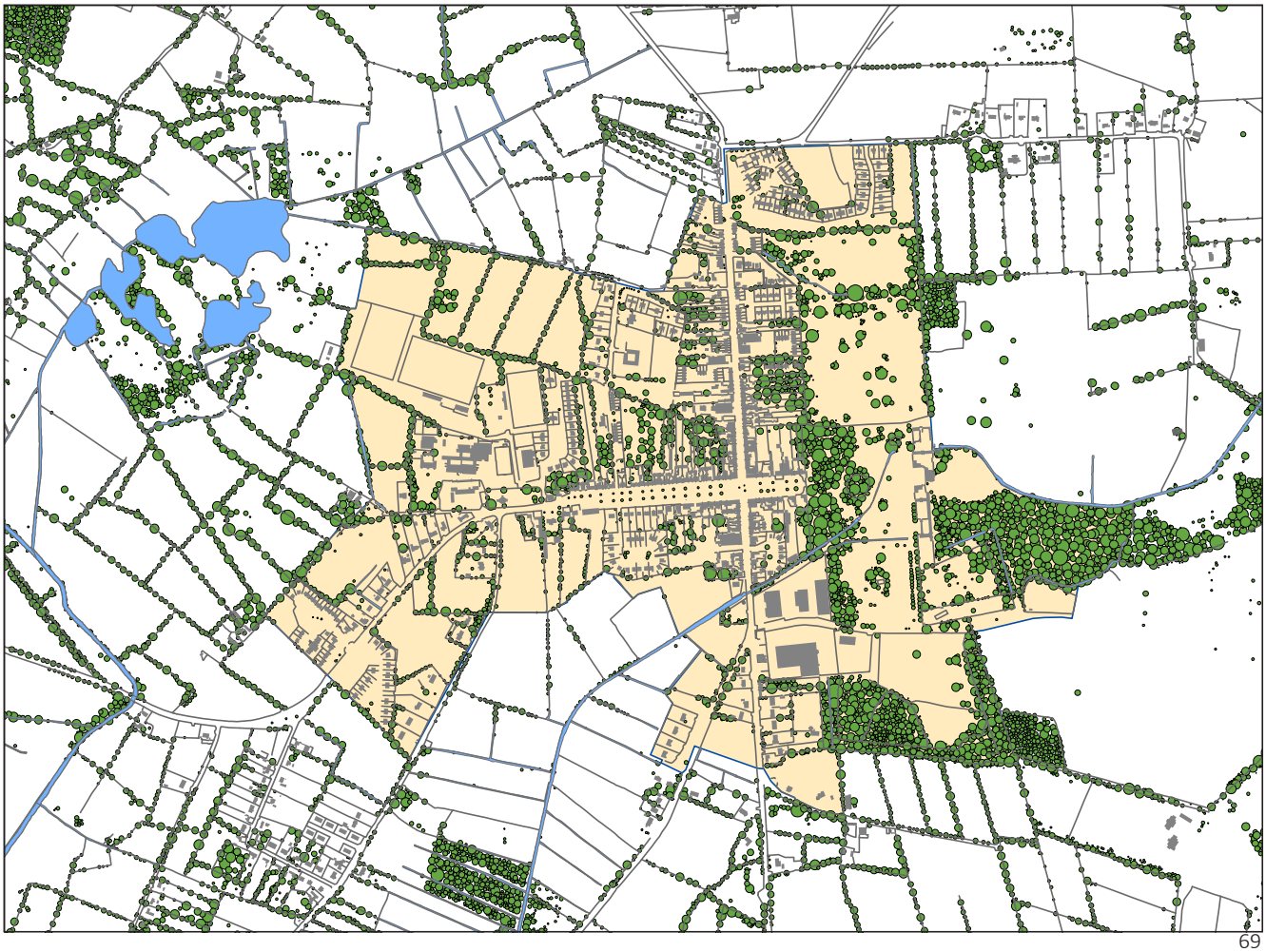
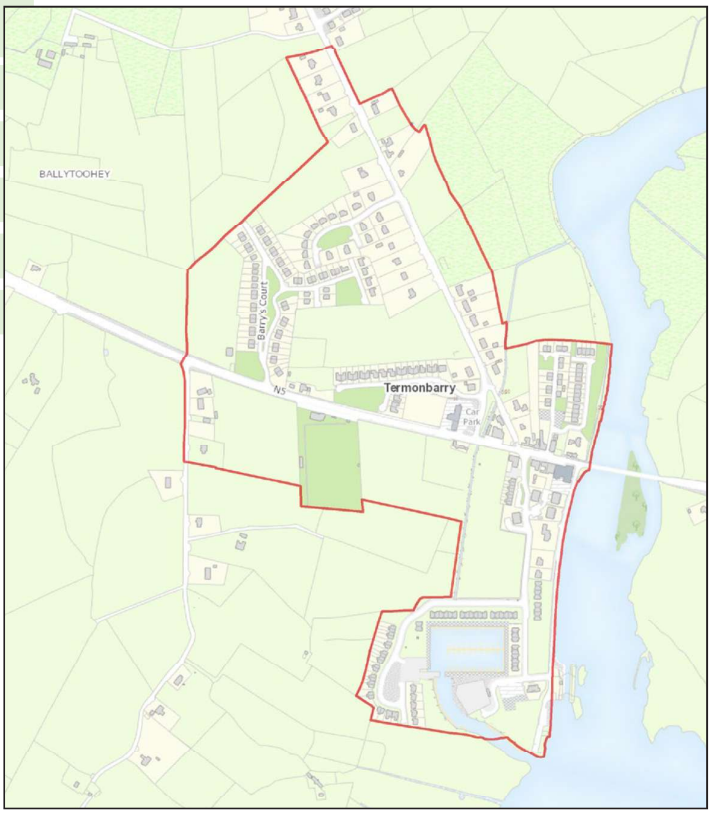


