Agenda Item No. 4

THE VALE OF GLAMORGAN COUNCIL

ENVIRONMENT AND REGENERATION SCRUTINY COMMITTEE: 16TH JANUARY, 2024

REFERENCE FROM CABINET: 30TH NOVEMBER, 2023

"C173 VALE OF GLAMORGAN COUNCIL TREE STRATEGY (NBS/SP) (SCRUTINY – ENVIRONMENT AND REGENERATION) –

The Cabinet Member presented the report, the purpose of which was to consider the first draft of the Vale of Glamorgan Council Tree Strategy 2024/39 and to agree arrangements for public consultation.

Councillor Wilson said that although the Strategy was in Draft, it was thorough and had not been rushed, with considerable input from numerous Officers and external experts. Attached to the Strategy was a Technical Report which included a methodology, a study of tree canopy and ground cover. The Strategy also considered the benefits of trees in reducing the likelihood of flooding by excess surface water run-off, the removal of air pollution, the capturing of carbon and the enhancements of habitats for wildlife. A repeat of the survey was also recommended in ten years' time.

To ensure that an increase in tree canopy could occur, an analysis of where tree planting could occur had to be undertaken, considering the deprivation of the area, the impact of reduction of air pollution and improving the quality of green spaces. Use of websites such as Treezilla would monitor the health of trees.

Community engagement was important in raising awareness of the importance of trees, with many external groups in and around the Vale of Glamorgan who have an interest in the matter. Trees enhanced a sense of place, enhanced wellbeing and made towns and villages attractive places to live.

The Strategy set out a number of aims and objectives, including a net increase of canopy by 5% by 2039, as well as looking at policy context such as the Future Generations Act 2015.

Councillor Wilson encouraged external stakeholders to make their views known as part of the external consultation.

The Deputy Leader said that a huge amount of work had gone into the Draft Strategy, with some exciting strategic elements going forward, particularly around Placemaking, and she looked forward to seeing the consultation responses.

Councillor John referred to Paragraph 2.15 of the report which referred to ensuring that the right tree be planted in the right place, which was such an important consideration. Councillor Perkes agreed with Councillor John.

Councillor Wilson said that Members needed to work together to embrace trees as assets in the fight against climate change.

This was a matter for Executive decision.

Cabinet, having considered the report and all the issues and implications contained therein

RESOLVED –

(1) T H A T the Vale of Glamorgan Draft Tree Strategy 2024-39, attached at Appendix B to the report, be agreed in principle.

(2) T H A T the draft Strategy be subject to public consultation for a period of 12 weeks.

(3) T H A T as part of the consultation process the draft Strategy be presented to the Environment and Regeneration Scrutiny Committee for consideration and comment.

(4) T H A T on conclusion of the 12-week consultation period the consultation responses would be considered by Cabinet and the final Vale of Glamorgan Tree Strategy 2024/39 agreed.

Reasons for decisions

(1) To agree the start of a process to develop a robust framework for all tree related decisions and activity in Vale of Glamorgan over the next 15 years. The draft Tree Strategy set out standards for the management of the tree resource under the stewardship of the Vale of Glamorgan Council which complied with nationally recognised codes of practice and would mitigate third party risks, as well as increase the urban tree canopy and help to protect trees and woodlands as a valuable natural asset.

(2) To ensure that a wide cross section of views was sought on the Strategy.

(3) To seek views from the relevant Scrutiny Committee.

(4) To consider all the consultation responses prior to agreeing the final Strategy."

Attached as an Appendix – Report to Cabinet: 30th November, 2023

Appendix

Meeting of:	**Cabinet**
Date of Meeting:	**Thursday, 30 November 2023**
Relevant Scrutiny Committee:	Environment and Regeneration
Report Title:	Vale of Glamorgan Council Tree Strategy
Purpose of Report:	To consider the first draft of the Vale of Glamorgan Council Tree Strategy 2024/39 and to agree arrangements for public consultation.
Report Owner:	Cabinet Members for Neighbourhood and Building Services and Sustainable Places
Responsible Officer:	Miles Punter - Director of Environment and Housing Services
Elected Member and Officer Consultation:	As this Strategy covers all areas of the Vale of Glamorgan, no specific Ward Member consultation has been undertaken. Officer consultation: Legal (Committee Reports), Operational Manager Accountancy Finance Support Manager, Director of Social Services, Director of Learning and Skills.
Policy Framework:	The report is a matter for Executive decision by Cabinet

Executive Summary:

- At present the Council's tree stock is managed using long-standing office procedures and processes, often aimed at mitigating the Council's third-party risk for damage caused by trees. Most of the planned maintenance work undertaken on trees is currently prioritised based on risk, and tree planting schemes, though successful in many cases, are not coordinated Vale wide and tend to be driven by individual service departments.
- The Council`s commitment to both the Climate Emergency and the Nature Emergency will mean that the actions and polices of the Council will need to take into consideration the impact on both the climate and biodiversity within the Vale of Glamorgan.
- In considering trees and planning for the future, we will need to ensure that trees are recognised as public assets, rather than liabilities. The Council will focus its efforts on actively protecting and increasing tree cover on its estate, with a commitment to increase canopy cover by 5% over the next 15 years, ensuring that the right tree is planted in the right place.
- This report proposes a draft Tree Strategy for the Council for the next 15 years, considering the many factors associated with trees and their impact on the environment. The Strategy is inclusive, in that it requires all Council Departments to accept and follow the principles and objectives, it also relies on the support of the voluntary sector, individual members of the public, developers and private landowners.

- Whilst the Strategy stipulates how the Council will manage its existing tree stock in the future, it primarily concentrates on increasing the urban and rural tree canopy across the Vale of Glamorgan, seeking to do this in the most cost effective and sustainable way.
- It is imperative that the Council's final tree strategy, whilst always seeking to be aspirational, takes account of both the revenue and capital budgets available to the Council for tree maintenance and management over the full duration of the Strategy.
- In following the Strategy, significant emphasis should be placed on the role of individual private landowners to both protect trees on private land and to plant more.
- Many of the Council's trees are managed in partnership with local individuals and interested groups. It will be necessary to build on these current relationships and to encourage others in order to meet the demands of the strategy.
- It is important to seek the views of all interested parties on the Strategy and therefore a comprehensive public consultation process is proposed.
- Cabinet is asked to agree the draft Strategy in principle subject to the public consultation exercise aimed at informing the final Strategy document.

Recommendations

1. That Cabinet agrees in principle the Vale of Glamorgan Draft Tree Strategy 2024-39, attached at Appendix B to this report.
2. That the draft Strategy is subject to public consultation for a period of 12 weeks.
3. That as part of this consultation process the draft Strategy is presented to the Environment and Regeneration Scrutiny Committee for consideration and comment.
4. That on conclusion of the 12 week consultation period the consultation responses are considered by Cabinet and the final Vale of Glamorgan Tree Strategy 2024/39 agreed.

Reasons for Recommendations

1. To agree the start of a process to develop a robust framework for all tree related decisions and activity in Vale of Glamorgan over the next 15 years. The draft Tree Strategy sets out standards for the management of the tree resource under the stewardship of the Vale of Glamorgan Council which comply with nationally recognised codes of practice and will mitigate third party risks, as well as increasing the urban tree canopy and helping to protect trees and woodlands as a valuable natural asset.
2. To ensure that a wide cross section of views is sought on the Strategy.
3. To seek views from the relevant Scrutiny Committee.
4. To consider all the consultation responses prior to agreeing the final Strategy.

1. Background

1.1 It is estimated that there are more than 1.7 million trees in the Vale of Glamorgan. The Vale of Glamorgan's urban forest (all trees within the Vale's towns and built-up areas) provides ecosystem services worth in excess of £2.05 million each year. This includes avoided water runoff, carbon sequestration and the removal of three types of air pollution. It is considered that this estimation is still an underestimate, as many of the ecosystem services provided by trees could not be assessed as part of the i-Tree project (i-Tree Survey is attached at Appendix A).

1.2 In 2019 the Vale of Glamorgan Council established Project Zero as response to the climate change emergency declared by Welsh Government. It brings together the wide range of work and opportunities available to tackle the climate emergency, reduce the Council's carbon emissions to net zero by 2030 and encourage others to make positive changes. As a Council we are committed to investing in our green spaces and to delivering natural carbon storage solutions such as those provided by trees, meadow areas, grassland and other natural

habitats across the Vale of Glamorgan to enhance air quality and reduce the impact of greenhouse gasses.

1.3 Our trees, hedgerows, and woodlands are an integral part of nature, supporting a wide range of insects, animals, birds and plant life. Looking after the trees, hedges and woodlands in our local environment is essential for the future health of nature and of people. Trees can improve the environmental quality of our urban areas, delivering physical, social and economic benefits as well as mitigating climate change, improving storm water management, air quality, biodiversity, visual amenity and more.

1.4 Our climate is changing which has implications on how our trees, woodlands and wildlife react to it and the levels of management required. Globalisation increases the threat from pests and diseases and although not new, these are a growing concern. Currently, Ash Dieback is a major challenge, but others have significant impact on our native tree stock (Dutch elm, Phytophthora, Chalara, processionary oak moth etc.).

1.5 The value of trees to the Council and the residents of the Vale of Glamorgan is significant, from the well-established aesthetic and landscape benefits to local air quality, water cycling and shade etc. Other habitats are also important and conserving these has benefits for residents, climate, and nature. The importance of our semi-natural biodiversity rich habitats and of conserving existing soil carbon sequestration. It also identified the on-going natural processes of native woodland regeneration and colonisation taking place across the Vale of Glamorgan.

1.6 Trees fall within the remit of numerous departments of the Council, from Planning, Legal and Environmental Health to Corporate Estates, Education, Parks and Countryside, Housing and Highways. Trees cannot be considered in isolation. They form a major part of our Green Infrastructure and how we manage them should complement other works carried out by the Council in terms of climate change measures.

1.7 At present the Council's tree stock is managed using long-standing office procedures and processes, often aimed at mitigating the Council's third-party risk for damage caused by trees. Most of the planned maintenance work undertaken on trees is currently prioritised based on risk, and tree planting schemes, though successful in many cases, are not coordinated Vale wide and tend to be driven by individual service departments.

1.8 To understand the challenges that would need to be addressed by a comprehensive tree strategy for the Vale of Glamorgan, the Council engaged 'Forest Research', the Research Agency of the Forestry Commission and the leading UK organisation engaged in forestry and tree related research to undertake a survey of the trees in the area. As previously advised, the 'i-Tree' report that the Agency produced is attached at Appendix A to this report.

1.9 The Draft Tree Strategy uses the i-Tree data and seeks to provide a unified direction for all Council services in respect of our tree activity, and a framework to consider the organisational and resource requirements needed to address the current challenges and the opportunities highlighted by the broader scope of the climate change and biodiversity emergencies.

1.10 It should be noted that the Council's tree canopy aspirations will only be met with the support of its current and future partners and also private landowners.

2. Key Issues for Consideration

2.1 The Council is responsible for many thousands of trees, though it should be noted that any measurement of the tree canopy in an area covers all land, most of which the Council is not responsible for.

2.2 Tree canopy cover for the Vale of Glamorgan as a whole is 13% compared with the Welsh average 16.3% with a varied picture of canopy cover and tree management practices in different areas of the Vale. Tree cover has continued to decline and there is a disparity between areas / wards, particularly within deprived areas, as highlighted in the Natural Resources Wales Report `Town Tree Cover in the Vale of Glamorgan`.

2.3 For land for which the Council has responsibility, there are many challenges in retaining the current urban tree canopy cover or increasing this cover generally. This is due to footway damage that has been caused by existing trees and constraints on space available, including underground utility apparatus in urban environments, restricting opportunities to plant new trees and making it expensive. Many of the urban trees have also suffered from reduced levels of maintenance, leading to structural weaknesses and tree health issues.

2.4 Trees add to the landscapes of our towns, villages and countryside creating visual interest through their shape, bark, leaf colours, flowers, fruit and seeds. They mark the passing of the seasons and are bastions of history, reflecting civic pride and the culture of the past.

2.5 When added together with our local green spaces, river corridors, road verges, railway lines, allotments and gardens there is a significant green network within our towns and villages that has the potential to be good for both people and wildlife. Ensuring that our green networks are protected and managed with increased tree cover where appropriate is essential and will be important for future generations.

2.6 In looking forward the Council and a whole range of other organisations, communities, businesses and individuals need to plan for the future, so that we can have a more significant, varied and better managed treescape in the Vale of Glamorgan.

2.7 The draft Strategy is attached at Appendix B to this report and features an action plan. It sets out the strategic framework for the management of trees across the Vale of Glamorgan for the next 15 years to 2039. It has been prepared with reference to local, regional and national policies and guidance and will complement the emerging Green Infrastructure Strategy / policy being developed for the Vale of Glamorgan. The Green Infrastructure policy will inform where maximum gains can be developed, enabling the Council to achieve its future aims and objectives.

2.8 Through appropriate management of existing trees and targeted tree planting programmes, the Council will seek to reverse the trend of the continuing loss of tree canopy cover.

2.9 The Council will protect and enhance the tree stock while remaining sympathetic to the interests of residents. We will also seek to ensure that the tree stock is managed in such a way that continuity of tree cover will be safe-guarded, and improved, for future generations.

2.10 The tree lined streets and parks are an attractive feature of the Vale of Glamorgan and have helped enhance the quality of life for generations. The continued maintenance and enhancement of trees is a key priority to ensuring that the area remains an attractive and pleasant place for the future.

2.11 The Tree Strategy will develop and evolve as and when new data and information is obtained and will form part of the Council's Green Infrastructure Strategy.

2.12 The 'Vision' for the Strategy is to 'protect, maintain and enhance our tree population for the multiple benefits to the environment and the people living, working and visiting the Vale - now and for future generations to come.'

2.13 The Strategy features a set of Guiding Principles and Objectives, and these are as follows:

2.14 Guiding Principles

- Commit to protect and care for our tree stock.
- Commit to work to retain existing mature tree stock, wherever possible in both public and private settings.
- Commit to identify suitable locations across the Council`s` land holding where additional tree planting can be accommodated, without detriment to the existing habitats.
- Commit to ensure that trees that are lost are replaced in greater numbers by planting a minimum of 2 trees for every one removed within the urban environment and develop a sliding scale of mitigation based on the extent of tree loss.

- Commit to plant a minimum of 1500 trees annually, which will include a minimum of 500 standards, in predetermined targeted areas (right tree, right place), across the Council estate.
- Commit to develop tree planting schemes/natural regeneration.
- Commitment to ensure that the right tree is planted in the right place.
- Commit to increase urban street canopy cover within the adopted Highway year on year.
- Commit to a net increase in canopy cover in urban areas on Council owned land by 5% by 2039.

2.15 Objectives:

- Protect and enhance the current tree stock.
- Ensure that the Council has an accurate database of its tree stock.
- Raise awareness of the Council's tree stock and the environmental and social benefits it provides.
- Ensure that all tree related decisions and activities are made in a consistent and structured way across all Council departments.
- Develop community involvement in tree related issues, including opportunities for grant aided funding.
- Increase tree planting and natural regeneration on Local Authority land and influence tree planting on new developments and private land through the planning system and the provision of grants.
- Prioritise increasing canopy cover in areas identified in the i.Tree survey with less than 10% cover.
- Prioritise tree planting in urban areas with the highest levels of deprivation.
- Establish a healthy and diverse tree population maintaining tree numbers and canopy cover wherever possible.
- Take into account the current and future changes in climate and manage the tree stock accordingly.
- Ensure that there is diverse species coverage to increase resilience and mitigate against future tree disease.
- Ensure that the right tree is planted in the right place.
- Deal with queries relating to trees from stakeholders in a consistent and effective manner.
- Protect the Council from any third-party risks associated with trees.
- Ensure all operational staff have received Quantified Tree Risk Assessment (QTRA) training.

2.16 The Strategy is intended to be a live document, with measurable aims and objectives. It is a statement of the Council's policies and procedures in relation to trees and their management.

2.17 This Strategy will be subject to a bi-annual review, particularly in the event of changes in environmental, cultural or social needs. The future Green

Infrastructure Strategy will inform where maximum gains can be developed, enabling the Council to achieve its future aims and objectives.

2.18 The Strategy will also look at how we as a Council can influence and encourage developers to safeguard and retain existing trees and to plant trees as a matter of priority, particularly in new housing developments or major infrastructure projects.

2.19 The Strategy will assist the Council in meeting the recommended targets set out by Welsh Government of 20% canopy cover for towns and cities and a minimum of 15% for coastal and urban areas.

3. How do proposals evidence the Five Ways of Working and contribute to our Well-being Objectives?

LONG TERM

3.1 The Tree Strategy sets out an approach to the management of the Council's trees that responds to short term issues of health and safety matters associated with trees in a way that undertakes works to promote the long-term health of trees. The Strategy highlights the value that trees provide to the Vale of Glamorgan and proposes an approach towards planting of further tree stock for longer term benefits.

PREVENTION

3.2 The recent I-Tree assessment highlighted the deficiencies of canopy cover across the Vale of Glamorgan and the need to improve connectivity. The improved maintenance of trees to reduce their failure rates by ensuring healthier trees.

COLLABORATION

3.3 It will be necessary for Officers to work with private developers and private landowners to encourage increased tree planting to assist with improving the tree canopy. Officers will also work with voluntary organisations to help manage its tree stock and seek external funding opportunities to both better maintain the existing stock and increase new tree planting.

INTEGRATION

3.4 A cross-Council project team has worked together to date to develop the Tree Strategy in recognition that the management of Vale of Glamorgan Council tree stock does not fall to a single department. Going forward, training will be provided to members of staff to increase the awareness of sustainable tree management.

INVOLVEMENT

3.5 The tree strategy highlights the need to work with local communities to develop partnerships for future tree planting schemes and maintenance. In addition, we would look at third party organisations and Government departments to develop funding opportunities.

4. Climate Change and Nature Implications

4.1 The Tree Strategy represents an important vision for trees in the Vale of Glamorgan area and is a vital part of the Council's response to the Climate Change and Environmental Emergency declaration.

4.2 The core principles and delivery mechanisms detailed within the Strategy, will help mitigate our changing climate by absorbing carbon dioxide (CO2) from the atmosphere, create shade and shelter thus keeping our urban areas cool and increase our resilience to flooding.

4.3 The Strategy will also seek to safeguard existing habitats and, through additional planting, trees will also create more, better, joined up habitat. As such, the Strategy also links to the Council's Biodiversity forward plan.

5. Resources and Legal Considerations

Financial

5.1 In order to fully implement the tree strategy there will be a requirement to provide two additional posts, these being an Arboricultural Manager post and a Tree Preservation Officer post.

5.2 The Arboricultural Manager post has been filled and is funded for two years, after which the post would have to be funded from within existing Neighbourhood Services & Transport budgets. Funding has not yet been identified for a Tree Preservation Officer, but this remains an aspiration for the future.

5.3 The current tree maintenance revenue budget for Parks and Highway trees (not including Country parks) is £201.6k. This funding can be supplemented with Neighbourhood Services and Transport Asset renewal funding and other sources of capital funding. However, this was not possible in 2023/24 due to other competing demands, namely highway resurfacing. Unless the Asset Renewal allocation for Neighbourhood Services and transport is increased for 2024/25 this position is unlikely to change.

5.4 In addition, the service spent circa £75k from reserves dealing with the ongoing problem of Ash Die-Back and this work will need to continue for a number of years.

5.5 To assist in supporting the Tree Strategy, two capital bids have been submitted for 2024/25, totalling £175k. £75k of this funding is for cyclical tree reduction and pollarding and £100k is for planting and maintaining new trees. This funding is not confirmed at this time, the Capital Programme is out for consultation in January and will go forward for Council approval in March 2024.

5.6 All Council land holding departments will need to make provision to manage trees on their land in accordance with the final strategy.

5.7 Responsibility for trees on school land lies with the School and its Governing Body. All schools will however be encouraged to sign up the principles of the Tree Strategy.

5.8 It is recognised that the Council's financial position is extremely challenging and is likely to remain so. Therefore, all forms of external grant funding will be investigated to support the Strategy. In addition, Town and Community Councils, voluntary and private sector organisations and private individuals will be encouraged to increase their tree planting efforts.