Name:	Tarmonbarry
Population:	699
Area:	0.50 km2
Number of trees:	666
Total canopy:	36.970 m2
Canopy cover:	8 %



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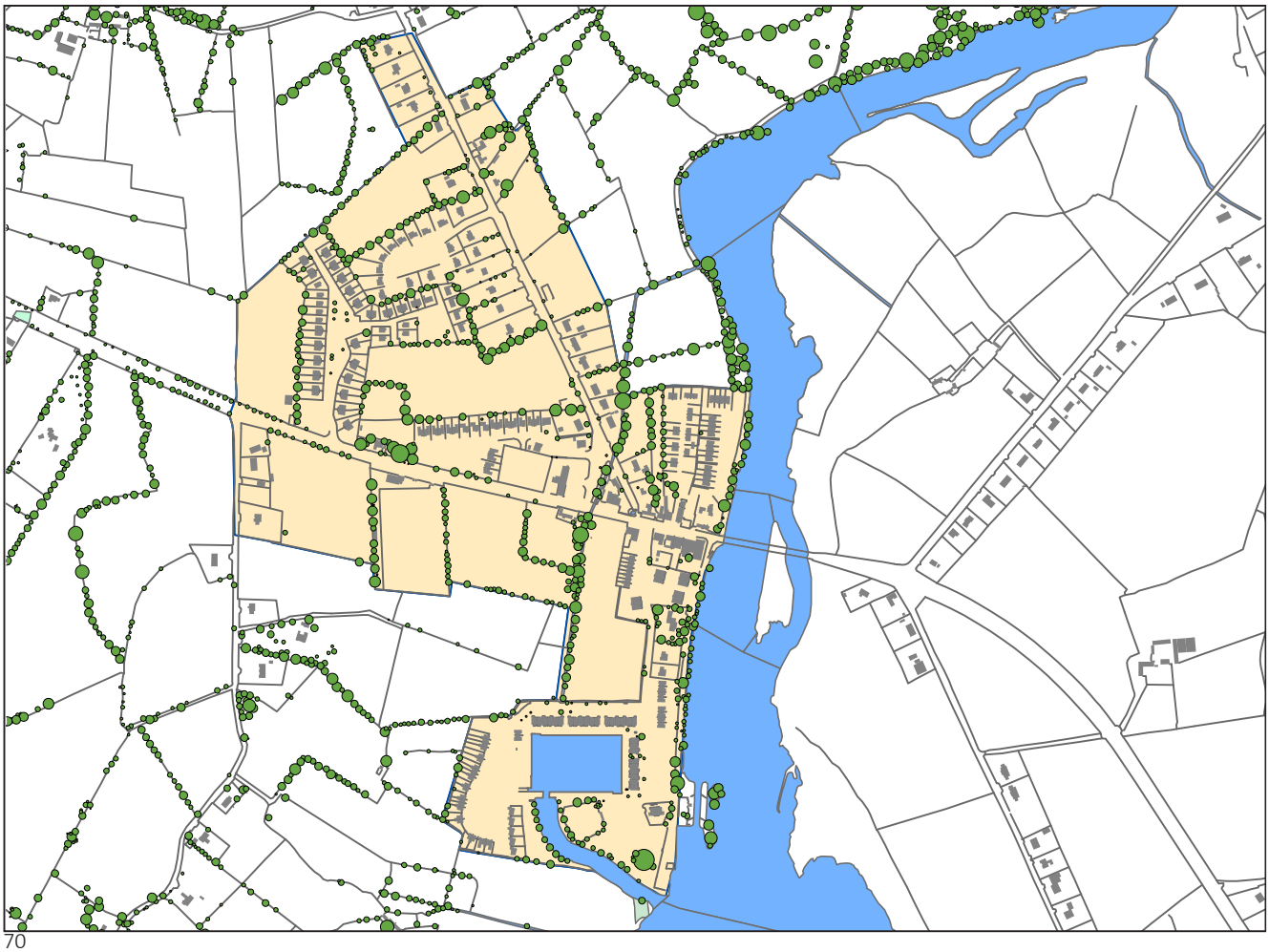
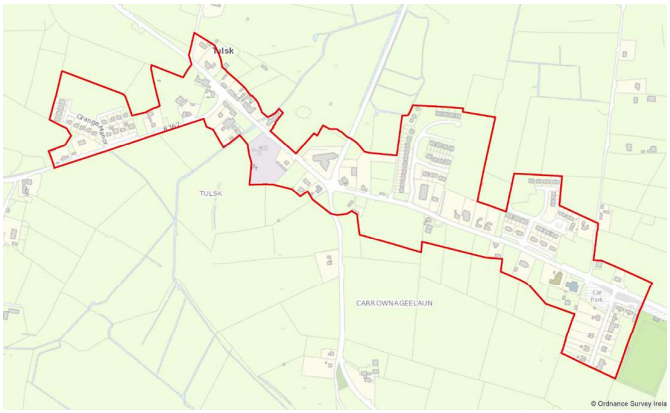