Employment

5.9 An Arboricultural Manager post has recently been created to help deliver the Tree Strategy action plan.

5.10 There is a future aspiration to create a Tree Preservation Officer post should suitable funding become available.

Legal (Including Equalities)

5.11 There are no direct legal implications arising from the activities detailed within this report, but activities undertaken in response to the climate change emergency will be consistent with duties under the Environment Act and the Well-being of Future Generations Act.

6. Background Papers

Natural Resources Wales Report `Town Tree Cover in the Vale of Glamorgan`.

Forest Research

Treeconomics

i-Tree Eco Vale of Glamorgan

Understanding the Vale's Tree Resource: Technical Report

The Research Agency of the Forestry Commission

Forest Research is the Research Agency of the Forestry Commission and is the leading UK organisation engaged in forestry and tree related research.

The Agency aims to support and enhance forestry and its role in sustainable development by providing innovative, high quality scientific research, technical support and consultancy services.

Treeconomics is a social enterprise, whose mission is to highlight the benefits of trees. Treeconomics works with businesses, communities, research organisations and public bodies to achieve this.

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and community forestry analysis and benefits assessment tools, including i-Tree Eco. The Forest Service, Davey Tree Expert Company, National Arbor Day Foundation, Society of Municipal Arborists, International Society of Arboriculture, and Casey Trees have entered into a cooperative partnership to further develop, disseminate and provide technical support for the suite.

This project has been undertaken on behalf of:

Vale of Glamorgan Council

Citation

This report should be cited as:

Sparrow. K, Chambers-Ostler. A, Hill. D, Vaughan-Johncey. C, Doick. K (2022) *i-Tree Eco Vale of Glamorgan. Understanding the Vale's Tree Resource: Technical Report.* Forest Research, Farnham. 106pp.

Copies of this report and other corresponding documents can be downloaded from:

https://www.valeofglamorgan.gov.uk/en/index.aspx

Images

Taken on behalf of the Project by Devon Tree Services (taken September 2021)

Contents

Key Definitions

Urban forest: 'all the trees in the urban realm – in public and private spaces, along linear routes and waterways, and in amenity areas. It contributes to green infrastructure and the wider urban ecosystem' (Davies et al., 2017).

i-Tree Eco: a software application which quantifies the structure and environmental effects of urban trees and calculates their value to society. It was developed as the urban forest effects (UFORE) model in the 1990's to assess impacts of trees on air quality and has since become the most complete tool available for analysing the urban forest. Eco is widely used to discover, manage, make decisions on and develop strategies concerning trees in urban landscapes – www.itreetools.org

Natural capital: refers to the elements of the natural environment – such as the trees and shrubs of an urban forest - that provide goods, benefits and services to people, such as clean air, food and opportunities for recreation (Natural Capital Committee, 2014). As the benefits provided by natural capital are often not marketable, they are generally undervalued, and inventories limited. This can lead to poor decision making about the management and maintenance of natural capital.

A full Glossary is provided on pages 86-88

Executive Summary

Trees are a valuable resource that can provide a wide range of benefits to people and the environment. These benefits, known as ecosystem services, can help to reduce the impact of people on the landscape and lessen some of the effects of the changing climate. Such ecosystem services include capturing and storing carbon, providing habitat for wildlife, improving local air quality, reducing flooding and improving social cohesion in communities.

Effective and sustainable management of treescapes is important for the continual provisioning of these benefits. Management and maintenance of trees can affect the vitality, structure and composition of the total tree stock, and significant losses of trees due to threats such as pests and disease can also impact ecosystem service delivery. To inform management practice and tree planting, it is important to understand the current state of this resource.

To gain such an understanding requires a substantial information gathering exercise. As part of the 'i-Tree Eco Vale of Glamorgan' project, a total of 681 plots were surveyed throughout the Vale of Glamorgan, and information collected on the trees within them, and the land they are situated on. This included trees in urban and rural areas.

i-Tree Eco, a tool used worldwide for assessing and evaluating tree resources, was used to better understand the trees that are found throughout the Vale of Glamorgan; what species are present, where they are and what condition they are in. The information can act as a baseline which can help to understand the challenges and threats, set appropriate goals, and monitor progress.

This report provides a detailed breakdown of the structure, composition and condition of the Vale of Glamorgan's trees, and demonstrates the importance of the tree resource to local people.

It is estimated that there are **more than 1.7 million trees in the Vale of Glamorgan**. The Vale of Glamorgan's urban forest (all trees within the Vale's towns and built-up areas) provides ecosystem services worth **in excess of £2.05 million each year**. This includes avoided water runoff, carbon sequestration and the removal of three types of air pollution. As such, this value estimation is still an underestimate, many of the ecosystem services provided by trees could not be assessed as part of this project.

It is important to note that the results of this project are a snapshot in time and do not consider how and why the Vale of Glamorgan's tree resource may change over time.

This project was funded by the Vale of Glamorgan Council and carried out by Forest Research and Treeconomics. Fieldwork was conducted by Forest Research's Technical Services Unit (TSU) and Devon Tree Services. Our thanks go to the Vale's landowners and residents for granting us access to their property to undertake the survey work.

Headline Facts and Figures

Table 1. The estimated structure and composition of the Vale of Glamorgan's tree resource in 2021

Structure and composition of the Vale of Glamorgan's tree resource in 2021				
	Urban		Rural	
Estimated total number of trees	143,400	Pg.27	1,606,000	Pg.61
Estimated average tree density (trees per ha)	39.7	Pg.27	47.3	Pg.61
Estimate of total tree canopy cover (%)	13%	Pg.28	14%	Pg.61
Number of tree species surveyed	59	Pg.31	40	Pg.63
Top three most common species surveyed	Common ash, Sycamore, Common Hawthorn	Pg.31	Common ash, Common hawthorn, Sycamore	Pg.63
Land uses where a greater percentage of surveyed trees were found	Residential, Park, Commercial/Industrial	Pg.29	Agriculture, Vacant, Park	Pg.61
Proportion of surveyed trees of different sizes (by DBH*)	7-20 cm: 45.4% 20-40 cm: 32.2% 40-60 cm: 14.9% >60 cm: 7.5%	Pg.35	7-20cm: 44.4% 20-40cm:37.2% 40-60cm:13.2% >60cm: 5.3%	Pg.64
Proportion of trees in good or excellent condition	72%	Pg.55	43%	Pg.67
Top pest and disease threat	Present: Ash dieback Potential: Asian Longhorn Beetle	Pg.60	Present: Ash dieback Potential: Asian Longhorn Beetle	Pg.70

* DBH: Diameter at Breast Height

Table 2. The estimated amount and value of some of the ecosystem services delivered by the Vale of Glamorgan's urban trees in 2021

Estimated ecosystem service provision amount and value provided by the Vale of Glamorgan's urban forest in 2021			
Avoided runoff	78,438m^3	£135,838 per yr	Pg. 41
Pollution removal	36 tonnes per yr	£212,481 per yr	Pg. 43
Carbon storage	57,314 tonnes	£51,467,972	Pg. 47
Net carbon sequestration	1977 tonnes per yr	£1,775,346 per yr	Pg. 47
Replacement cost	Amenity value of all trees: £1,551,402 Structural value of all trees: £126,101,683		Pg. 53
Total annual benefit	**£2.05 million** (air pollutant removal, net carbon sequestration and avoided runoff, equivalent to £569/ha, or £15.16 per capita[1]		

1. Based upon the 2020 mid-year estimate of the whole of the Vale of Glamorgan population, which was 135,295 (Welsh Government, 2021)

Using this report

This technical report provides detailed baseline information on the structure and composition of the Vale of Glamorgan's trees, and the benefits they deliver. It may be used to help inform strategic thinking and future decision-making with regards to the Vale's tree resource.

This report has been produced for Vale of Glamorgan Council, but can also be used by:

- Those writing strategies and policies
- Those involved in planning to incorporate resilient and sustainable tree cover into new and existing developments
- Landowners who are looking to increase tree cover on their land
- Those who are interested in local trees for improving their own and others' health and wellbeing
- Those interested in local nature conservation

This report forms part of set of documents produced as part of the 'i-Tree Eco Vale of Glamorgan' project. These include:

- Understanding the Vale's tree resource: Summary Report
- Guiding future tree planting
- Trees in the Vale of Glamorgan (Infographic)

An appendices section has been included within this report to provide further detail on the information captured and analysed as part of this project.

Key Conclusions

- There is an over-reliance on Common ash in both the urban and rural tree population. In light of ash dieback, this presents a threat to the overall resilience and sustainability of the Vale of Glamorgan's tree resource and the benefits it provides.
- Much of the Vale of Glamorgan's urban forest is privately owned, with over half of all trees surveyed located on residential property. Strategic tree management should consider prioritising engagement with the local community to enhance and protect existing tree cover.
- There is little difference in tree canopy cover values for both rural and urban areas, both of which are below the reported averages for Wales and fall short of published recommended canopy cover targets.
- The Vale of Glamorgan's rural area is dominated by agricultural land, comprising over four fifths of all plots surveyed. This presents potential opportunities to increase tree cover and ecological connectivity through further woodland planting and agroforestry.

Introduction

Trees form a core component of our urban and rural spaces and have a unique ability to deliver a range of environmental and societal benefits on a scale greater than many forms of engineered infrastructure. These benefits, termed ecosystem services, range from improving air quality, alleviating flooding, sequestering and storing carbon, to reducing temperatures in urban areas, and enhancing our natural environment, local communities and economy (Figure 1 and

Table 3).

The delivery of these ecosystem services is particularly important in our towns and cities. Vast areas of urban spaces are dominated by hard, impermeable infrastructure, contributing to the urban heat island effect (the phenomenon where urban areas are warmer than their surrounding countryside) and increasing surface water runoff. With over 80% of the UK's population living in towns and cities (Defra, 2021), these impacts are widespread and are projected to worsen under the changing climate. It is no wonder that with an increasing focus on climate change mitigation, local authorities and other organisations responsible for caring for the environment seek to use trees as a tool to alleviate some of the impacts of the changing climate.

There has been a surge in tree planting over the last few years, particularly more so since many local authorities up and down the UK declared climate emergencies. This has also led to increased public interest in trees, as well as an uptake in planting activities occurring on both public and private land. Increasing tree cover through planting more trees is an important aspect of ensuring a sustainable tree resource. However, it is important to understand how this ties together with the existing tree stock, as this will inform future tree management, such as planning the workload of maintenance throughout the lifetime of trees, predicting budgets necessary for tree care, and setting schedules for regular health and safety inspections where necessary.

Trees are important assets and need to be treated as an investment. As such, future tree planting needs to be informed to ensure that planting activities are not in vain, and do not result in widespread failures in tree establishment through poor tree and site matching or lack of aftercare. Such instances can present significant costs and losses of the intangible monetary benefits that trees can provide if nurtured to maturity (Hand, et al., 2019).

Mature trees are a cornerstone of the tree resource. In particular, large, mature trees are capable of providing greater quantities of some ecosystem services. This is because typically, leaf area (the total surface area of a tree canopy) is directly related to the amount of benefit provided, so for example, the larger a tree's leaf area the greater the amount of air pollution or rainfall can be held in the canopy of the tree. It is therefore important that protection and good management of the existing tree population is implemented, so that growing trees to maturity can be prioritised to enable them to function to their greatest potential. Such management should complement the planting of new trees to increase canopy cover and to replace trees as they become over-mature and die, or succumb to pests, diseases or other stresses.

Figure 1. A summary of the benefits provided by trees that have been measured and valued for the Vale of Glamorgan's urban areas as part of this project.

Rainfall interception and avoided surface water run-off

The Problem
In urban areas in particular, a higher proportion of impermeable surfaces, such as tarmac, can increase the risk of surface water flooding, which can lead to higher costs to treat the resulting sewage discharge.

What trees can do
The canopies of trees can intercept rainfall and reduce the amount that reaches the ground and forms floodwater runoff. Where trees are planted in areas of higher permeable cover, tree roots also contribute to flood prevention by taking up water.

Relevance to the Vale of Glamorgan
In December 2020, a 1 in 20-year rainfall event led to the internal flooding of 18 properties in Sully and also affected other residences and local transportation links. The flooding was attributed to run-off from nearby fields, which quickly led to the drainage network reaching full capacity (JBA Consulting, 2021). Following this, action to mitigate such events happening again was recommended, and it is suggested that trees can form part of such alleviation schemes.

Air pollution removal

The Problem
Air pollution is often linked to poor health outcomes, particularly respiratory conditions (e.g. asthma), and can even lead to premature death. It is estimated that the effects of long-term exposure to air pollution equate to 1,000-1,400 deaths in Wales each year (PHE, 2018; PHW, 2020).

What trees can do
Trees can help reduce overall exposure to air pollutants harmful to human health, such as nitrogen dioxide (NO2) through absorption or interception. Trees can also reduce local temperatures which reduces the rate at which some pollutants (e.g. ozone) are formed (Jacob & Winner, 2009)

Relevance to the Vale of Glamorgan
The Vale of Glamorgan has historically had one Air Quality Management Area (AQMA), which was declared for NO_2 in Penarth in 2013. Following a successful 3-year period whereby all objectives were met, the AQMA was revoked in 2021. However, it remains important that improvements to air quality are considered. Retention, and replacement where necessary, of trees along transport networks that receive both high pedestrian footfall and busy traffic should be prioritised.

Carbon storage and sequestration

The Problem
Increasing levels of carbon dioxide (CO_2) in the atmosphere are significantly contributing to climate change, which is predicted to bring about increased summer temperatures and more winter rainfall and storms.

What trees can do
Reducing CO_2 emissions could help reduce the impact of climate change. CO_2 can be removed from the atmosphere by trees and stored within their woody components. Trees can continue to sequester carbon throughout their lifetime.

Relevance to the Vale of Glamorgan
The Vale of Glamorgan has one of the highest ecological footprints in Wales, at 3.53 global hectares per capita. The county's carbon footprint is also high, at 11.48 tonnes of CO_2 equivalent per capita, which ranks it 7th out of Wales's 22 local authorities (GHD, 2015). The Vale's carbon land requirements are 64% - slightly higher than the Welsh average (63%), suggesting increased tree planting would be beneficial.

Figure 1 (cont.). A summary of the benefits provided by trees that have been measured and valued for the Vale of Glamorgan's urban areas as part of this project.

Habitat provision

The Problem
Changes in land management practice, invasive species, urbanisation, and pollution are key drivers of net loss in UK biodiversity (UK National Ecosystems Assessment, 2011).

What trees can do
Trees are vital sources of food and habitat for a variety of flora and fauna. Trees in urban areas in particular can boost people's engagement and feeling of connection with nature. Woodland trees can provide wildlife corridors to facilitate movement between sites.

Relevance to the Vale of Glamorgan
There are more than 22 Sites of Special Scientific Interest (SSSIs) in the Vale. The county hosts a rich biodiversity, with many different habitats and species, as well as a designated Heritage Coastline that spans 19km in length (Wales Biodiversity Partnership, 2022). However, there is a large amount of agricultural land in the Vale which may not be supporting as many species as it could, and there are many isolated fragments of woodland that limit habitat connectivity.

Amenity value

The Problem
The demand for grey infrastructure to support the UK's growing population can consume greenbelt land, lead to loss of canopy cover to make space for new development and as a result reduce the overall amenity value that trees and green infrastructure can provide.

What trees can do
Trees and green and blue infrastructure such as shrubs, green spaces and water bodies, that are visually accessible can contribute significantly to the amenity value of an area. This can also be linked to improved mental health outcomes and feelings of happiness.

Relevance to the Vale of Glamorgan
The Vale of Glamorgan's Community Strategy (2011-2021) outlines the need to protect and enhance the quality of the built and natural environment as one of its 10 priority outcomes. Enhancing the Vale's existing green infrastructure and limiting that which is lost to further development is important to allow opportunities for the general public to access nature. This is likely to be particularly important to the north of the Vale of Glamorgan, around Llantrisant, and in St Athan, which were identified as Strategic Opportunity Areas as part of the Wales Spatial Plan in 2008.

Table 3. A summary of further ecosystem services provided by trees, which were not measured as part of this project.

Ecosystem service	What urban trees do	Relevance to the Vale of Glamorgan
Cultural and historical value	Trees can be a link to the past, creating a historical context to a place, and contributing to the local landscape character and sense of place.	Some ancient trees of interest including oaks, ash, horse chestnuts and sycamores, can be found within Dyffryn Gardens (Ancient Tree Forum, 2017). There are still many mature trees within Penarth and Barry, linking these areas to their Victorian seaside resort past.
Educational value	Engaging with nature can be a brilliant way of learning, for children and adults alike. Trees and woodlands present many opportunities to be used as educational tools to learn about the natural world.	Forest school programmes are an important mechanism of learning in the Vale of Glamorgan. The rangers at Porthkerry Country Park play a key role in delivering nature-based activities and educational programmes at the Forest Lodge.
Noise reduction	When planted densely in wide shelterbelts, trees can significantly reduce the noise and apparent loudness of passing traffic and other industrial noise.	In 2019, it was estimated that 738.2 million vehicle miles were travelled in the Vale of Glamorgan (Department for Transport, 2022). Whilst there are no major road networks within the Vale, noise pollution mitigation is still important to reduce the incidence of noise-related health problems such as Noise Induced Hearing Loss, stress and high blood pressure.
Temperature regulation	Trees can contribute to local cooling through evapotranspiration and shading. Temperature regulation by trees is particularly important in towns and cities, to mitigate the urban heat island effect.	The Met Office expects hot summers to become more common (2021), with the temperature increase predicted to be between 3.7°C and 6.8°C (based on UKCP local 2.2km projections). Strategic tree placement could help to cool the local air temperature by 2-8°C (Forest Research, 2013)
Recreation	Green infrastructure, including trees, can lead to increased uptake in physical activity, and subsequently improve physical and mental health (Kondo, et al. 2018)	There are 10 parks in the Vale of Glamorgan that have been recognised with a green flag award (Vale of Glamorgan Council, 2022). Continuing to maintain these greenspaces to this high standard is important for local residents who use the parks for recreation.

Understanding the structure and composition of the trees within the Vale of Glamorgan provides the opportunity to explore the current asset's species diversity, size distribution and susceptibility to pests and diseases. This is important for understanding the management needs of the overall tree resource, whilst also providing a clear baseline from which future tree planting can be guided, and further opportunities identified to diversify the tree population.

The project also provides the Vale of Glamorgan Council with information that can be used to engage with the local community, and to demonstrate the importance of trees in urban and rural landscapes. There is already the benefit of current enthusiasm and momentum within the local community, for example, through the preparation of a Tree Strategy for Penarth, by Penarth Civic Society. Community engagement is an important aspect of managing trees near to people, and projects that have involved members of the local community have yielded many benefits (see Moffat and Doick, 2019). One such benefit is that community engagement provides the opportunity to implement action that may be brought about by the findings of this project, and to build upon the findings further with continual monitoring and the input of specific local knowledge.

Project aims

- To gain a current baseline understanding of the extent, composition, and condition of the Vale of Glamorgan's tree resource in rural and urban areas
- To value some of the ecosystem services that the Vale of Glamorgan's urban trees can provide
- To inform target-setting for increasing tree canopy cover, and the development of a tree strategy that considers the effective management and enhancement of the Vale of Glamorgan's trees
- To increase awareness of the importance of trees in the Vale of Glamorgan and the benefits they can provide.

What difference can i-Tree Eco make?

i-Tree Eco software has been used within this project to collect information on the Vale of Glamorgan's tree resource and quantify the value of the county's urban forest. i-Tree Eco has been used to gain a comprehensive understanding of over 30 urban forests across the UK since it was introduced to the UK in 2011. Some of the benefits that have arisen following the completion of an i-Tree Eco project include:

- In Cardiff, i-Tree has helped with planning related to Ash dieback and has highlighted the importance of the city's urban forest, particularly in relation to the pressures of development, land sales and infrastructure improvements. It has also been an important resource for feeding into the One Planet Cardiff strategy, which has in turn led to the ~£1m Coed Caerdydd project which will see thousands of trees planted across the city.
- Increased investment in the management of the urban forest, such as securing two £25k budget increases in 2 years in Torbay, and the creation of an arboricultural officer post in Wrexham.

For further information on the impacts of some of the i-Tree Eco projects completed over the last 10 years, see the review 'Evaluation of i-Tree Eco surveys in Great Britain' by Hall, et al., 2018; Hand and Doick, 2018.

Data limitations

i-Tree Eco presents a first estimate of the tree resource and the benefits it provides. The valuations presented within this report are limited to the urban area of the Vale of Glamorgan only. This is because the ecosystem services that are currently measured within i-Tree Eco do not 'carry across' to the rural area of the Vale of Glamorgan.

The ecosystem services measured within i-Tree Eco are only a few of the many benefits that trees provide. As such, the valuations presented within this report

should be treated as a conservative estimate of the full value of benefits that the Vale of Glamorgan's urban forest provides. It is also important to realise that:

- The v6 i-Tree Eco model provides a snapshot-in-time picture of the size, composition and condition of an urban forest. To be able to assess changes in the urban forest over time, repeated i-Tree Eco studies, or comparable data collection, would be necessary.
- i-Tree Eco requires air pollution data from a single air quality monitoring station and the data used therefore represents an urban area average, not localised variability.
- i-Tree Eco is a useful tool providing essential baseline data required to inform management and policy-making in support of the long-term health and future of an urban forest but does not report on these factors itself.
- i-Tree Eco demonstrates which tree species and size class(es) are currently responsible for delivering which ecosystem services. Such information does not necessarily imply that these tree species should be used in the future.
- Planting and management must not rely solely on i-Tree Eco results, but also be informed by:
    - Site-specific conditions, such as soil properties, and available growing space
    - the aims and objectives of the planting or management scheme
    - local, regional and/or national policy objectives
    - current climate and future climate projections and associated threats; and
    - guidelines on species composition and size class distribution for a healthy resilient urban forest.

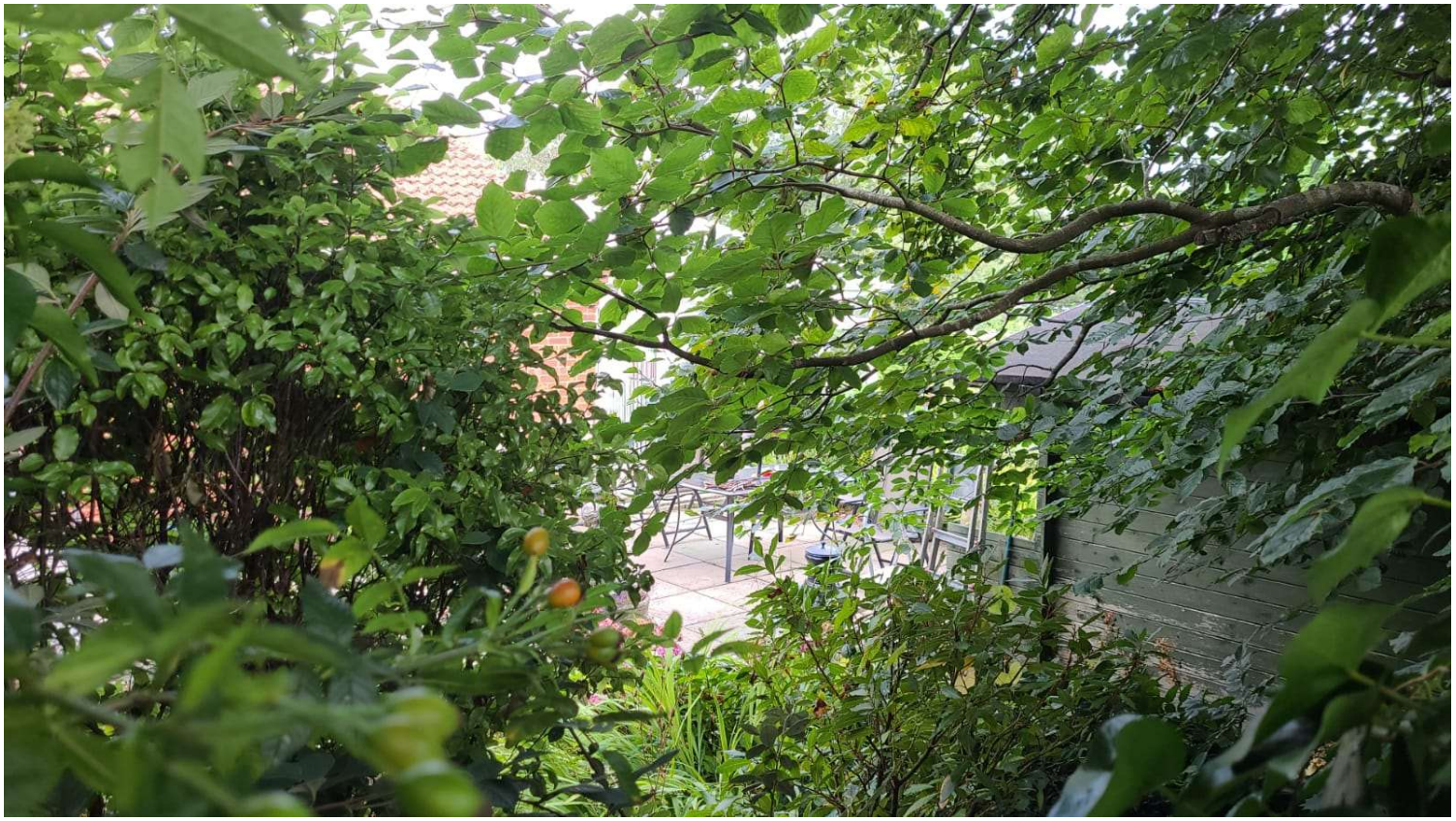
For further guidance, refer to the Urban Tree Manual (Defra, 2018).

Further information

Further details on i-Tree Eco and the full range of i-Tree tools for urban forest assessment can be found at: www.itreetools.org. The website also includes many of the reports generated by the i-Tree Eco studies conducted around the world.

For further details on i-Tree Eco in the UK, on-going i-Tree Eco model developments, training workshops, or to download reports on previous UK i-Tree Eco studies visit www.forestresearch.gov.uk/research/i-tree-eco and www.treeconomics.co.uk.

The identification, measurement, mapping and caring of trees in the urban environment create opportunities for members of the general public and community groups to become 'citizen scientists'. Interested readers are referred to Treezilla: the Monster Map of Trees (www.treezilla.org) and the UK Canopy Cover mapping project on Forest Research's website (https://www.forestresearch.gov.uk/research/i-tree-eco/urbancanopycover/).



Methodology

i-Tree Eco uses a plot-based method of sampling, whereby plots (circular areas of land of 0.04ha in size) are distributed throughout the survey area. It is within these plots that data are collected. i-Tree Eco software then extrapolates this data to represent the entire study area.

Sampling strategy

The Vale of Glamorgan was split into two distinct areas: the urban and the rural (Figure 2). For each area, a grid was overlaid onto a map and plots were randomly distributed within each grid square. This allowed reasonable assumption that there would be spatial representation, and that it would avoid the potential for clumping with true random sampling.

Figure 2. Map of the total study area, with plot distribution for both urban and rural areas

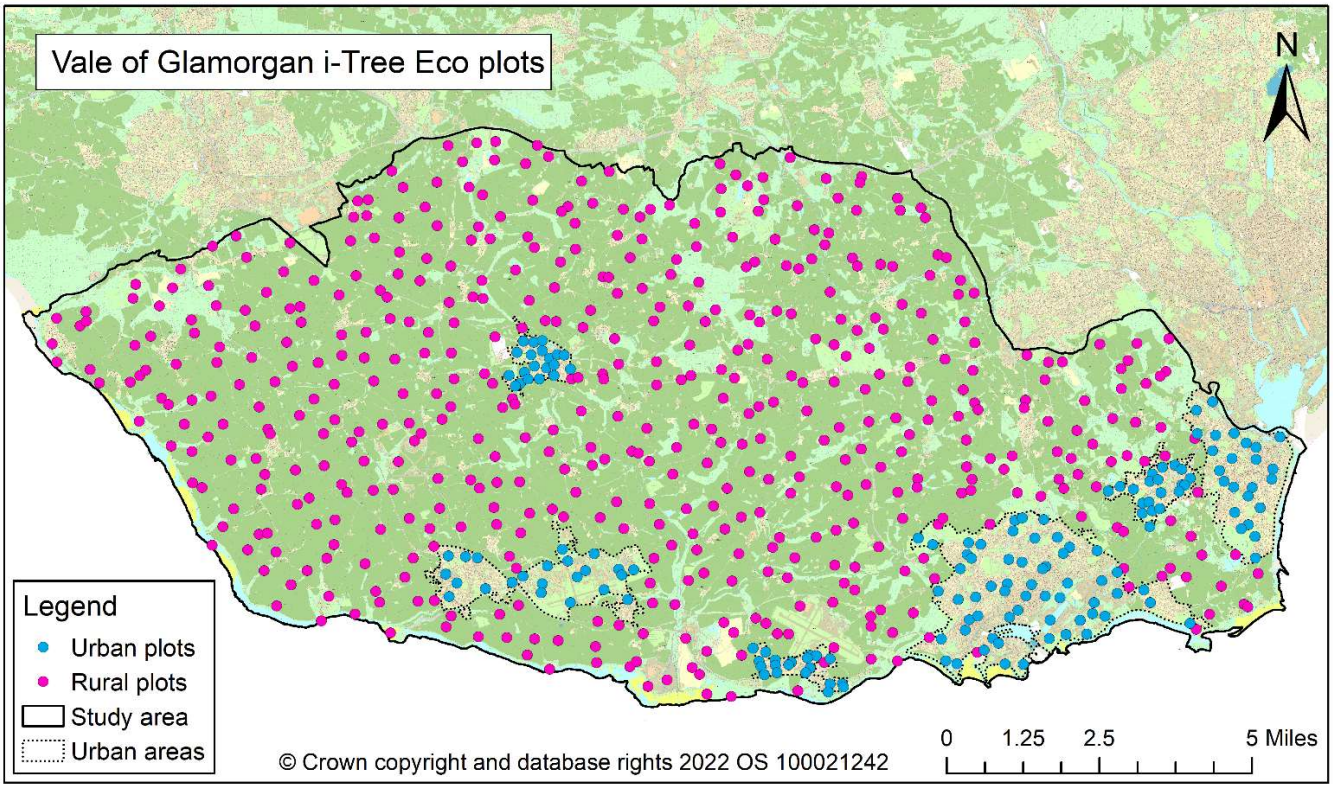


Table 4 below lists the urban areas that were included within the study. Each urban area was treated as a separate stratum to allow comparisons between towns. The urban area was 3,609ha in total. A minimum of 20 plots per stratum was required to allow for i-Tree Eco analysis. Plot density was the determining factor when deciding on the number of plots to be distributed for each locality.

Table 4. Urban areas that were included within the Vale of Glamorgan's i-Tree Eco survey

Urban Area Name	Area (ha)	Number of plots	Plot density (plot/ha)
Cowbridge	160	20	1/8ha
Llanwit major and St Athan (contiguous)	682	23	1/29.7ha
Barry and Barry Island (contiguous)	1707	57	1/29.9ha
Rhoose	136	20	1/6.8ha
Penarth	712	24	1/29.7ha
Murch	212	20	1/10.6ha
	Total Number of plots	164	

All land outside of the urban areas but within the county boundary was classed as rural. This included those smaller urban areas on or near the border of Bridgend and Cardiff. The rural area was 33,980ha in total, and 517 plots were distributed resulting in a plot density of 1 plot every 65ha. Whilst this plot density is lower than that of the urban areas, existing data suggested a high proportion of the land use in the rural area was agricultural, and therefore, the more homogenous nature of the rural area deemed it acceptable to have a sparser plot distribution.

Data collection

The data collection methods differed for urban and rural areas. For urban areas, a comprehensive list of data was collected for each plot to allow for full analysis of structure, composition and the value and amount of ecosystem services provided. For rural areas, the data collected were more limited, to enable higher plot

repetition, but sufficient data were collected to be able to describe the structure and composition of the rural tree stock. The data collected include:

Urban areas:

- Land use type, e.g. park, residential
- Ground cover (%), e.g. grass, tarmac
- Tree and shrub cover (%)
- The % of plot that could have trees planted in it
- Information on the trees present within the plot, including:
  - Number of trees and their species
  - Size of the trees, including height, canopy spread and diameter at breast height (DBH) of the trunk (measured at 1.5m above ground level)
  - The condition of the tree, including fullness of the canopy
  - The amount of light the tree canopy is exposed to
  - The estimated life expectancy of the tree

Rural areas:

- Land use type
- Tree cover (%)
- The % of the plot that could have trees planted in it
- Information on the trees present within the plot including:
  - Number of trees and their species
  - DBH of the trunk
  - The condition of the tree

For rural areas plots with no tree cover, and for which recent aerial imagery was available, were filtered out and remotely surveyed to assess land use type.

Replacement cost and amenity value

i-Tree Eco provides valuation estimates for the like-for-like replacement of trees in urban areas based upon the CTLA (1992) valuation method. These are described as 'replacement costs' when presented in the results and offer a 'structural value' of the tree. Urban trees also have the potential to provide significant amenity value. As such, an amended version of the Capital Asset Value for Amenity Trees (CAVAT) Quick Method (Doick, et al. 2018) was also used to assess the value of the Vale of Glamorgan's urban forest. CAVAT values are based upon tree size (trunk diameter) and are depreciated for attributes that impact its contribution to amenity. CAVAT includes a Community Tree Index (CTI) factor which adjusts the CAVAT value to take into account greater amenity associated with higher population density, using official population figures. The CAVAT value relates to the replacement cost of the tree as an amenity asset, rather than as a structural asset (as per CTLA) and has been used by many councils across the UK to support planning decisions.

Pests and diseases

The susceptibility of the Vale of Glamorgan's trees to pests and diseases was assessed using information on the number of trees within pest/pathogen target groups and the prevalence of the pest/disease within the Vale of Glamorgan or the UK. A risk matrix was used to determine the number of trees that could be impacted by each pest/disease should they become established within the local area, as well as the probability of establishment.

Habitat provision

Trees and shrubs provide valuable habitats and food for many species, including, insects, birds and mammals, as well as non-vascular plants such as moss. A review of the value of different tree species to UK wildlife by Alexander et al. (2006) was used to examine the relative biodiversity value for urban trees. Alexander et al. review a wide range of biodiversity values, giving trees a score from 5 (high value) to 0 (low value) and three examples are shown in this report (foliage invertebrate

value, blossom and pollen value, and fruit and seed value). The assessment was supplemented with information from Southwood (1961), Kennedy & Southwood (1984), and RHS (2018a).

Other calculations that have been used within the project are summarised within Table 5 below.

Table 5. Summary of calculations

Variable	Calculated from
Number of trees	Total number of trees; an estimate based on an extrapolation from the sample plots
Tree canopy cover	Total tree cover extrapolated from tree cover (%) measured within plots
Pollution removal value	Based on the UK central damage costs where available: £6,385 per tonne NO_x (nitrous oxides), £13,026 per tonne SO_2 (sulphur dioxide) and £74,403 per tonne $PM_{2.5}$ (particulate matter) (Defra, 2020).
Avoided runoff	The amount of water held in the tree canopy and re-evaporated after the rainfall event (avoided runoff) and not entering the water treatment system. The value used was the household standard volumetric rate of sewerage charges set by Welsh Water (£1.73 per m^3) in 2021/22.
Carbon storage and sequestration values	The baseline year of 2021 and the respective value of £254 per tonne (DBEIS, 2021)
Replacement cost (direct replacement)	The value of the trees based on the physical resource itself (e.g., the cost of having to replace a tree with a similar tree), the value is determined within i-Tree Eco according to the CTLA (Council of Tree and Landscape Appraisers) v9 method.
Replacement cost (amenity valuation)	Using the Capital Asset Value for Amenity Trees (CAVAT) Quick method (amended).

Survey findings – Vale of Glamorgan's Urban Forest

This section of the report presents the results of the i-Tree Eco survey of Vale of Glamorgan's urban forest (collectively Cowbridge, Llanwit major and St Athan, Barry and Barry Island, Rhoose, Penarth and Murch).

Throughout this chapter, some comparisons of previous i-Tree Eco studies in Wales are drawn. However, the area surveyed varies notably with each location, and as such direct comparisons should not be wholly relied upon. These studies include:

- Newport (Buckland et al., 2020)
- Cardiff (Hand et al., 2019)
- Bridgend (Doick et al., 2016b)
- Wrexham (Rumble et al., 2015)

Table 6. Outputs from the Vale of Glamorgan's i-Tree Eco survey of its urban areas compared to five other Welsh surveys.

	Vale of Glamorgan	Newport	Cardiff	Bridgend	Wrexham
Study area size (ha)	3,609	4,854	14,064	4,440	3,833
Number of trees	143,400[1]	259,900	1,410,000	439,000	364,000
Plot density (one per […] ha)	22[2]	24	71	22	19
Canopy cover (ha)	469[3]	582	2,658	533	652
% Tree canopy cover	13%	12%	19%	12%	17%
Average number of trees per ha	40	54	100	99	95

1. This represents 1 tree per resident (based upon the 2020 mid-year estimate of the Vale of Glamorgan's population, which was 135,295, Welsh Government, 2021)
2. Plot density differed between each urban area surveyed. This figure presents an average plot density for the entire urban forest. For more information on the plot density per strata, see Table 4.
3. This is approximately 5 x the size of Porthkerry Country Park which covers 89 ha (Vale of Glamorgan Council, 2021)

Canopy Cover

The **tree canopy cover of the Vale of Glamorgan's urban forest is estimated to be 13%.** This is higher than the canopy cover recorded in Newport and Bridgend (12% and 12% respectively), but lower than that of Cardiff (19%) and Wrexham (17%). It is also lower than the reported 2013 average of 16.3% for Welsh urban areas (NRW, 2016), but slightly higher than the previously estimated canopy cover of 12.3% for Vale of Glamorgan in 2013. The 2013 NRW study used the same boundaries as those that were used to identify urban areas for this study. For a further breakdown of estimated canopy cover per each urban area in the Vale of Glamorgan, see Table 9.

Ground Cover

The ground cover in the Vale of Glamorgan's urban areas mainly consisted of permeable materials (51%), with the most widespread ground cover being grass (maintained). This figure is lower than Cardiff (59% permeable cover), but higher than Newport (46% permeable) and Bridgend (49% permeable). Impermeable surfaces can increase the potential for surface water flooding through reducing and slowing the infiltration of rainfall into the soil. Impermeable surfaces can also contribute to local heating of the urban environment, therefore greater presence of permeable cover is favourable. Urban trees can contribute to the alleviation of these impacts through intercepting rainfall and regulating the local climate.

Land use

3b illustrates the proportion of land use of the plots that were measured, and the proportion of land uses where trees were found.

Residential land makes up the highest percentage across the whole of the Vale of Glamorgan's urban areas, at 49%. This is also the land use with the greatest proportion of tree'd plots (58%).

Land use can be roughly split into public and private ownership. Land uses that might be considered as publicly owned include parks, cemeteries and transportation. Based upon this loose classification, the percentage of tree'd plots found on publicly owned land is estimated to be at 18%. The high proportion of assumed privately owned land presents potential risks and challenges for management. Private ownership means less input into management decisions, replacement tree selection and placement, and can make it more difficult to retain tree cover. An appropriate tree policy that considers the management of trees, particularly in private residences, could be beneficial. It may also help to undertake a more detailed spatial evaluation of the land use within Vale of Glamorgan's urban areas, using GIS to map existing and potential tree cover opportunities.

Figure 3a. Proportion of total plot area within the Vale of Glamorgan's urban areas that was classified by the different land use types.