Name:	Tulsk
Population:	191
Area:	0.31 km2
Number of trees:	475
Total canopy:	26.682 m^2
Canopy cover:	9 %



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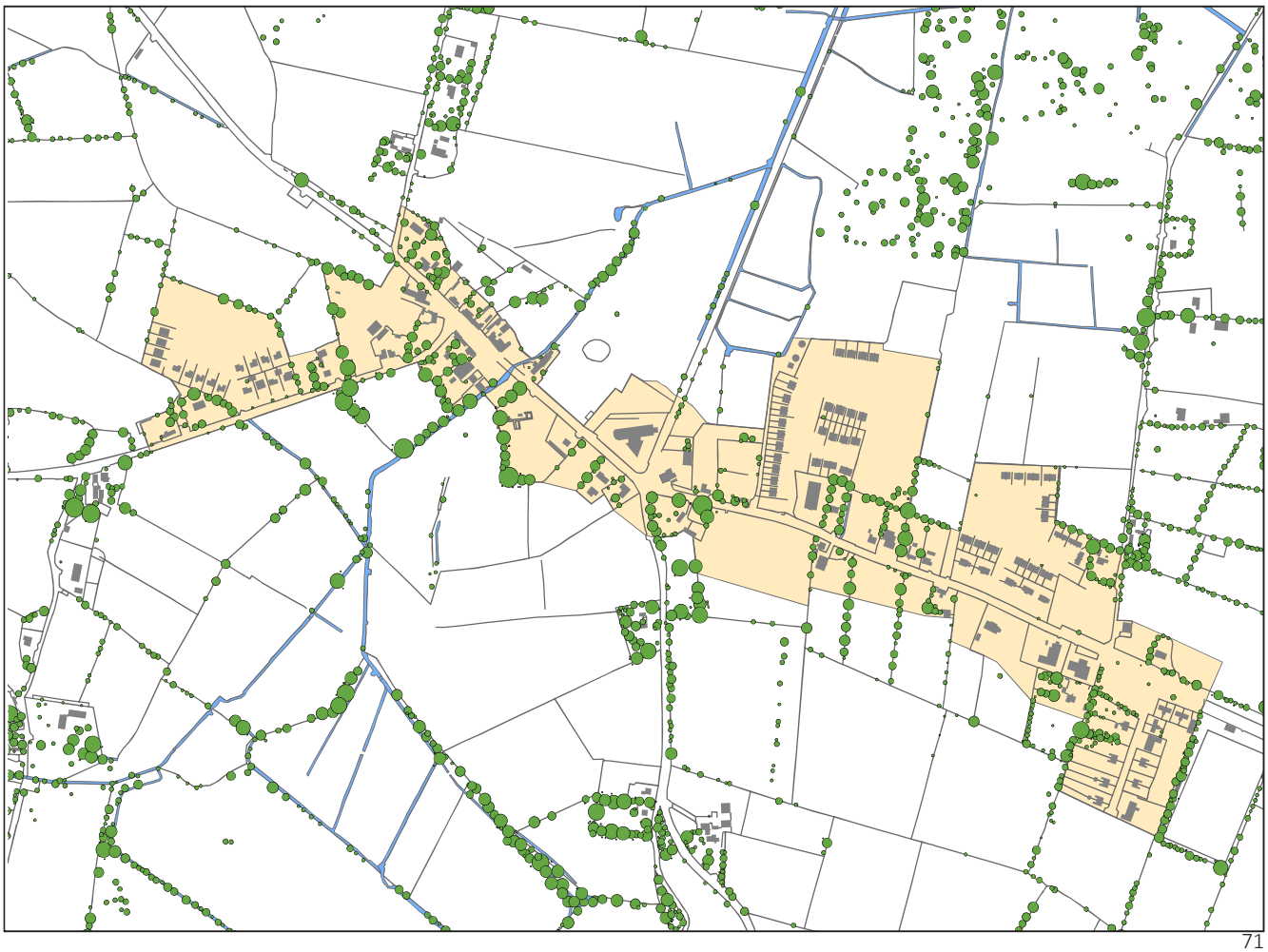