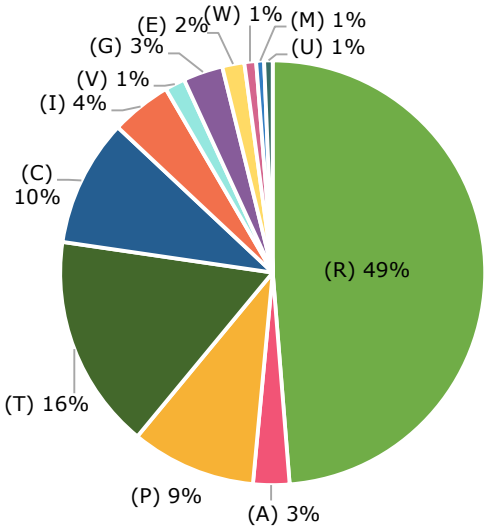
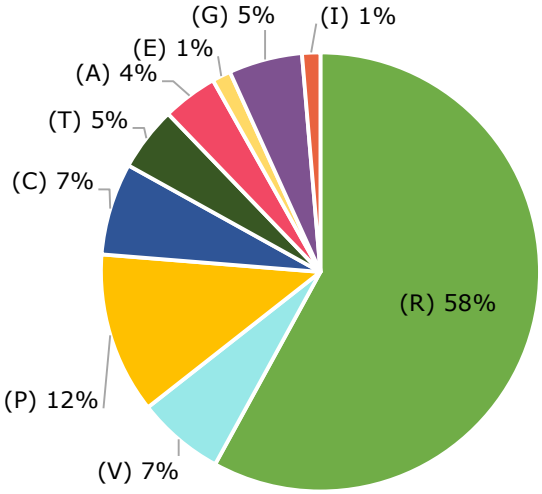


Figure 3b. Proportion of tree'd plot area within the Vale of Glamorgan's urban areas that were classified by the different land use types.



Key:

A = Agriculture	P = Park
C = Commercial/industrial	R = Residential
E = Cemetery	T = Transportation
G = Golf course	U = Utility
I = Institutional	V = Vacant
M = Multi-family residential	W = Water/wetland

Table 7. Tree data for the different land use types surveyed in the Vale of Glamorgan's urban areas

	Land use type											
	Agricultural	Cemetery	Commercial	Golf Course	Institutional	Multi-family residential	Park	Residential	Transportation	Utility	Vacant	Water/ Wetland
Percentage of all plots	2.8%	1.7%	9.7%	3.0%	4.6%	0.6%	9.5%	48.7%	16.3%	0.6%	1.5%	0.9%
Percentage of plots with trees present	4.1%	1.4%	6.8%	5.4%	1.4%	N/a	11.9%	58%	4.7%	N/a	6.4%	N/a
Average canopy cover (%) of plot	43.8%	47.5%	21.4%	39.5%	42.5%	N/a	40.9%	18.1%	26.5%	N/a	27.4%	N/a
Average plot plantable area (%)	52.5%	3.5%	5.7%	34.2%	25%	N/a	19.8%	27.1%	5%	N/a	10.5%	N/a
Number of trees measured	12	4	20	16	4	N/a	35	171	14	N/a	19	N/a
Species richness	9	2	12	7	3	N/a	15	45	8	N/a	5	N/a

Urban Forest Structure

Species composition and diversity

A total of 59 tree species were recorded across each of the urban areas surveyed as part of the study (for a full list of tree species, see appendix II). This is the same number of species identified in Newport, but less than those recorded in Cardiff (73 species), Bridgend (60 species) and the Tawe catchment (88 species).

The three most common species were common ash (*Fraxinus excelsior*) at 10.8%, sycamore (*Acer pseudoplatanus*) at 9.5% and common hawthorn (*Crataegus monogyna*) at 8.1%. The 10 most common species accounted for 60.1% of all the trees surveyed within Vale of Glamorgan's urban forest.

Figure 4a. Top 10 species recorded within the Vale of Glamorgan's urban areas

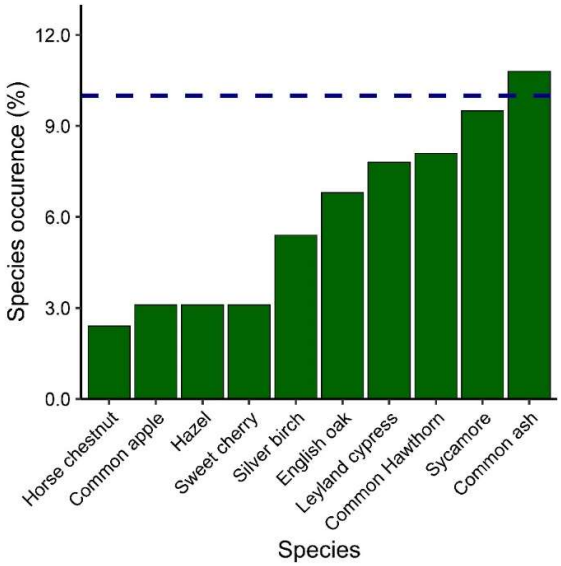
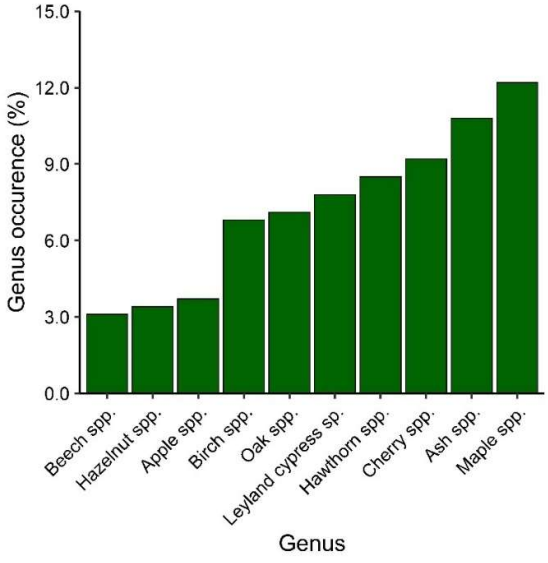


Figure 4b. Top 10 genera recorded within the Vale of Glamorgan's urban areas



Species composition by origin

52% of the trees that were surveyed were native species. Of the remaining trees surveyed, 16% are considered naturalised and 32% non-native. Native species can be an important source of food and habitat for invertebrates and other wildlife. Non-natives also have the potential to provide for local wildlife but may not be suitable

for specialist feeders or those that take time to adapt. As such, where wildlife provision is an important selection factor for future tree planting, further information should be sought on suitability. Some of the available information and research on this is covered within the document 'Tree Planting Recommendations for the Vale of Glamorgan'. For information on food and habitat provided by the Vale of Glamorgan's urban trees, see page 50.

Diversity index

Increased tree species diversity (the amount of different tree species present and their numbers) can offer a higher level of resilience to pests and diseases, as there is less of an opportunity for large numbers of trees to be potentially affected by an outbreak. Over the years, there have been different approaches to assessing whether there is a suitable level of species diversity. In 1990, Santamour recommended that no species should exceed 10% of the total urban tree population, no genus 20%, and no family 30%. There have since been suggestions of a 5-10-15 rule instead (The Morton Arboretum, 2018). Considering both of these approaches the following was observed across the Vale of Glamorgan's urban areas:

- 1 species exceeded Santamour's 10:20:30 guidelines (Common ash, 10.8%)
- 6 species exceeded 5-10-15 guidelines. These were Common ash (10.8%), Sycamore (9.5%), Common hawthorn (8.1%), Leyland cypress (7.8%), English oak (6.8%) and Silver birch (5.4%)
- There was no genus that exceeded the recommended 10-20-30, but 2 genera exceeded the 5-10-15 guideline. These included *Acer* (12.2%) and *Fraxinus* (10.8%).
- No family exceeded the 10-20-30 guidelines, but Rosaceae made up 24.7% of the total tree population, exceeding the 5:10:15 guideline.

The diversity of populations can be calculated using the Shannon-Wiener index, which measures the number of different species and their dominance within the population. According to the Shannon-Wiener index, the diversity score of the Vale of Glamorgan's urban forest is 3.4 (Table 8), which is lower than the scores for Newport (3.5) and Bridgend (3.6), but higher than that of Wrexham (3.1) and Cardiff (3.3). There was greater diversity of tree species in residential areas (3.4), but lower diversity in cemeteries (0.6) and institutional land, e.g., schools, hospitals (1.0). The primary species found within these less diverse land uses were Wild cherry (*Prunus avium*), English oak (*Quercus robur*) and Sycamore (*Acer pseudoplatanus*).

Table 8. Shannon-Wiener diversity index scores for tree species found on different land use types in the Vale of Glamorgan's urban areas

Land Use	Shannon-Wiener Diversity Index Score
Residential	3.4
Park	2.4
Commercial/Industrial	2.4
Agriculture	2.1
Transportation	1.8
Golf course	1.7
Vacant	1.2
Institutional	1.0
Cemetery	0.6
Overall score	**3.4**

Species diversity and its impact on tree management

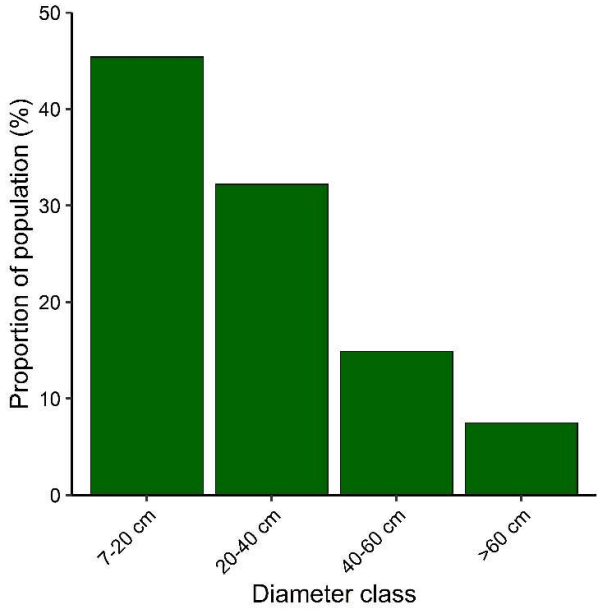
To improve urban forest resilience as a whole, understanding where species diversity could be improved can be helpful for informing strategic tree planting and tree management at the local level (within towns and wards). In the Vale of Glamorgan's total urban forest, ash is the most frequent tree species, and exceeds the 5:10:15 and 10:20:30 guidelines. In light of ash dieback, which is widely present in the area, the amount of ash surveyed suggests an over-reliance on the species within the urban forest population.

As ash trees will continue to be lost and/or removed as a result of ash dieback, sufficient numbers of trees will be needed to replace those lost. Additionally, a more diverse range of trees should be selected for replacement to enhance overall tree species diversity in the wider urban forest population. Where there is the potential to provide this benefit, such as in woodland and hedgerow settings, the species selection should consider the ecological niche that ash currently fulfils, and aim to continue the provision of at least some of this habitat and/or food. Further information and guidance on this are available in the report 'Tree Planting Recommendations for the Vale of Glamorgan'.

It can be challenging to influence the species selection of trees on privately owned land to encourage greater diversity. Institutional land such as schools, colleges and hospitals may benefit from the help of volunteer groups to increase tree cover on their land, with sufficient steer and guidance from the council to ensure that newly planted trees sit within the management objectives of the landowner and the council.

Size Class Distribution

Figure 5. Proportion of the total urban tree population that falls into each DBH class



Understanding the distribution of size classes within an urban forest population is important for two primary reasons. One is that it can be used as a proxy for age, and this can help offer insights into the sustainability of an urban forest, and whether there is a need to increase tree planting efforts to address potential shortfalls in tree numbers in the future. Secondly, larger trees can deliver a greater amount of ecosystem services than smaller trees (Sunderland et al., 2012; Hand et al. 2018, a,b). It is therefore important that where practically possible, large stature trees should be incorporated into new planting. It is also important that trees are supported through to maturity to increase the ecosystem service delivery per tree of the urban forest.

Richards (1983) suggested the ideal street tree distribution to ensure a healthy stock is 40% of trees with a DBH <20 cm, 30% of trees with DBH from 20 to 40 cm, 20% of trees with DBH from 40 to 60 cm and 10% of trees with DBH >60 cm It is estimated that 7.5% of the urban tree population in the Vale of Glamorgan have a DBH larger than 60cm (Figure 5). This is lower than the 10% value recommended by Richards (1983), but higher than that of Newport (6.2%) and Cardiff (6.9%). There is a greater proportion of trees with a DBH of less than 20cm (45.4%). Analysis of the large stature tree species shows that the greatest DBH

Figure 6a. Proportion of trees of large stature that fall into each DBH class

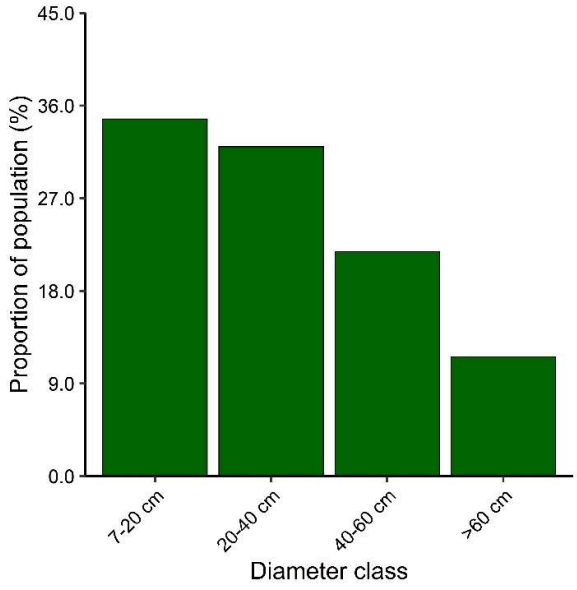
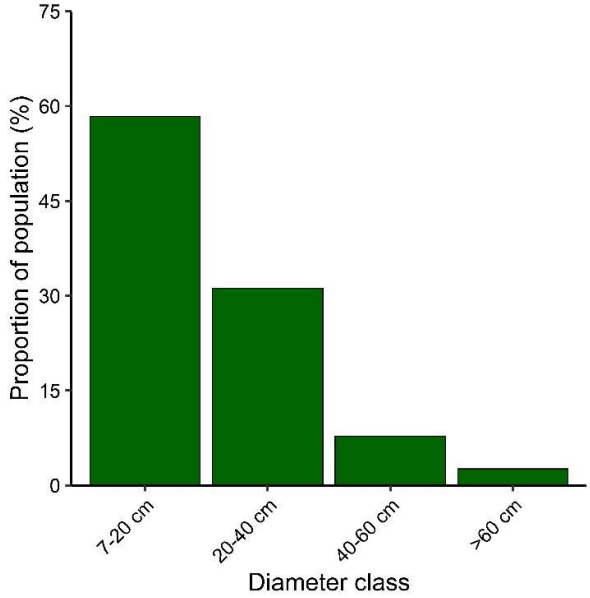


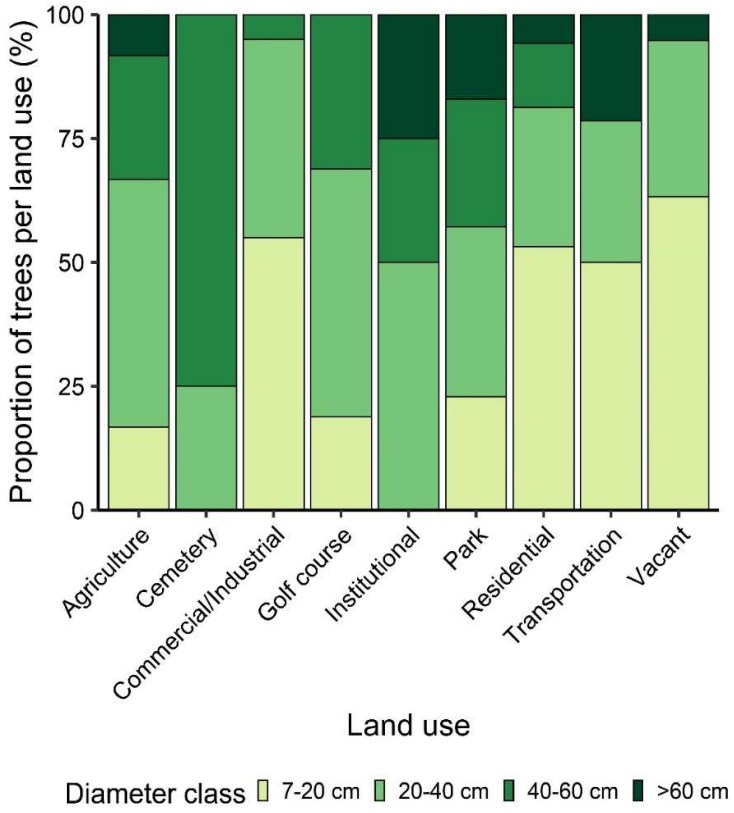
Fig. 6b. Proportion of trees of small stature that fall into each DBH class



band is in the 7-20cm category (Figure 6a), and as such there is a shortage of trees maturing into large diameter trees in the near future (note: Large stature trees are defined as trees that attain a maximum height of greater than 12 metres).

There is a fairly uneven distribution of diameter size classes across the different land use types (Figure 7). There is generally a higher proportion of small (<20cm DBH) and intermediately sized trees (20-60cm DBH), and notably and unusually, there were no large trees surveyed (>60cm DBH) in cemeteries, golf courses or commercial/industrial land. The proportion of large trees is greatest on land described as institutional or transportation use, and it would therefore be beneficial to protect large trees found here where possible, in addition to efforts to increase the number of large DBH trees across the whole spectrum of land uses.

Figure 7. Land use types and their associated proportions of trees that fall within the different DBH size classes



Size matters

The size of tree is a determining factor in the amount of benefit that tree might provide, with larger trees generally providing greater benefit. It is therefore important to retain large stature trees wherever possible, to ensure this continual provisioning. It is also important that large stature trees continue to be planted. However, incorporating large trees in urban areas can be challenging, particularly in areas of higher housing density or limited available greenspaces. In many new residential developments, it has been observed that a majority of newly planted trees are ornamental species of small to medium stature.

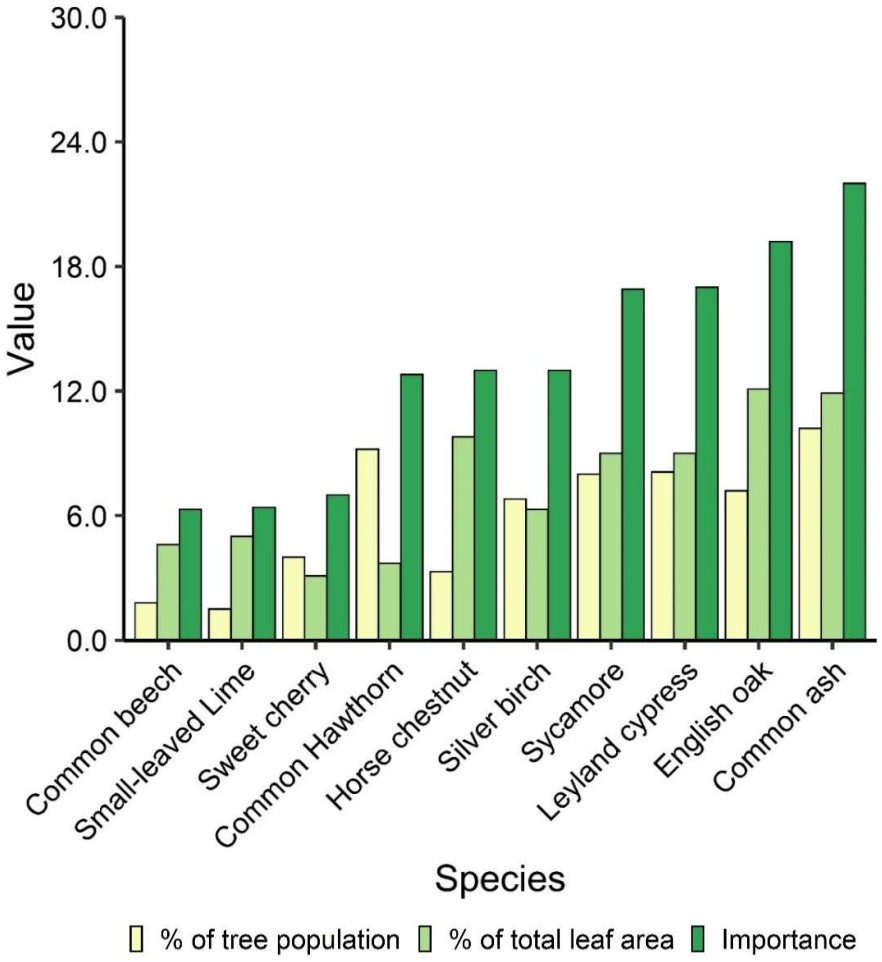
Understanding the age and size distribution can also be beneficial for developing a plan for sustainable replacement. Such a plan could be incorporated into the development of a tree planting strategy for the Vale of Glamorgan, which may help to refine future programmes of tree planting.

Leaf area and 'Importance Value'

Leaf area is the total surface area of leaves found within trees' crowns. Leaves are an important component in ecosystem service provisioning; therefore, a larger, healthier leaf area indicates greater benefit provided.

Importance value is calculated within i-Tree Eco using estimated leaf area per tree and the population size. This gives an indication of which tree species are contributing most to ecosystem service provisioning by the Vale of Glamorgan's urban forest. Trees with denser canopies and/or large leaves tend to rank highly. A list of the importance values for all tree species encountered during the study can be found in the appendices.

Figure 8. The top 10 tree species in the Vale of Glamorgan according to their importance value, along with their associated percentages of population and leaf area



The total leaf area provided by the Vale of Glamorgan's urban trees is 34.4 km^2. **Ash, English oak and Horse chestnut provide the greatest amount of leaf area at 11.8%, 12.0% and 9.7% respectively**.

i-Tree Eco importance value

The science that underpins i-Tree Eco reveals a direct relationship between leaf area and the provision of ecosystem services. Thus, in i-Tree Eco, importance value is the sum of leaf area and population size. If the most common trees have larger leaves or large tree canopies, then they tend to rank higher in importance.

Also known as the dominance value, the terminology can create assumptions that these are the tree species that should form the core of any future planting strategy. However, this value is used to demonstrate which species are currently delivering the most benefits based on their population numbers and leaf area.

To enable continual provision of ecosystem services to society, maintaining a healthy population of these trees is important. However, ash is one of the highest performing trees in terms of leaf area, and as such other species which are known to yield a similar or larger leaf area should be considered for the replacement of any ash trees lost. Large stature trees, such as English oak and horse chestnut which are currently found to also provide larger leaf area, will be important trees retain for the purposes of benefit provision.

Urban forest structure and composition by locality

Table 9. A breakdown of some of the key structure and composition figures for each urban locality surveyed within the Vale of Glamorgan.

	Locality					
	Cowbridge	Barry and Barry Island	Rhoose	Penarth	Murch	Llanwit major and St Athan
Estimate canopy cover (%)	20.0	8.9	5.5	21.2	20.3	7.7
Estimated total number of trees	11,700	56,900	4,700	34,400	13,900	22,700
Estimated average tree density (trees per ha)	73	33	35	48	65	33
Number of tree species surveyed	27	31	20	19	19	15
Most common species surveyed	Sycamore (15.3%)	Leyland cypress (11.6%)	Leyland cypress and Bird cherry (16% each)	Silver birch (12.8%)	Common ash (18.9%)	Common ash and Common Hawthorn (16.1% each)

Ecosystem services delivered by the Vale of Glamorgan's urban forest

Avoided Surface Water Runoff

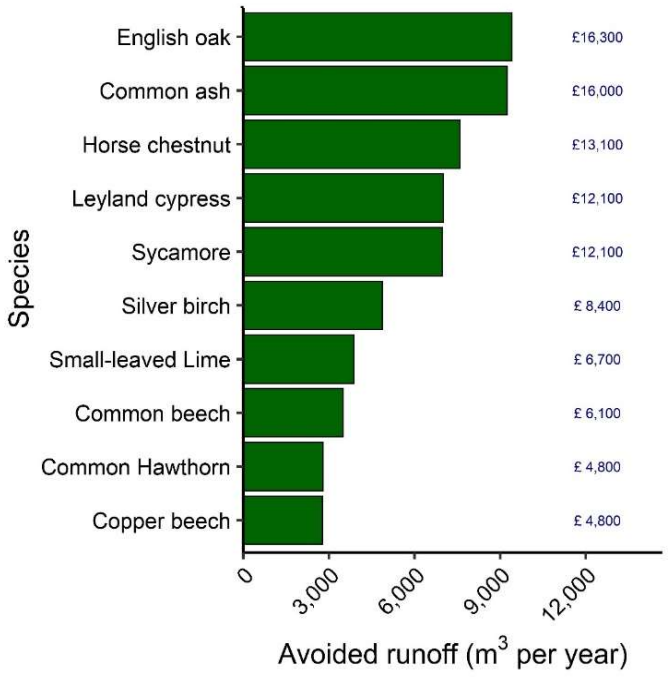
The Problem
In urban areas in particular, a higher proportion of impermeable surfaces, such as tarmac, can increase the risk of surface water flooding, which can lead to higher costs to treat the resulting sewage discharge.

What trees can do
The canopies of trees can intercept rainfall and reduce the amount that reaches the ground and forms floodwater runoff. Where trees are planted in areas of higher permeable cover, tree roots also contribute to flood prevention by taking up water.

Relevance to the Vale of Glamorgan
In December 2020, a 1 in 20-year rainfall event led to the internal flooding of 18 properties in Sully and also affected other residences and local transportation links. The flooding was attributed to run-off from nearby fields, which quickly led to the drainage network reaching full capacity (JBA Consulting, 2021). Following this, action to mitigate such events happening again was recommended, and it is suggested that trees can form part of such alleviation schemes.

Trees in the Vale of Glamorgan's urban forest intercept an **estimated 78,438m³ of rainfall per year.** This equates to almost 30 times the total water volume capacity of an Olympic sized swimming pool. Based upon the standard volumetric rate for charged for sewerage (using the Welsh Water 2021/22 value of £1.73 per m^3) this saves £135,838 in avoided sewerage charges. English oak intercepts the most water (9,412m^3 per year), contributing to avoided charges amounting to approximately £16,300 (Figure 9).

Figure 9. The top 10 tree species in the Vale of Glamorgan for avoided surface water runoff, and the associated cost saving



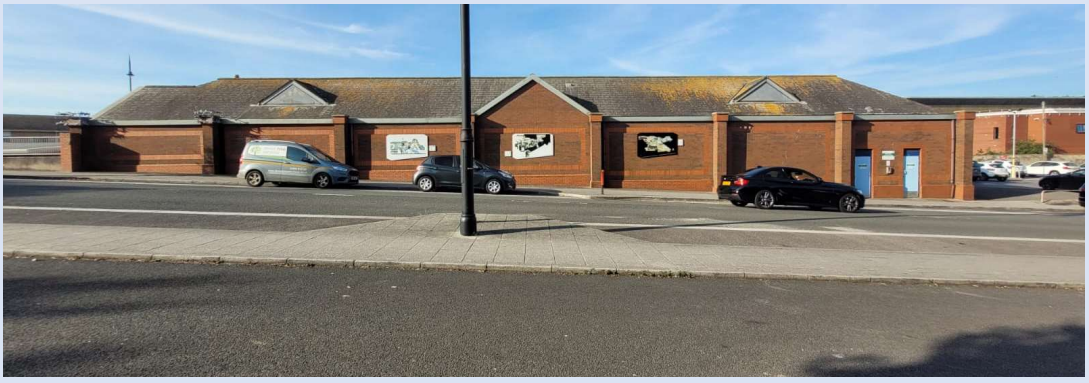
Reducing flooding in the Vale of Glamorgan's towns

Climate change in the UK is expected to lead to increasingly rainy winters with more storms. This increases the risk of flooding which is further exacerbated by a higher proportion of impermeable surfaces in urban areas such as roads and buildings. This can lead to a higher volume of surface water run-off which can quickly overwhelm drainage systems and lead to flooding.

In a natural environment, rain which falls onto vegetation is delayed in reaching the soil. Rainwater which reaches the surface percolates into the soil where it may be drawn up again by plant roots and returned to the atmosphere by evapotranspiration. The rate at which this happens depends on the soil structure, but roots can help water run into the earth instead of straight off the surface, reducing the risk of flooding.

In a heavily built-up environment, there may be very little interception, since any rain which falls onto roofs or roads run straight into gutters and drains which then reaches the rivers quickly. This can lead to both river (fluvial) flooding and surface (pluvial) flooding. Reducing the rate at which rainwater and surface run-off reach the river can reduce the amount of water entering the river system at once, allowing the river to drain more freely for longer. Urban trees can ease the pressure on drainage infrastructure and protect the catchment area from flooding, thanks to their ability to intercept, evaporate, transpire, infiltrate and store rainfall.

This issue can be difficult to combat, and river catchments rarely confine themselves to administrative boundaries, therefore collaboration with those both upstream and downstream is key to making an most impact. Tree planting can be most effective in the mid and upper regions of rivers, along tributaries and in cities along the river course. In the lower reaches of the river, on flood plains, interception is less vital and increasing percolation rates becomes the top priority to allow the land to drain after a flood has occurred.



Air Pollution Removal

The Problem
Air pollution is often linked to poor health outcomes, particularly respiratory conditions (e.g. asthma), and can even lead to premature death. It is estimated that the effects of long-term exposure to air pollution equate to 1,000-1,400 deaths in Wales each year (PHE, 2018; PHW, 2020).

What trees can do
Trees can help reduce overall exposure to air pollutants harmful to human health, such as nitrogen dioxide (NO_2) through absorption or interception. Trees can also reduce local temperatures which reduces the rate at which some pollutants (e.g. ozone, O_3) are formed (Jacob & Winner, 2009)

Relevance to the Vale of Glamorgan
The Vale of Glamorgan has historically had one Air Quality Management Area (AQMA), which was declared for NO_2 in Penarth in 2013. Following a successful 3-year period whereby all objectives were met, the AQMA was revoked in 2021. It is however important that improvements to air quality are considered. Retention, and replacement where necessary, of trees along transport networks that receive both high pedestrian footfall and busy traffic should be prioritised.

It is estimated that the Vale of Glamorgan's urban forest removes **36 tonnes of airborne pollutants each year**, including NO_2/NO_x (nitrogen dioxide/oxides of nitrogen), O_3 (ozone), SO_2 (sulphur dioxide), CO (carbon monoxide) and PM (particulate matter) (for further information on sources and health implications of these pollutants, see Table 10). Ozone is removed in the greatest quantity, with over 24 tonnes removed per year (Figure 10).

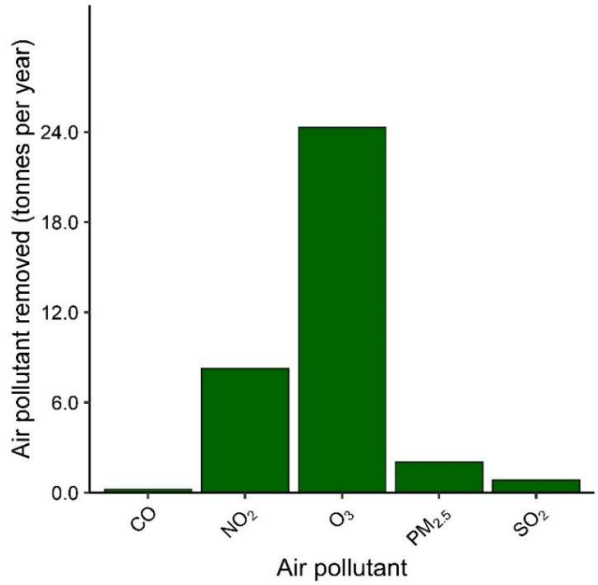
The pollution removed from the atmosphere can be valued to aid interpretation of this data. In both the USA and the UK, pollutants are valued in terms of the damage they cause to society. However, these are valued using different methods in each country: United States Externality Costs in the US (USEC) and in the UK, air quality can be valued using either the impact pathways approach (IPA), damage costs (monetary impact values per tonne of emission) or activity costs (monetary value per KWh energy used) (Defra, 2021). The UK damage costs approach used to value the air pollution removal in this project does not cover all airborne pollutants, and so only valuations for NO_2, $PM_{2.5}$ and SO_2 are provided. This is because of the uncertainty associated with the value of removing some airborne pollutants, and because the value of some pollutants can vary depending on their emission source

or because the cost of these other pollutants has not yet been determined by the UK Government.

Table 10. The health effects and source of different types of air pollutants.

Pollutant	Health Effects	Source
NO_2	Shortness of breath, chest pains	Fossil fuel combustion, predominantly cars (44%) and power stations (21%)
O_3	Irritation to respiratory tract, particularly for asthma sufferers	From NO2 reacting with sunlight
SO_2	Impairs lung function, forms acid rain that acidifies freshwater and damages vegetation	Fossil fuel combustion; predominantly burning coal (50%)
CO	Long term exposure is life threatening due to its affinity with haemoglobin	Carbon combustion under low oxygen conditions (e.g. in petrol cars)
PM*	Carcinogenic, responsible for tens of thousands of premature deaths each year	Various sources: cars (20%) and residential properties (20%) are major contributors

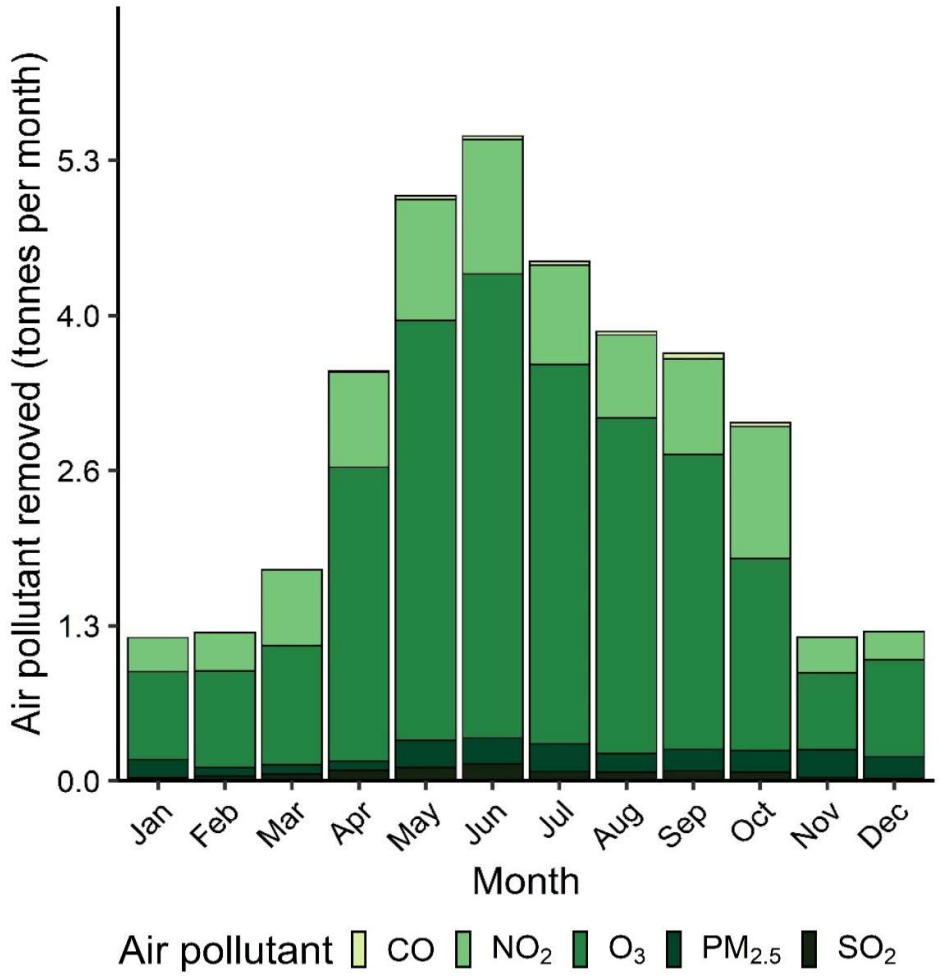
Figure 10. Amount of each air pollutant removed by the Vale of Glamorgan's urban forest



Using the UK damage costs system, **the annual removal of airborne pollutants by trees in the Vale of Glamorgan's urban forest is valued at £212,481 per year.**

The quantity of airborne pollutants removed can vary seasonally, with greater amounts of O_3 removed during the spring and summer (Figure 13). The production of O_3 is more prevalent in warm temperatures (Sillman & Samson, 1995) and so it is more likely that it is present to be removed by trees.

Figure 11. Amount of each air pollutant removed by the Vale of Glamorgan's urban forest each month



Air pollution removal by the Vale's urban trees

Trees can capture particulate matter on leaves and bark. Whilst some species struggle to manage the high levels of particulate matter exuded by cars and other modes of transport in cities, some species are incredibly good at it, for example the London plane tree (*Platanus x hispanica*). London plane trees shed their bark, so particulate matter doesn't build up and smother the tree, making them hardy and resistant to the stress of city living, hence their popularity in London and across the UK.

Trees also sequester other types of pollutants in the form of gases and fumes. This sequestration occurs as the plant respires through small pores in the leaf surface, taking in air to use the carbon dioxide in the process of photosynthesis. Additional chemicals and toxins get trapped within the leaf, which can improve air quality in the immediate area.

The amount of pollution trees can remove is directly linked to the amount of leaf area which the tree has, and some species have more leaf area than others, so species selection is a key consideration for a planting strategy aimed at cleaner air. Trees which can achieve a larger canopy size or have a denser canopy would be preferable to capitalise on this. It is also important to consider that though conifers and other evergreens usually have less leaf area than broadleaf species, evergreens continue to remove pollution all year round, unlike broadleaves. In order to keep air quality high through the winter months, some evergreen species should be included in any planting mix.

As well as species selection, planting location can have a huge impact on the success of a clean air strategy based on green infrastructure. If trees are in the wrong place, too close together, or all the same height, then pollution can get trapped beneath the canopy, particularly along transport corridors and in cities where buildings channel and block out the wind. To combat this, careful planning on tree spacing and planting trees of different species and of different ages is vital.

Carbon Storage and Sequestration

The Problem
Increasing levels of carbon dioxide (CO_2) in the atmosphere are significantly contributing to climate change, which is predicted to bring about increased summer temperatures and more winter rainfall and storms.

What trees can do
Reducing CO_2 emissions could help reduce the impact of climate change. CO_2 can be removed from the atmosphere by trees and stored within their woody components. Trees can continue to sequester carbon throughout their lifetime.

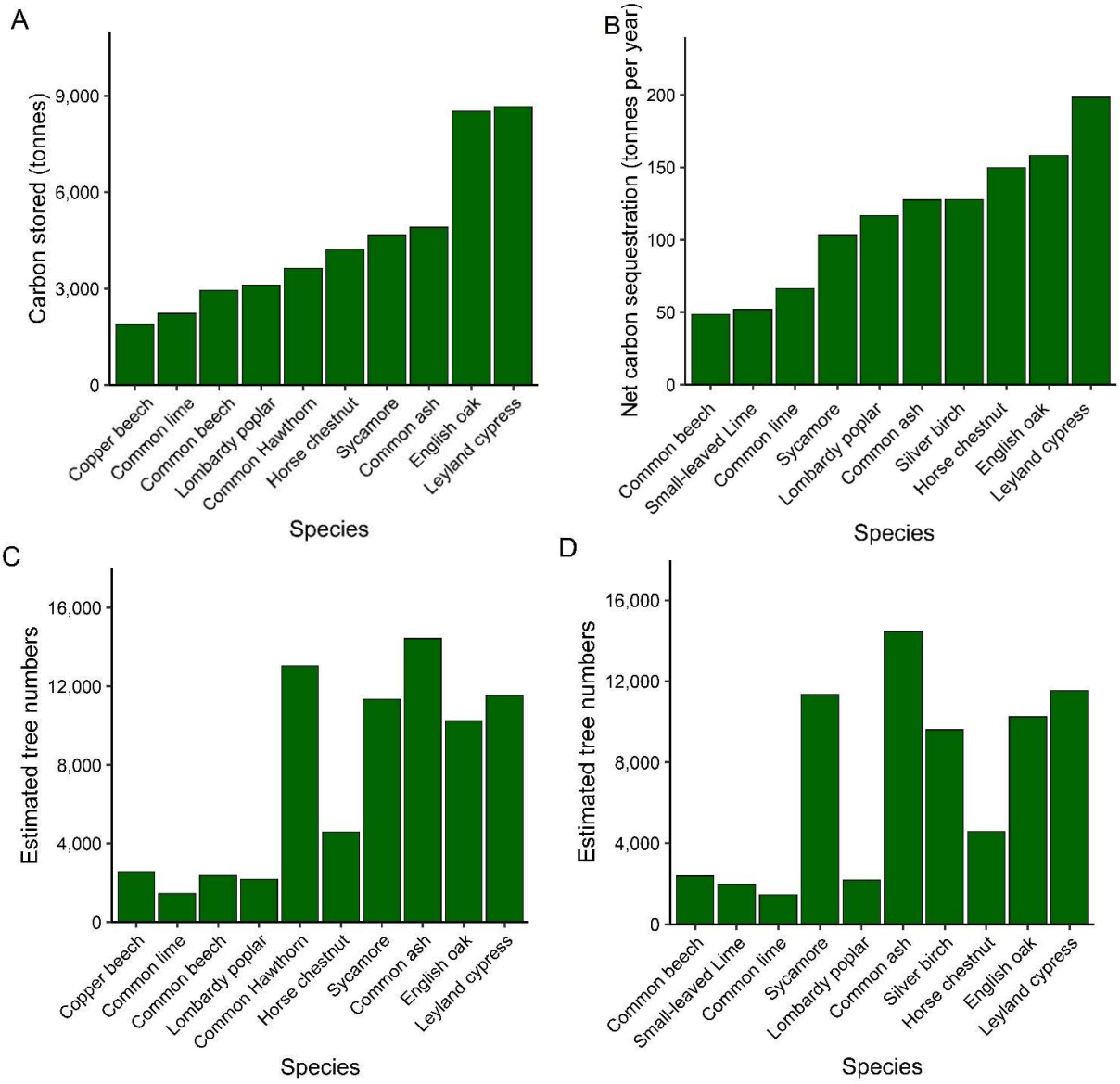
Relevance to the Vale of Glamorgan
The Vale of Glamorgan has one of the highest ecological footprints in Wales, at 3.53 global hectares per capita. The county's carbon footprint is also high, at 11.48 tonnes of CO_2 equivalent per capita, which ranks it 7th out of Wales's 22 local authorities (GHD, 2015). The Vale's carbon land requirements are 64% - slightly higher than the Welsh average (63%), suggesting increased tree planting would be beneficial.