Appendix 2

Tree selection for Green Infrastructure

Tree selection is of strategic importance. Trees are a major component of green infrastructure; as such, they are directly associated with a range of benefits or ecosystem services. As the provision of ecosystem services is dependent on healthy trees, the volume of ecosystem services bestowed by trees is proportionate to their vitality. Vitality can only be secured by good quality growing environments hosting appropriate species. Therefore the advantages of choosing the right tree species should be apparent.

'… establishment success enhances the positive contribution trees make within any green infrastructure scheme. Potential disservices can be minimised and future maintenance requirements reduced. These outcomes are all important for managers seeking to sustainably manage trees in green infrastructure and foster stewardship from the communities most directly impacted by their presence.

For understandable reasons, aesthetic criteria often dominate species selection decisions for green infrastructure projects. However, such an approach is seldom as rewarding as at first envisioned. Trees will only perform well and express their ornamental assets fully if they are appropriate for the site conditions. For example, maples (Acer spp.) often famed for their autumn colour rarely deliver this if they have experienced prolonged periods of drought through the growing season.

Poorly selected plant material is prone to under-performance, decline and early mortality. Therefore, the principal driver in tree selection should relate to the species' ability to thrive on the chosen site, as the benefits imparted by trees rely on them performing well in the landscape. Trees clinging to life, barely surviving, require more intensive management, are more vulnerable to pests and pathogens and, ultimately, deliver meagre benefits.'[66]

See the Trees and Design Action Group (TDAG) Tree Species Selection for Green Infrastructure. A Guide for Specifiers (2014)

66 Hirons, Andrew and Sjopman, Henrik. Tree Species Selection for Green Infrastructure. A Guide for Specifiers (2014). https://www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html

Fig 30 Frontispiece. TDAG A Guide for Specifiers

Appendix 3a

List of Native Trees

Not all native species are adapted to all sites. The choice of a tree must take account of the site and location and the tree's preferences. Wherever possible, species selection and site preparation should be guided by specialist advice.[67]

The three key considerations are for species selection are:

- Mature size that a tree is likely to attain and the above ground space available to accommodate its growth Do not rely on annual pruning to contain the growth and future size of the tree – select an appropriate species or cultivar.
- Volume and quality of soil available for growth, underground space available for rooting, and proximity of footpaths, street lighting and CCTV (that may interfere with development of the natural crown).
- Suitability in the setting or landscape context, including appearance, seasonal attributes, loss or framing of views from future growth, and shading.

Ireland has a very limited number of native trees. An online guide to Ireland's native trees and woodlands is available from the National Parks & Wildlife Service[68]. Many native species have cultivated varieties which may be better suited in urban settings.Many introduced species have naturalised and so behave much like native species and support significant biodiversity. Examples include beech, sycamore, limes and sweet chestnut, amongst others.

It is not practicable or sensible to limit planting to native species on all sites especially given current climate change. For urban, park and residential sites, the far greater number of introduced (naturalised and 'exotic' or 'non-native') species and varieties should be considered.

A useful online guide[69] to tree selection is available from the Trees & Design Action Group: https://www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html

Table 03 (Native treelist) is adapted from Kilkenny County Council's Draft City Plan. Appendix F[70]

67 Teagasc. "Less well-known native trees – adding a powerful ecological punch in our new forests". June 17, 2022. https://www.teagasc.ie/news--events/daily/forestry/less-well-known-native-trees--adding-a-powerful-ecological-punch-in-our-new-forests.php

68 https://www.npws.ie/sites/default/files/publications/pdf/Woodlands%20booklet.pdf

69 https://www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html

70 https://ourplan.kilkenny.ie/archive/node/143.html

Common name	Botanical name	Mature Height (max)	Suitable for public open spaces	Suitable for streets	Guide to planting: see key below
Alder	*Alnus glutinosa*	20m	Yes	Sometimes	ADPS
Alder buckthorn	*Frangula alnus*	6m	Yes	No	D
Strawberry tree	*Arbutus unedo*	6m	Yes	No	Not frost hardy
Ash	*Fraxinus excelsior*	25m	Not currently due to ADB disease	No	N/A
Aspen	*Populus tremula*	25m	Yes	No	DPSV
Bird cherry	*Prunus padus*	15m	Yes	Sometimes	P
Crab apple	*Malus sylvestris*	10m	Yes	Yes varieties	AHIP
Downy/White birch	*Betual pubescens*	15m	Yes	Yes	ADIP
Elder	*Sambucus nigra*	6m	Yes – but rarely needs to be planted	No	V
Hawthorn / Whitethorn	*Crataegus monogyna*	8m	Yes	Sometimes	AHIPS
Hazel	*Corylus avellana*	6m	Yes	No	AHS
Holly	*Ilex aquifolium*	12m	Yes	Seldom	AHPS
Juniper	*Juniperus communis*	6m	Sometimes	No	S
Pedunculate oak	*Quercus robur*	25m	Yes	Yes	AI only suitable for large spaces
Purging buckthorn	*Rhamnus cathartica*	6m	Sometimes	No	AHPV
Rowan or mountain ash	*Sorbus aucuparia*	12m	Yes	Yes	ADHIP
Scots pine	*Pinus sylvestris*	25m	Yes	Sometimes	AI
Sessile oak	*Quercus petraea*	25m	Yes	Sometimes	AI only suitable for large spaces
Silver birch	*Betula pendula*	15m	Yes	Yes	ADIP
Blackthorn	*Prunus spinosa*	6m	Yes	No	AHPV
Spindle	*Euonymous europaeus*	6m	Yes	Occasionally	H
Whitebeam	*Sorbus aria* *Sorbus hibernica*	12m	Yes	Yes	IPS
Wild cherry	*Prunus avium*	20m	Yes	Yes	AHI
Willow spp. ***Grey willow, Bay willow, Pussy willow are native, as is Smaller-Eared willow. White & crack willow not, but are naturalised.***	*Salix spp.* *Salix cinerea,* *Salix caprea* *Salix pentandra*	5-25m	Sometimes	No	V
Wych elm	*Ulmus glabra*	25m	Sometimes	Rarely	PS
Yew	*Taxus baccata*	15m	Yes	No	AIPS

Guide to Planting Key:

A – Grows in a wide variety of soils, D – Tolerates or prefers damp conditions, H – Suitable for hedging, I – Suitable as an individual tree, P – Tolerates smoke or pollution, S – Tolerates shade, V – Can be invasive, T - Tolerates dry conditions

Table 03 Native treelist

Appendix 3b

Non-native tree list

The three key considerations are for species selection are listed in Appendix 3a. As also discussed in Appendix 3a, not all native species are adapted to all sites. For urban, park and residential sites, the far greater number of introduced (naturalised and 'exotic' or 'non-native') species and varieties should be considered. In all cases, the choice of a tree should take account of the site and location and the tree's preferences and, wherever possible, species selection and site preparation should be guided by specialist advice.