It is estimated that **the Vale of Glamorgan's urban trees store a total of 57,314 tonnes of carbon** in their woody components. Timber density, quality and amount are important in terms of carbon storage, and larger trees are generally more able to store larger quantities of carbon. Leyland cypress and English oak store the most carbon at 15.1% and 14.9% of all carbon respectively (Figure 12A) and make up 7.8% and 6.8% of the total tree population (Figure 12C).

The **net carbon sequestered by the Vale of Glamorgan's urban forest each year is estimated at 1,977 tonnes annually**. The carbon in trees can be valued within the framework of the UK government's carbon valuation method (DBEIS, 2021). This is based on the abatement costs of meeting the UK's carbon reduction targets. These social values of carbon are split into two types: traded and non-traded. Traded values are only appropriate for industries covered by the European Union Emissions Trading Scheme. Carbon storage or sequestration by trees does not fall within this category so non-traded values are used instead. Within non-traded values, there are three pricing scenarios: low, central and high. These are used to reflect uncertainties in determining future carbon values, including in relation to future fuel prices. Based on the central value for non-traded carbon for

2021[1], it is estimated that **the carbon in the current tree stock is worth £51.4 million.**

Figure 12. Top 10 species for carbon storage (A), top 10 species for carbon sequestration (B), estimated tree numbers associated with top 10 species for carbon storage (C), estimated tree numbers associated with top 10 species for carbon sequestration (D).



[1] The 2021 value for 1 tonne of carbon is £898, based on the non-traded value of 1 tonne of CO_2 equivalent as £245 (DBEIS, 2021).

Carbon Storage and Sequestration

Plants have the ability to sequester CO_2 through photosynthesis. They can store carbon in soil and in plant biomass; approximately 50% of a tree's dry weight is carbon. Green areas in cities can significantly reduce the atmospheric concentration of CO_2 and can indirectly reduce carbon emissions by offering shading in the summer and insulation in the winter.

Across any area, the amount of carbon sequestered is influenced by the number of trees and their spatial coverage, the age and health of trees, their rate of mortality, their interaction with soil, and the disposal/use of trees at the end of their life. Naturally, the more trees and the more area they cover, the more carbon will be sequestered. Trees sequester carbon at different rates throughout their lifetime; young trees grow quickly and therefore the rate of sequestration is increased. As they mature, the growth rate reduces, as does the rate of sequestration. It is important to keep the population diverse in age and size to maintain sequestration and storage rates when some trees die or are felled, and so sustainable tree planting will help in this aspect.

Approximately 20% of a tree's biomass is below the ground in root systems which can transfer nutrients to and from the surrounding soils, trapping carbon compounds. Additional carbon is stored when leaves fall in autumn, however often in cities the leaves are not given a chance to break down in-situ and therefore this opportunity is not maximised; composting can be a vital carbon sink and can increase soil health.

Carbon storage and sequestration are part of a wider cycle. In order to ensure that the trees in the Vale of Glamorgan are having a positive impact in reducing global atmospheric carbon, they must sequester more carbon than is given off. The cycle extends far beyond the life of the tree, and carbon must be stored for as long as possible. If trees being removed are disposed of in a poorly managed way, the carbon which has built up over the lifetime of the tree can be instantly returned to the atmosphere (for example if the trees are burned). Converting dead or felled trees into lumber or wood products can vastly extend the amount of time carbon is stored for. Wood products can also indirectly reduce carbon emissions by acting as a replacement for a less eco-friendly product made of, for example, plastic or metal.

Habitat Provision

The Problem
Changes in land management practice, invasive species, urbanisation and pollution are key drivers of net loss in UK biodiversity (UK National Ecosystems Assessment, 2011).

What trees can do
Trees are vital sources of food and habitat for a variety of flora and fauna. Trees in urban areas in particular can boost people's engagement and feeling of connection with nature. Woodland trees can provide wildlife corridors to facilitate movement between sites.

Relevance to the Vale of Glamorgan
There are more than 22 Sites of Special Scientific Interest (SSSIs) in the Vale. The county hosts a rich biodiversity, with many different habitats and species, as well as a designated Heritage Coastline that spans 19km in length (Wales Biodiversity Partnership, 2022). However, there is a large amount of agricultural land in the Vale which may not be supporting as many species as it could, and there are many isolated fragments of woodland that limit habitat connectivity.

The biodiversity value of the Vale of Glamorgan's urban trees was assessed using data on a range of biodiversity values of trees. This analysis provides an indicator of the relative value of tree species and their population size in the urban area of the Vale of Glamorgan. High populations of trees which have low biodiversity value may indicate opportunities for changes in the composition of the urban forest to improve its value to wildlife.

In their review, Alexander et al. (2006) scored trees from high value (5) to low value (0) for supporting fungi and epiphytes, providing pollen and nectar, fruits and seeds. The biodiversity value of the Vale of Glamorgan's urban tree population is assessed by reviewing the biodiversity value of the tree species and their population size. Information on the number of invertebrates associated with tree species was gathered from Southwood (1961), Kennedy and Southwood (1981), supplemented for additional species from the Biological Records Centre 'Database of Insects and their Food Plants'. While these values provide a useful indicator of the relative biodiversity value of different trees, it is important to note that these values are gathered from various sources using different methods and from different locations, and in particular, are not specific to trees in urban areas.

Biodiversity values were assessed for three aspects of biodiversity: foliage invertebrate richness, blossom and pollen provision, and seed and nut provision (Figures 15a, 15b, 16a and 16b). These figures illustrate the value of different tree species in supporting wildlife, but also demonstrate that some of the most beneficial tree species are not widely present in the Vale of Glamorgan's towns. Figure 15a shows that **the Vale's hawthorns, oaks and birches support the greatest number of foliage invertebrates**. Figure 15b demonstrates that some of the trees that support a greater number of insect species are not widely present in the Vale's urban areas, for example Willow spp. (0.3% of tree population) and Poplar spp. (0.7% of tree population). It is important to have a diversity in trees which produce pollen and nectar – trees flower at different times of the year and having a variety of tree species to allow for continuity of pollen and nectar availability will help to support a wide array of pollinator species. Figures 16a and 16b demonstrate that willow and hawthorn are again, important for pollinators, and that beech, oaks and cherries provide the most fruits and seeds.

Figure 13 (a) The top 10 tree species by species composition (%) and their associated number of insect species supported (b) The top 10 tree species according to the amount of insect species they support.

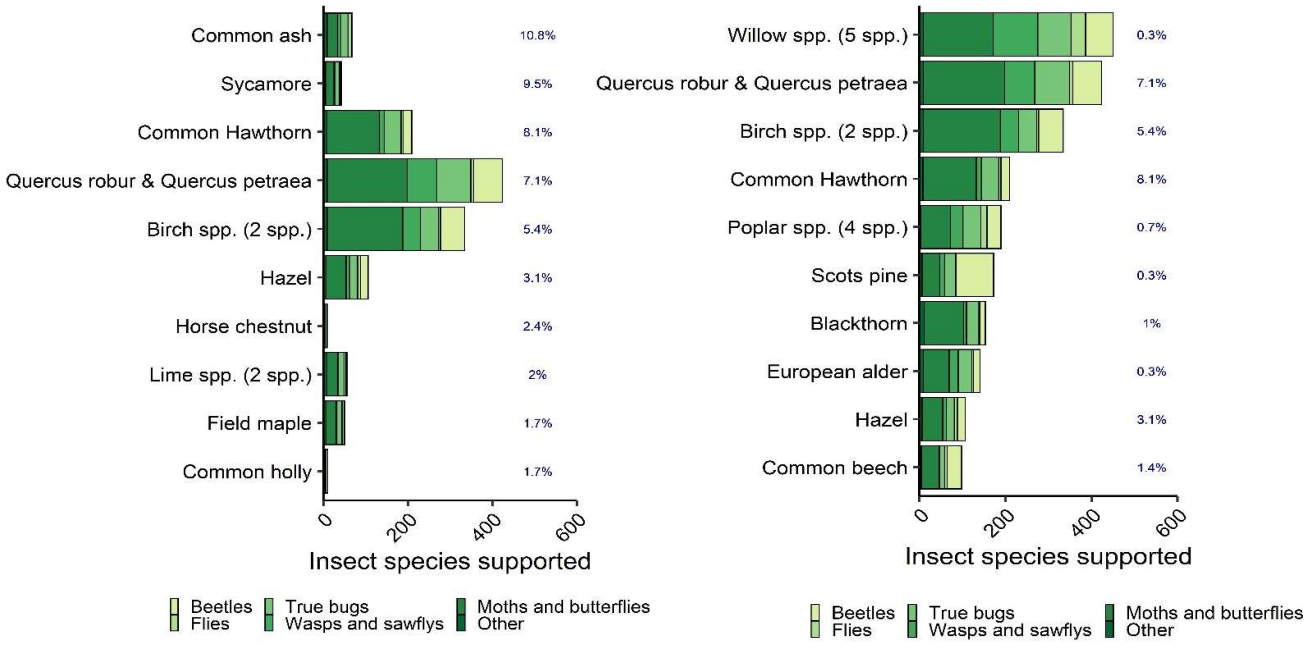
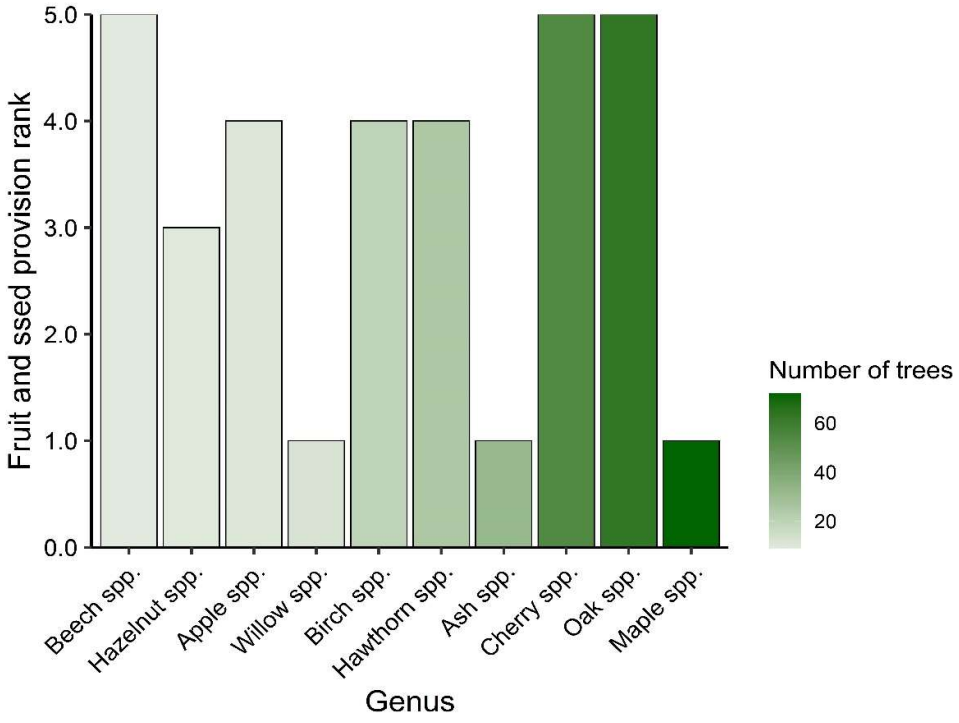
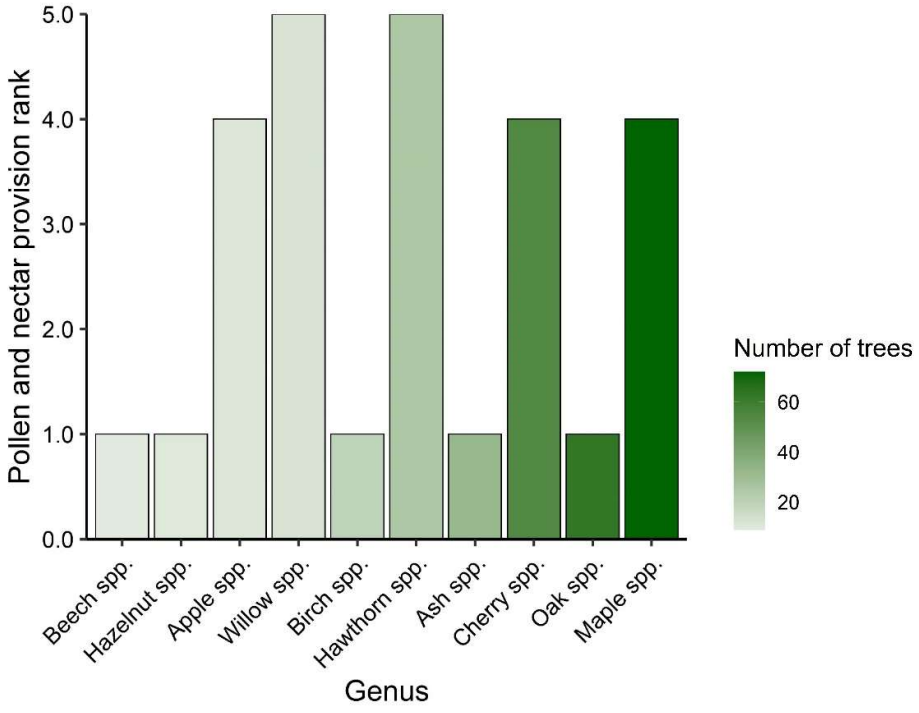


Figure 14. Tree species and their population size ranked from 0-5 for their: (a) provision of fruits and seeds and (b) provision of pollen and nectar.





Replacement Cost and Amenity Value

CTLA Valuation

The Vale of Glamorgan's urban forest has an estimated **replacement (structural) value of £126 million** according to the CTLA Appraisers (1992) valuation method. This is the cost of replacing all of the Vale of Glamorgan's urban trees should they be lost. As such, this method does not take into account the health or amenity value of trees, only the trunk area is considered as a proxy for tree size.

CAVAT Valuation

The Problem	**What trees can do**	**Relevance to the Vale of Glamorgan**
The demand for grey infrastructure to support the UK's growing population can consume greenbelt land, lead to loss of canopy cover to make space for new development and as a result reduce the overall amenity value that trees and green infrastructure can provide.	Trees and green and blue infrastructure such as shrubs, green spaces and water bodies, that are visually accessible can contribute significantly to the amenity value of an area. This can also be linked to improved mental health outcomes and feelings of happiness.	The Vale of Glamorgan's Community Strategy (2011-2021) outlines the need to protect and enhance the quality of the built and natural environment as one of its 10 priority outcomes. Enhancing the Vale's existing green infrastructure and limiting that which is lost to further development is important to allow opportunities for the general public to access nature. This is likely to be particularly important to the north of the Vale of Glamorgan, around Llantrisant, and in St Athan, which were identified as a Strategic Opportunity Areas as part of the Wales Spatial Plan in 2008.

The Vale of Glamorgan's urban forest has an estimated **public amenity asset value of £1.5 million**. This valuation was calculated using an amended version of the CAVAT Quick Method (QM) valuation tool (Doick, et al. 2018). This method takes into account the size and health of trees as well as their public accessibility. Oak trees contributed the largest proportion of the total amenity value at 21%, which was approximately £289,000 (**Error! Reference source not found.**). Residential land was associated with the greatest proportion of the total CAVAT value.

Figure 16. Top 10 genera in the Vale of Glamorgan's urban forest for providing amenity value and the associated proportion of the total CAVAT value

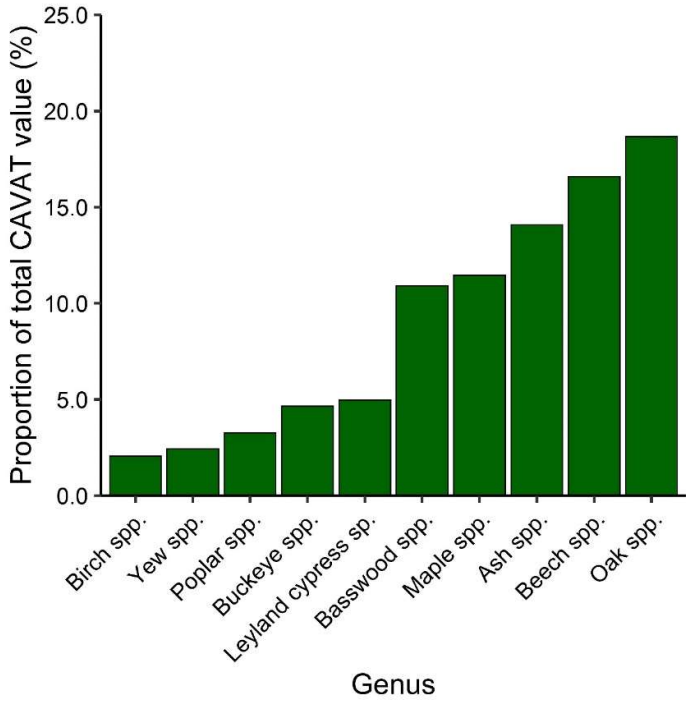
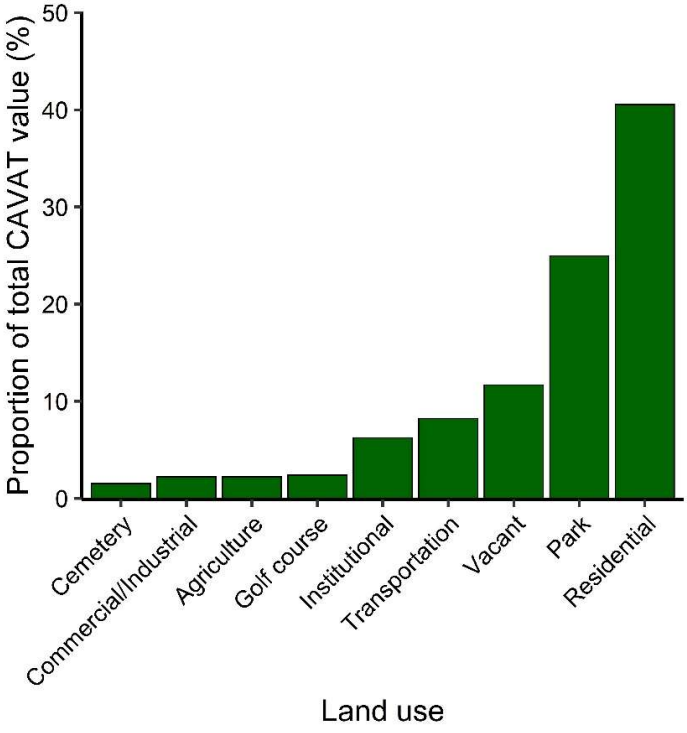


Figure 16. Proportion of the Vale of Glamorgan's urban forest's total CAVAT value provided by each land use



Urban tree Health

Tree Condition

Tree condition is an important metric for giving an estimate of the current state of the Vale of Glamorgan's urban forest. Condition is assessed by assigning scores relating to loss of leaves and the dieback of branches within the tree's crown. The results of this assessment could be a useful indicator of the possible presence of pests or diseases, unsuitable or poor management, unfavourable site conditions, or may warrant further investigation to understand whether there are any attributable causal factors. Dieback can lead to a reduction in the amount of ecosystem services provided by that tree, and can also present concern with regards to health and safety, particularly where trees may occupy a prominent position with frequent footfall.