Many native species have cultivated varieties which may be better suited in urban settings. Many introduced species have naturalised and so behave much like native species and support significant biodiversity. Examples include beech, sycamore, limes and sweet chestnut, amongst others.

The table opposite is adapted from the Tree Design Action Group (TDAG) Species Guide, available from https://www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html [1]

The list includes 30 non-native tree species for consideration for climate-resiliant urban tree planting schemes, such schemes may also include native species as and where appropriate.

All species listed here are suitable, and will grow well in parks. Some trees have greater tolerance to particular urban conditions, these characteristics are listed under 'special tolerances'. We have been mindful to choose trees that should thrive in Ireland, and are currently reasonably and commonly available from Irish and European nurseries. There are hundreds of suitable non-native (exotic) species that would grow well in the midlands, of Ireland, but many are difficult to source, as not commonly planted.

1 See www.TDAG.org

Species	Special tolerances	Mature size	Notes
Common name *Botanical name*	**P, SUDS, TC**	**Small, Medium, Large**	
Field Maple *Acer campestre*	P, TC	M	Good for pollinators
Causcasian Maple *Acer cappadocicum*	P	M	
Red Maple *Acer rubrum*	P	M	Various cultivars Beautiful colour
Large-leaved Lime *Tilia platyphyllos*	TC	L	Good for pollinators Various cultivars
Silver Lime *Tilia tomentosa*	P, TC	L (VL)	Various cultivars
Indian Horse Chestnut *Aesculus indica*		M/ L	Beautiful flowers Produces conkers
Italian Alder *Alnus cordata*	SUDS, TC	L	
Spaeth Alder *Alnus x sparthii*	P, SUCDS, TC	M	
Turkish Hazel *Corylus colurna*	P	M/ L	
Honey Locust *Gleditsia triacanthos*	P, SUDS, TC	M/ L	
Common Walnut *Juglans regia*		M/ L	
Dawn Redwood *Metasequoia glyptostroboides*	TC	L	
Tupelo *Nyssa sylvatica*		L	
Sargent's Cherry *Prunus sargentii*	P	M	
Hungaria oak *Quercus frainetto*	P, TC	L (VL)	
Spanish oak *Quercus hispanica*	P, TC	L	
Pin oak *Quercus palustris*	P, SUCDS, TC	L	
Red oak *Quercus rubra*	TC	L	
Swedish whitebeam *Sorbus intermedia*	P, TC	S/ M	
Elm (resistant cultivars) *Ulmus sp.*	P, TC	L	
Japanese Zelkova *Zelkova serrata*	P, TC	L	
Hornbeam *Carpinus betulus*	P	L	
Sweetgum *Liquidambar styraciflua*	P, SUDS, TC	M	
Tulip Tree *Liriodendron tulipfera*	TC	L (VL)	
Hop Hornbeam *Ostrya carpinifolia*	P, TC	M, L	
Persian Ironwood *Parrotia persica*	P		
Black Pine *Pinus nigra*	TC, P		
London Plane *Platanus x acerifolia*	P, SUDS, TC	L	
Oriental Plane *Platanus orientalis*	P, SUDS, TC	L	
Cherry plum *Prunus cerasifera*	Pm TC	S	
	P = suitable for planting in pavements SUDS = suitable for planting in sustainable urban drainage systems TC = suitable for planting along traffic corridor (roads), tolerates salt		

Appendix 4

Trees and pollinators

There are thousands of different types of pollinating insect in Ireland – including honeybees, wild bees, butterflies, moths, hoverflies and other types of fly. Pollinators play a key role in our ecosystems; some have a short life, in spring or summer, some overwinter underground or in plant stems or deadwood, but generally Irish pollinators are in decline because of a loss of native habitat.

Native plants (trees, shrubs, wildflowers) are the plants that Ireland's native pollinators evolved alongside, they are adapted to one another's needs and generally native plants are recommended for pollinators. Pollinator friendly plants are sources of pollen and nectar, but all native tree species are generally insect friendly, even when dead and dying, in so far as their bark, cavities and dead wood provide food and shelter.

In gardens and urban spaces, almost any flowering tree (even non-native or 'ornamental' species) is considered pollinator friendly.

A range of resources[71] is available online from pollinators.ie; see in particular the Top Ten Pollinator plants guide[72]

71 https://pollinators.ie/planting-trees-for-pollinators/
72 https://pollinators.ie/wp-content/uploads/2023/04/Top-Ten-pollinator-plants-Guide-WEB.pdf

Online edition: ISSN 2009-6852
Print edition: ISSN 2009-6844
National Biodiversity Data Centre Series No. 29

TOP TEN

pollinator-friendly plants for different situations

All-Ireland Pollinator Plan
www.pollinators.ie

National Biodiversity Data Centre
A Heritage Council Programme

UCD School of Agriculture and Food Science

UCD Earth Institute

pollinators.ie

How-to-guide 10

Fig 31 Frontispiece: Top Ten Pollinator PLants Guide

Appendix 5

Protecting trees in development planning applications)

Trees in Relation to Design, Demolition and Construction to Construction - Recommendations (BS 5837: 2012)[73]

73 https://www.bathnes.gov.uk/sites/default/files/2020-01/BS5837%20 2012%20Trees.pdf

Fig 32 Frontispiece: BSI Standards (BS 5387:2012)

This industry standard details how to ensure that trees are appropriately and successfully retained in development.

Where there are trees on or in proximity to a potential development site, planning applications and the development that follows should respect the processes and recommendations laid out in BS5837 (2012). Some vital elements are explained below.

(i) Tree Constraints Plan (existing site)

The first essential step in the design of a site is the Tree Constraints Plan. This is drawn up by an arborist before any site design takes place.

The Tree Constraints Plan contains all the information gathered during a topographical survey (location of all trees, shrubs and hedges and other relevant features such as streams, buildings and spot level heights) and an accurate tree survey.

A tree survey is carried out in accordance with BS 5837 (2012) and contains the following information about all trees of stem diameter 75+ mm measured at 1.5m above ground level, and any trees of smaller diameter that are of particular interest or potential value:

A tree reference number (this should relate to the to the Tree Constraints Plan)

- Tree species
- Height
- Stem diameter taken at 1.5m from ground level (Diameter at Breast Height)
- Branch spread (in four directions North, East, South and West)
- Height of crown clearance above ground
- Age class
- Physiological condition
- Structural condition
- Preliminary management requirements
- Estimated safe useful life expectancy
- Category grading (see BS 5837)

It is essential to remember that the parts of a tree below ground, its roots, are as important as those above ground (trunk, branches, leaves). The soil around the roots is part of the tree. Every effort must be made to ensure that the roots of retained trees are not damaged during the construction process.

Root problems can lead to a decline in a tree's health resulting in the death of the tree or even structural collapse.

Tree roots can be easily damaged by:

- Abrasion
- Crushing by vehicles/plant equipment and/or storage of building materials or soil
- Compaction of the surrounding soil leading to root death by asphyxiation or drought
- Severing of roots by excavation
- Poisoning from spillage or storage of fuel, oil, chemicals etc.
- Changes in soil levels resulting in root death by exposure or asphyxiation
- Installation of impermeable surfaces leading to lack of water

The Tree Constraints Plan must include the Root Protection Area (RPA) of each tree.

The Root Protection Area is a circle, with the tree at the centre, and a radius that is 12 times the tree's diameter at 1.5m height for a single stemmed tree, or alternatively 10 times its basal diameter measured above the root flare for a multi-stemmed tree.

(ii) Tree Protection Plan

Trees are vulnerable on development sites. Tree health may be affected by disturbance during the development process (removal, pruning) or later, because of pressure to remove or prune trees from the occupants of new buildings. The design layout should take these issues into account. Once it has been decided which trees, hedges or shrubs are to be incorporated into a design layout it is important to ensure that they will survive the development process.

A Tree Protection Plan is an essential aspect of tree protection during development. The Tree Protection Plan is a scale plan showing:

- All proposed or existing buildings or structures
- All retained trees both on and neighbouring the site and their corresponding Root Protection Areas and crown spreads (N, E, S and W)
- The location of protective fences or barriers (details of how these are to be constructed must also be supplied)
- Proposed location of all plant and materials storage
- Drainage runs, roads and driveways
- Existing and new accesses
- All other surface or underground features that may affect the trees on or neighbouring the site

(iii) Arboricultural Method Statement

If construction works (including pipes or trenches, or other detrimental activity) is to occur within the RPA of a tree, then an Arboricultural Method Statement is required. This details what may result in damage to a tree and how damage will be avoided.