Of the Vale of Glamorgan's urban trees 28.5% were in excellent condition, 43.7% in good and 16.3% in fair condition. A further 11.5% were estimated as being of poor or critical condition or were dying or dead. The land use type with trees in poorest condition was, surprisingly, parks, with 28.7% of the trees in critical or poor condition, or dead (Figure 17).

Tree condition was poorer than that of Newport (55% in

Figure 17. The proportion of total trees that fall into different land use categories and their condition

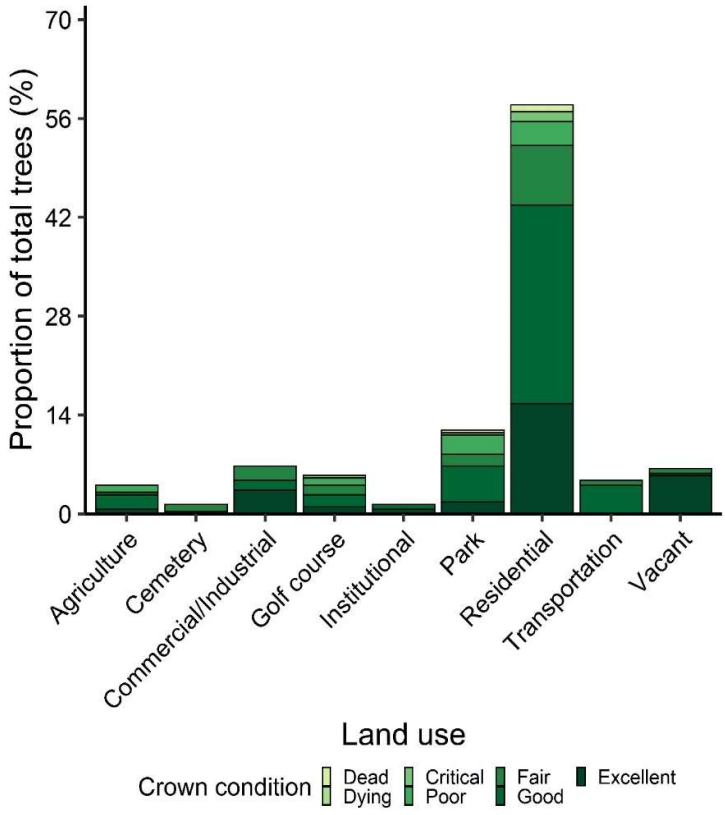
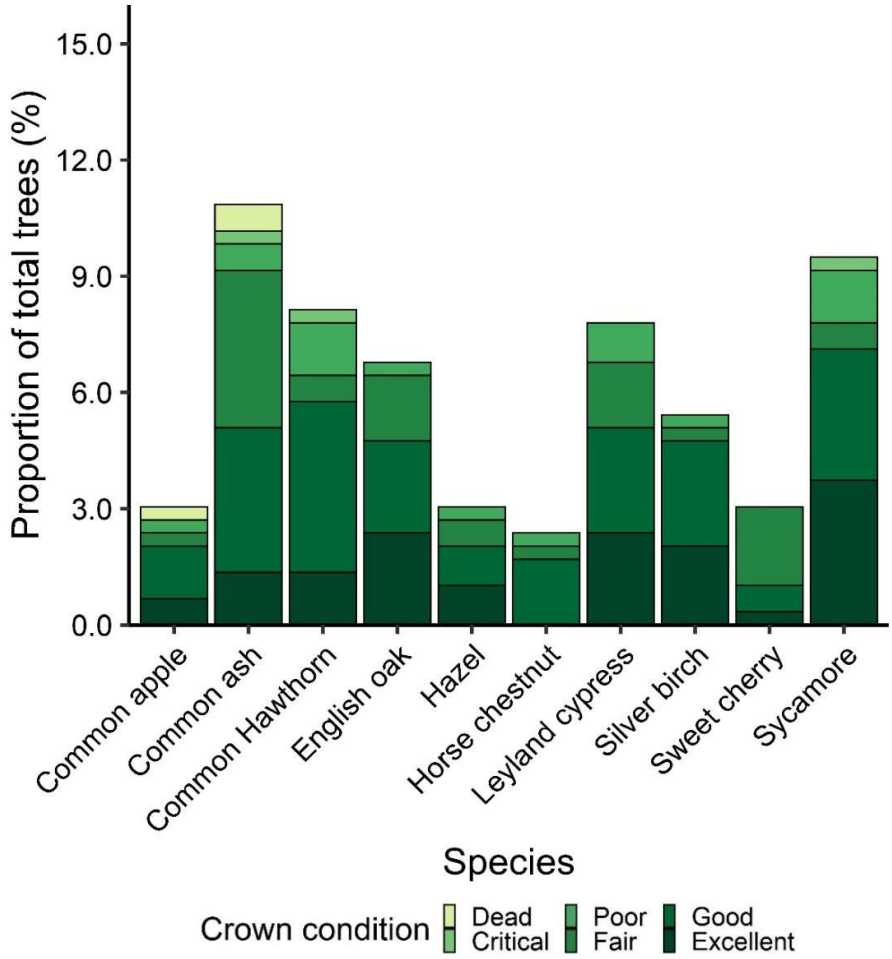


Figure 18. The condition of the top 10 tree species found within the Vale of Glamorgan's urban forest



excellent condition, 6% poor, critical, dead or dying). Cardiff and Wrexham had more trees in excellent condition (49% and 58% respectively) but also had more trees in poor or critical condition, dead or dying (both 13%).

Ash had the highest overall proportion of dead trees (Figure 18), **with 6.2% of the ash trees surveyed recorded as dead**. A further 9.3% were described as being in poor or critical condition, 71.9% in fair or good condition, and 12.5% in excellent condition. Common apple (*Malus* x domestica) also had higher proportions of trees on the poorer end of the scale, with one third of the apple tree population

recorded as dead, poor or fair. Sycamore appeared to be in the best condition, with over 74% of the sycamores recorded as in good or excellent condition.

The importance of condition

The loss of functional parts of trees, including leaves, woody components and roots can negatively impact ecosystem service provisioning. This might mean a more limited capacity to intercept rainfall and pollution filtration as a result of a loss in canopy, or reduced amenity value from a dying tree crown.

It is not always possible to ascertain the reasons for a decline in tree health and condition, but often it is attributed to the presence of pests and disease, or poor management or site conditions. It is likely that the higher proportion of poor, critical or dead trees in the ash population, can be attributed to ash dieback. This number will likely grow and has the potential to cause issues if not managed effectively. Ash in poor, critical or dead condition on publicly accessible land presents a possible health and safety risk, and suitable strategy/policy must be in place to facilitate the removal or safety pruning of such trees.

In the wider tree population, understanding tree condition is important to help understand overall urban forest sustainability and resilience, which can in turn inform management going forward. Current, local knowledge is essential for further unpicking the susceptibility of trees to harm, the extent of pests and disease and any other local threats (e.g. vandalism), and implementing effective mitigations and replacement strategies. Regular survey work and monitoring can be beneficial in identifying declining trees and causal factors where possible. If there are local volunteers who are interested in trees, there may be opportunities to get involved with initiatives such as Observatree (www.observatree.org.uk) which could prove beneficial at the local and national level.

Pests and Diseases

Pests and diseases are a very real and serious threat to the sustainability of the UK's urban forests. There have been a few outbreaks over the last 60 years (Dutch Elm Disease, *Phytophthora ramorum*, Ash dieback) which have had and are still having a significant impact on the UK's tree population; Dutch elm disease alone has killed at least 30 million trees in the UK since the 1960s (Webber, 2010). The

widespread dieback of trees attributed to certain pests and diseases can have substantial economic costs, as well as implications for health and safety, and a loss of the benefits that trees provide.

The threats associated with pests and diseases are only likely to worsen with the changing climate, as life cycles and natural ranges of new and established species change, and the risk of accidentally introduced pests and diseases becomes greater with increased probability of quick establishment.

Understanding the composition of the tree population can help to identify trees or species groups that may be most at risk, and the possible consequences this might have on the wider urban forest population. Probability risk matrices (Tables 11 and 12) have been developed for assessing the likelihood of the establishment of some pests and diseases that are not currently present in the Vale of Glamorgan. It has also included determining the potential level of impact of some pests and disease that are currently present in the area.

Table 11. Risk matrix used for the probability of a pest or disease becoming prevalent in the Vale of Glamorgan's urban forest on a single genus (one or more species).

Prevalence	**% Population**		
	0-5	6-10	>10
Not in UK			
Present in UK			
Present in South Wales			

Table 12. Risk matrix used for the probability of a pest or disease becoming prevalent in the Vale of Glamorgan's urban forest on multiple genera

Prevalence	**% Population**		
	0-25	26-50	>50
Not in UK			
Present in UK			
Present in South Wales			

Table 13 gives an overview of some of the established and emerging pests and diseases that could have a significant impact on the Vale of Glamorgan's urban forest. The focus has been on assessing pests and diseases that are more severe, i.e. could result in tree death, or present a significant human health risk. Further details on individual pests and disease are provided in the appendices. The table presents an estimate of the population of the Vale of Glamorgan's urban forest at risk from each pest and disease and the associated amenity value of these trees. Whilst this is not an exhaustive list of pathogens that could affect the Vale of Glamorgan's urban trees, it does give an indication of their potential impact. The information contained in the table may be used to inform programmes to monitor the presence and spread of a pest or disease, and strategies to manage the risks that they pose.

Table 13. Selection of pests and diseases and their potential impact on the Vale's urban trees

Pest/Disease	Tree species affected	Prevalence in the UK	Prevalence in Wales	Risk of spreading to the Vale of Glamorgan	Urban forest population at risk	CAVAT value of trees
Acute oak decline	*Quercus robur, Q. petraea, Q. cerris, Q. Fabri*	Mostly central and southern England, with a higher density of cases in the east.	Identified in at least one site in Wales	Medium – High	**7.1%**	£289,626
Asian longhorn beetle	Many broadleaf species (see appendices)	Not known to be present. One outbreak in Kent (2012) was eradicated quickly	None	Medium – climate may be suitable	**59.2%**	£868,274
Bronze birch borer	All *Betula* spp.	None	None	Medium	**6.8%**	£31,803
Chalara dieback of ash	*Fraxinus excelsior, F. angustifolia*	Throughout the UK	Widespread infection throughout Wales	Already present	**10.9%**	£218,568
Emerald ash borer	*F. excelsior, F. angustifolia*	None	None	Medium	**10.9%**	£218,568
Large eight-toothed bark beetle	*Most Picea spp., also reported on some Abies spp., Pinus spp., Larix spp.*	Limited outbreaks in SE England	None	Medium-High	**1%**	£9,328
Oak processionary moth	*Quercus* spp.	Established in Greater London and locally in home counties	None (previous successful eradication efforts)	Medium-High	**7.1%**	£289,626
Xylella fastidiosa subsp. *multiplex**	*Quercus robur, Ulmus glabra, Platanus occidentalis, Q. rubra, Acer pseudoplatanus, Prunus cerasifera*	None (one previous interception in the UK)	None	Medium – climate may be suitable	**16.6%**	£420,418

Survey findings – Vale of Glamorgan's Rural trees

This section of the report presents the results of the i-Tree Eco survey of Vale of Glamorgan's rural tree resource.

It is estimated that there are approximately **1,606,000 trees** in rural Vale of Glamorgan (47.3 trees per hectare).

Canopy Cover

The tree canopy cover of the Vale of Glamorgan's rural area is estimated to be **14%**. This is only 1% higher than the canopy cover recorded for the Vale of Glamorgan's urban areas.

Land use

Agricultural land makes up the highest percentage across the whole of the Vale of Glamorgan's rural area, at 81% (Figure 19a). The greatest proportion of tree'd plots also occurred on agricultural land (Figure 19b). For the purposes of corresponding with the underlying i-Tree Eco models, managed woodland is classified as 'Agricultural' land. Of the 352 plots that contained agricultural land, 83 of these contained tree cover.

Figure 19a. Proportion of total plot area within the Vale of Glamorgan's rural area that was classified by the different land use types.

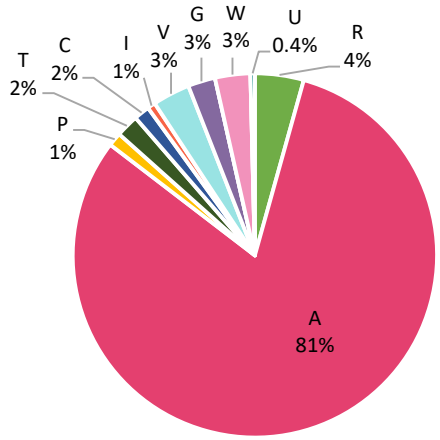
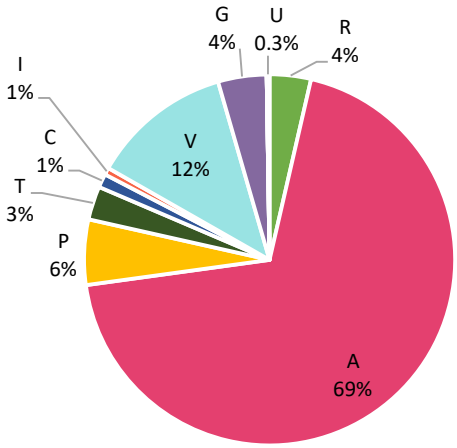


Figure 19b. Proportion of tree'd plot area within the Vale of Glamorgan's rural area that were classified by the different land use types.



Key:	
A = Agriculture	P = Park
C = Commercial/industrial	R = Residential
E = Cemetery	T = Transportation
G = Golf course	U = Utility
I = Institutional	V = Vacant
M = Multi-family residential	W = Water

Table 14. Tree data per land use type within the Vale of Glamorgan's rural areas

	Land use type											
	Agricultural	Cemetery	Commercial	Golf Course	Institutional	Multi-family residential	Park	Residential	Transportation	Utility	Vacant	Water/ Wetland
Percentage of all plots	80.5%	0%	1.4%	2.4%	0.7%	0.0%	1.2%	4.3%	2.0%	0.4%	3.3%	3.1%
Percentage of all plots with trees present	64.2%	N/a	1.4%	4.9%	0.7%	N/a	6.6%	4.2%	3.4%	0.3%	14.3%	N/a
Average canopy cover (%) of plot	54.9%	N/a	32.8%	42%	25.5%	N/a	65.8%	25.1%	32.5%	32.5%	77%	N/a
Average plot plantable area (%)	37.8%	N/a	52.5%	41.9%	70%	N/a	28.1%	41.3%	32.5%	3.5%	16.7%	N/a
Number of trees measured	635	N/a	14	48	7	N/a	65	42	34	3	141	N/a
Species richness	26	N/a	7	13	3	N/a	13	12	8	2	20	N/a

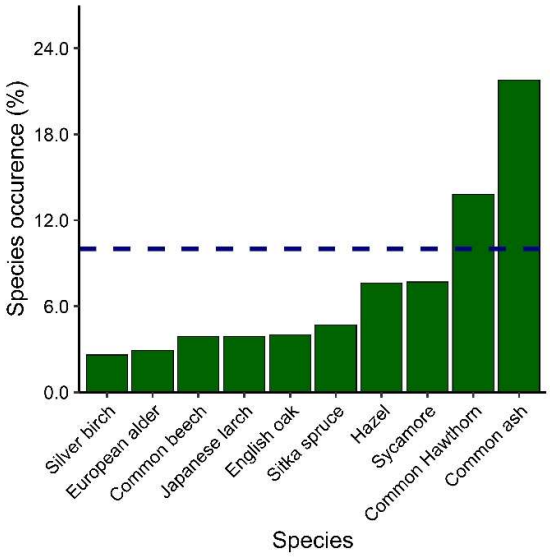
Structure of the rural tree resource

Species composition and diversity

A total of 40 tree species were recorded across the rural area of the Vale of Glamorgan (for a full list of tree species, see appendix II).

The three most common species were common ash (*Fraxinus excelsior*) at 21.8%, common hawthorn (*Crataegus monogyna*) at 13.8%, and sycamore (*Acer pseudoplatanus*) at 7.7%. The 10 most common species accounted for 72.9% of all the trees surveyed within Vale of Glamorgan's rural area.

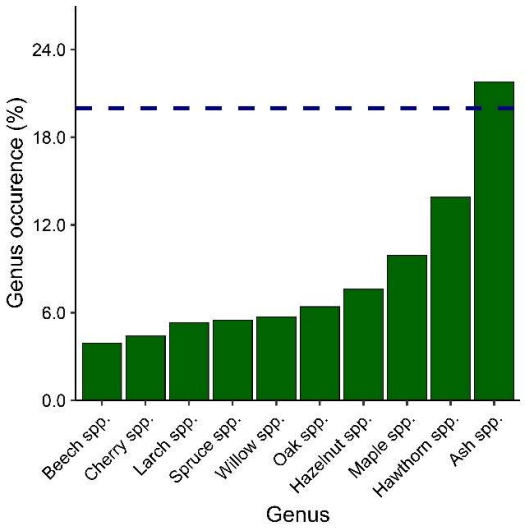
Figure 20a. Top 10 species recorded within the Vale of Glamorgan's rural areas



Species composition by origin

73% of the trees that were surveyed were native species. Of the remaining trees surveyed, 9% are considered naturalised and 18% non-native. These non-natives included Sitka spruce (4.7%), Japanese larch (3.9%) and Leyland cypress (<0.1%) to name a few.

Figure 20b. Top 10 genera recorded within the Vale of Glamorgan's rural areas



Diversity index

Increased tree species diversity is generally focussed on urban areas, but there is still a need to ensure a range of trees are being

planted and cared for in rural areas too. Diverse woodlands made up of different species and different structures can provide greater benefit for wildlife, and can offer much greater resilience to threats such as climate change and pests and diseases. **The diversity index score for the Vale's rural areas is 2.8.**

Table 15. Shannon-Wiener diversity index scores for tree species found on different land use types in the Vale of Glamorgan's rural areas

Land Use	Shannon-Wiener Diversity Index Score
Agricultural	2.6
Vacant	2.4
Residential	2.3
Park	2.1
Golf course	2.1
Transportation	1.8
Commercial/industrial	1.6
Institutional	1.1
Utility	0.6
Overall score	**2.8**

Size class distribution

The greatest proportion of the Vale of Glamorgan's rural tree population falls within the smallest DBH range of 7-20cm (Figure 21), making up 44% of the total rural tree population. When examining the split between those trees that are small stature and those that are large stature (Figures 22a and 22b), it seems that there is a fairly substantial number of young trees in the Vale's population, with 40% of large stature trees falling within this DBH band.

Figure 21. Proportion of the total rural tree population that falls into each DBH class

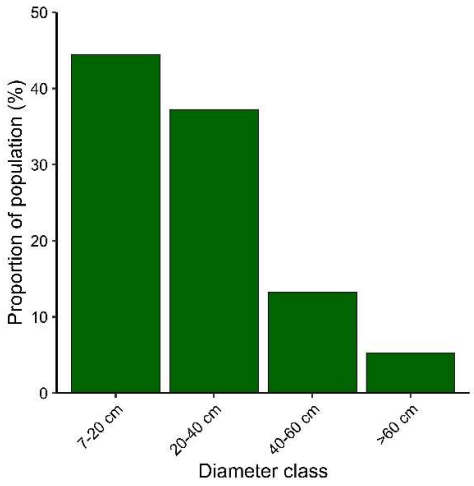


Figure 22a. Proportion of rural trees of large stature that fall into each DBH class

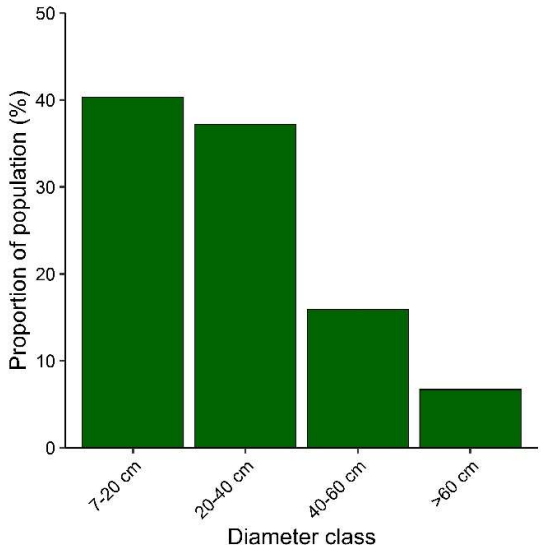
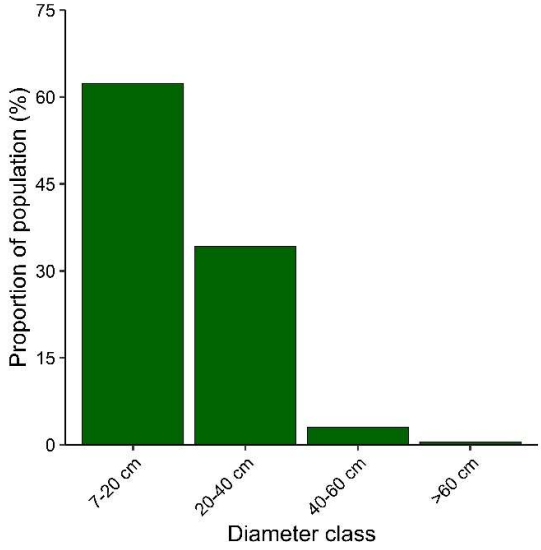
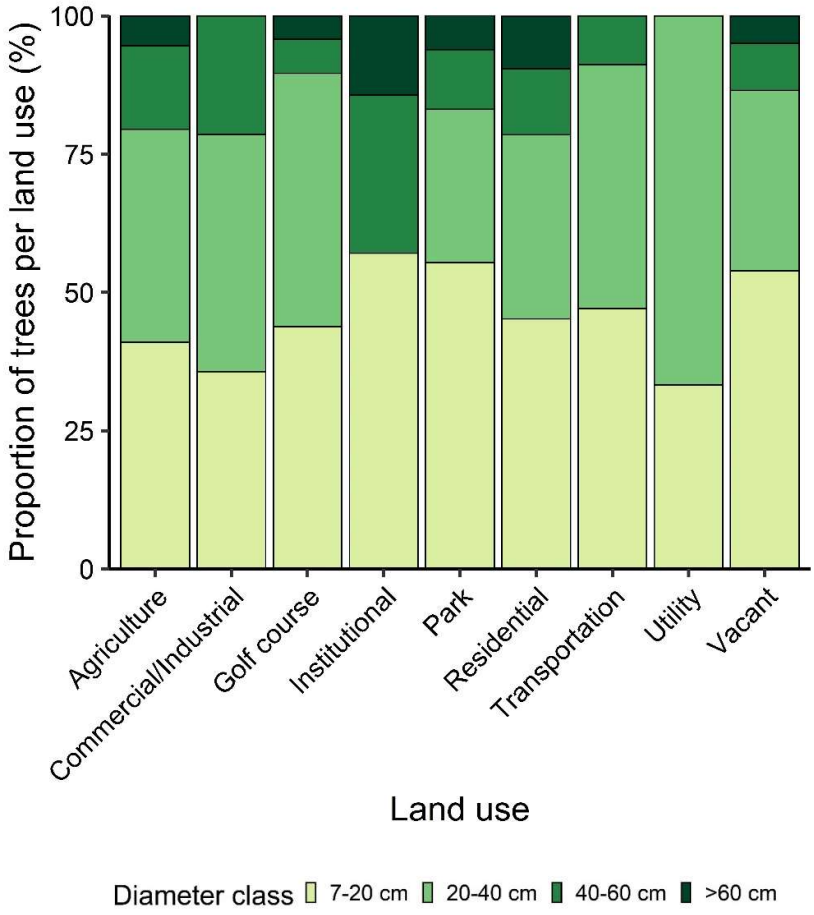


Figure 22b. Proportion of rural trees of small stature that fall into each DBH class



There is a very small proportion of trees that have a DBH greater than 60cm (5.3%). However, it is clear from databases such as the Ancient Tree Inventory (Woodland Trust, 2022) that within this category are some important trees which are likely to yield significant benefits for people and wildlife. Opportunities to protect and enhance such trees would be helpful in maintaining a balanced population structure and would be particularly beneficial for wildlife that might rely on some of the characteristics of mature, veteran or ancient trees for habitat or food. It is expected that a good proportion of the rural tree population will be grown as a commercial crop. As such, a sustainable tree population in rural Vale of Glamorgan will need to consider substantial tree replacement where losses incur (e.g. as a result of ash dieback), and a greater amount of planting where harvesting is not the end goal to maintain continuity of trees that reach the later life stages (i.e. ancient trees).

Figure 23. Land use types and their associated proportions of trees that fall within the different DBH size classes



Institutional land (e.g. schools, colleges, hospitals) hold the greatest proportion of larger trees per land use (Figure 23), but lack some intermediately sized trees (DBH 20-40cm). The proportion of young and/or small-stature trees (DBH 7-20cm) was relatively similar across the different land uses.

Rural Tree Health

Condition

Of the Vale of Glamorgan's rural trees 25.8% were in excellent condition, 17.1% in good and 17.6% in fair condition. A further 39.5% were estimated as being of poor or critical condition or were dying or dead. The land use type with trees in poorest condition was agriculture, with more than two fifths of trees recorded (41.6%) in critical or poor condition, or dying or dead (Figure 24).

Figure 24. The proportion of total trees that fall into different land use categories and their condition

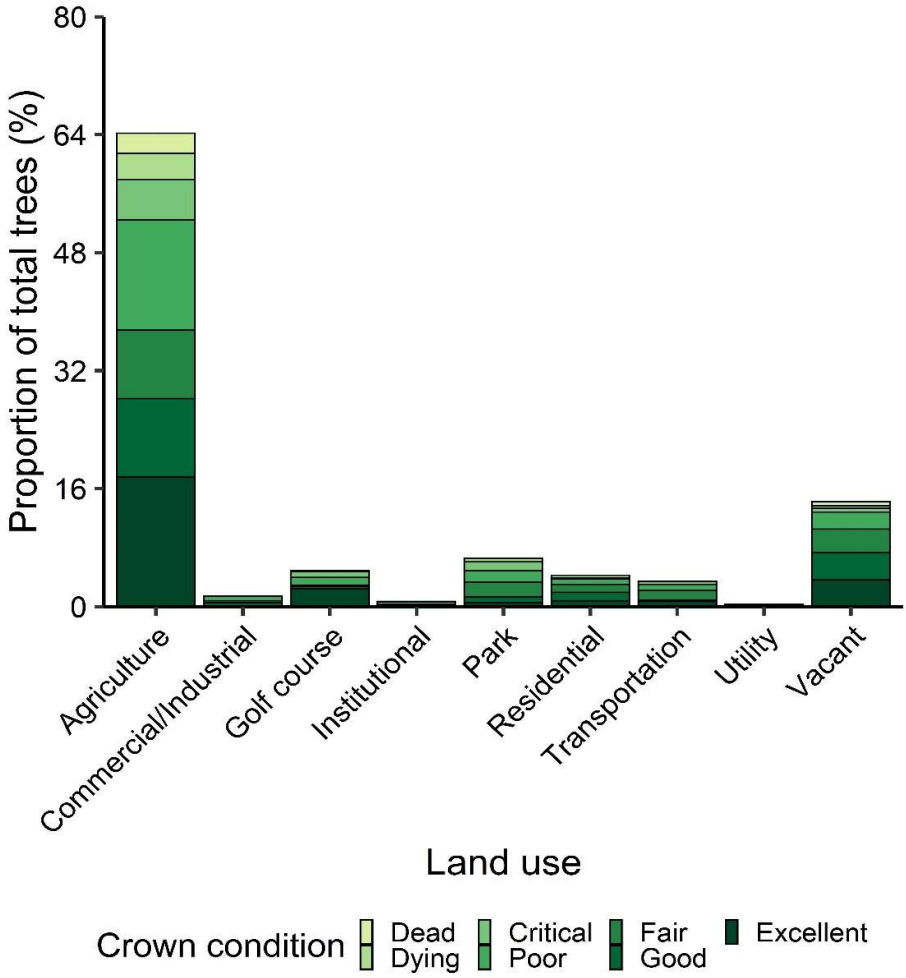
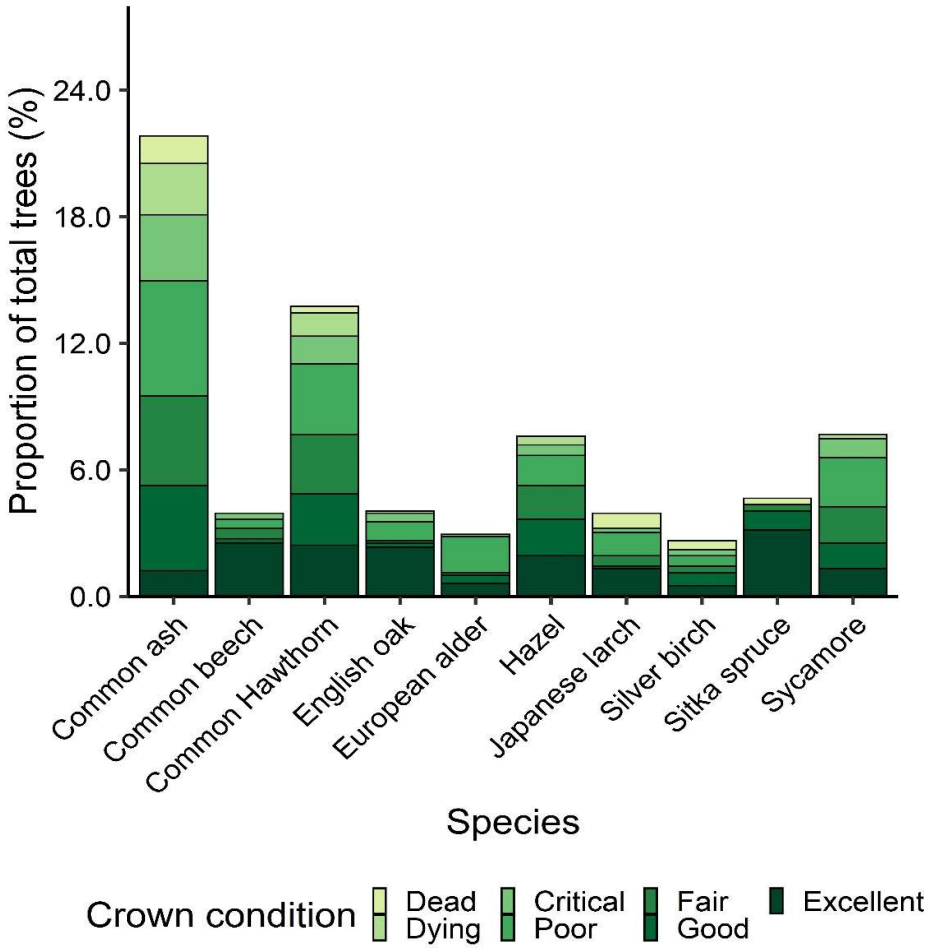


Figure 25. The condition of the top 10 tree species recorded in the Vale of Glamorgan's rural areas



Common ash had the greatest proportion of trees recorded in poorer condition (poor, critical, dying or dead), accounting for more than half (56.5%) of all the ash recorded. This could be a result of ash dieback infection. Contrarily, tree species that were recorded as proportionally in much better condition included Common beech, English oak and Sitka spruce. Notably 17.9% of Japanese larch recorded were dead, possibly as a result of infection from *Phytophthora ramorum*.

Pests and diseases

Understanding the impact of pests and diseases is particularly important where trees are grown on a commercial basis and in woodland planting. Outbreaks of pathogens can have a significant economic cost, with a direct impact on the local economy and further implications for the wider forestry sector.

The probability risk matrices (Tables 11 and 12) have been employed again for assessing the likelihood of the establishment of some pests and diseases that are not currently present in the Vale of Glamorgan, and for determining the potential level of impact of some pests and disease that are currently present in the area.

Table 16. Risk matrix used for the probability of a pest or disease becoming prevalent in the Vale of Glamorgan's urban forest on a single genus (one or more species).

Prevalence	**% Population**		
	0-5	6-10	>10
Not in UK			
Present in UK			
Present in South Wales			

Table 17. Risk matrix used for the probability of a pest or disease becoming prevalent in the Vale of Glamorgan's urban forest on multiple genera

Prevalence	**% Population**		
	0-25	26-50	>50
Not in UK			
Present in UK			
Present in South Wales			

Table 18 gives an overview of some of the established and emerging pests and diseases that could have a significant impact on the Vale of Glamorgan's rural tree population, focussing on the assessment of pests and diseases that are more likely to lead to a severe decline in tree health or mortality. Further details on individual pests and disease are provided in the appendices.

Table 18. Selection of pests and diseases and their potential impact on the Vale's rural trees

Pest/Disease	Tree species affected	Prevalence in the UK	Prevalence in Wales	Risk of spreading to the Vale of Glamorgan	Rural tree population at risk
Acute oak decline	*Quercus robur, Q. petraea, Q. cerris, Q. Fabri*	Mostly central and southern England, with a higher density of cases in the east.	Identified in at least one site in Wales	Medium – High	**4.3%**
Asian longhorn beetle	Many broadleaf species (see appendices)	Not known to be present. One outbreak in Kent (2012) was eradicated quickly	None	Medium – climate may be suitable	**63.6%**
Bronze birch borer	All *Betula* spp.	None	None	Medium	**2.7%**
Chalara dieback of ash	*Fraxinus excelsior, F. angustifolia*	Throughout the UK	Widespread infection throughout Wales	Already present	**21.8%**
Emerald ash borer	*F. excelsior, F. angustifolia*	None	None	Medium	**21.8%**
Large eight-toothed bark beetle	Most *Picea* spp., also reported on some *Abies* spp., *Pinus* spp., *Larix* spp.	Limited outbreaks in SE England	None	Medium-High	**12%**
Neonectria neomacrospora	*Abies* spp. Also reported on *Picea abies* and *Tsuga heterophylla*	Observed on some fir species in England and Wales since 2015	Present	High	**0.8%**
Oak processionary moth	*Quercus* spp.	Established in Greater London and locally in home counties	None (previous successful eradication efforts)	Medium-High	**6.3%**
Phytophthora pluvialis	*Pinus radiata, Pinus patula, Pinus strobus, Tsuga heterophylla, Pseudotsuga menziesii, Notholithocarpus densiflorus*	Multiple outbreaks across England, Wales and Scotland since its discovery in Cornwall (Sep 2021)	Some outbreaks present	High	**0.3%**

Table 18. (Cont.) Selection of pests and diseases and their potential impact on the Vale's rural trees

Pest/disease	Tree species affected	Prevalence in the UK	Prevalence in Wales	Risk of spreading to the Vale of Glamorgan	Rural tree population at risk
Phythophthora ramorum	Mainly *Larix spp.* but other tree species susceptible (for a full list, see appendices)	Widely present, mostly in the West	Cases reported throughout Wales	Already present	**5.2%**
Xylella fastidiosa subsp. *multiplex**	*Quercus robur, Ulmus glabra, Platanus occidentalis, Q. rubra, Acer pseudoplatanus, Prunus cerasifera*	None (one previous interception in the UK)	None	Medium – climate may be suitable	**14%**

Conclusions and Recommendations

The Vale of Glamorgan's total tree population is estimated to contain over **1.7 million trees**. A total of 59 species were recorded in the Vale's towns, and 40 species were surveyed in the county's rural areas. The three most common species throughout the entire study area were Common ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*) and Common hawthorn (*Crataegus monogyna*).

Urban trees in the Vale of Glamorgan provide benefits valued at **£2.05 million per year**. This value represents only a handful of ecosystem services, namely carbon sequestration, air pollution removal and avoided surface water runoff. Therefore, this is a conservative estimate of the services that urban trees in the Vale of Glamorgan are capable of providing, such as health benefits, social and cultural values and provisioning for wildlife. Investment in green infrastructure such as trees, is vital for continual benefit provision and its contribution to quality of life for the Vale of Glamorgan's residents.

Canopy cover across the Vale's urban and rural areas is broadly similar, at **13%** and **14%** respectively. There is a considerable difference in the canopy cover values between towns, ranging from 5.5% in Rhoose, to 21.2% in Penarth. Whilst some of the Vale's urban areas exceed recommended targets of 20% (or 15% for coastal towns and cities), Rhoose, Barry, Llanwit major and St. Athan all have very low canopy cover, and as such these areas should be prioritised for new tree planting schemes. Further work may be needed to identify potential planting sites, which may entail a combination of desktop mapping exercises, consultation with the local community and site visits. In rural areas, canopy cover is low, and engagement with a wide range of stakeholders is likely necessary to drive forward new woodland creation.

Both urban and rural areas lack enough mature large trees. 11.6% of the Vale of Glamorgan's urban forest comprised of large stature trees with a DBH of over 60cm, and in rural areas, this figure was 6.7%. Large stature trees are capable of providing a greater amount of ecosystem services and are integral to the landscape character and sense of place, bridging the gap between the present and the past and acting as 'living history'. Across Wales, there has been a general decline in large trees (NRW, 2016), highlighting the need to look after this particular age class of the tree population, and ensure younger trees are able to reach maturity.

Tree condition was variable across the Vale, with trees in rural areas in much poorer condition than those in towns. Almost 40% of trees in rural Vale of Glamorgan were in poor or worse condition, highlighting a possible need to further assess the state of current rural tree cover and the challenges of managing this resource. Whilst the i-Tree Eco survey did not include the identification of pests and diseases, it is highly likely that some of the tree population is being impacted by such, for example, ash dieback. Pests and diseases not currently present in the UK could also have a huge impact on tree health should they become established. Asian Longhorn Beetle could impact as many as 1.1 million trees, which equates to almost 70% of the Vale's total tree resource. This therefore highlights an overreliance on key tree species to make up the overall tree population, and a more diverse species mix will be necessary for future planting schemes to enhance overall resilience of the tree resource. This is true of both urban and rural areas.

Where trees were present, they most commonly occurred on agricultural land in rural areas, and residential land in urban areas. However, less than a quarter of all agricultural plots surveyed contained trees, which demonstrates that there is potential for incorporating further tree planting on this land. It is important to recognise the value of farming to the Vale of Glamorgan, but also to recognise that it is possible to integrate tree planting with

agriculture to further enhance farming practice. In the Vale of Glamorgan's urban areas, residents are a key stakeholder in managing urban trees, and are the custodians of the most species-rich sector of the Vale's urban forest (45 species recorded in residential areas). Engagement, outreach and education is therefore critical, and could be encompassed in a strategy for engagement, the development of (or further development of) a dedicated tree warden network across the county, and the provision of resources and information on tree care for residents and landowners.

Recommended next steps:

- For both rural and urban areas, **setting canopy cover targets** to increase overall tree cover can be an effective means of engaging a wide range of stakeholders including decision-makers, landowners and the general public. Adopting a localised approach to canopy cover targets (i.e., per town) will support a more even spread of tree cover and facilitate more equal access opportunities to green infrastructure for the Vale's residents. Canopy cover targets need to be realistic and attainable, taking into consideration current tree cover and what opportunities exist for further tree planting. Mechanisms for **monitoring change in the tree population**, including canopy cover, the structure and composition of the tree stock (species diversity, age and size structure) and regular review of the threats and challenges to the Vale's trees (e.g., pests and disease, climate change, new development) will need to be included for consideration when setting targets. A repeat i-Tree Eco survey in 10 years could be a means of doing so.
- In addition to setting canopy cover targets for different locations, **identifying priorities for tree planting** will help to determine where to focus tree planting efforts (i.e., at the within-town level for urban areas). One such approach could be to undertake a GIS-based assessment of the Vale's towns, which incorporates a multi-criteria decision analysis (MCDA) to highlight potential areas for planting based upon planting priorities which are weighted or ranked.

Planting priorities for example, may include reducing air pollution, improving the quality of existing greenspaces or focussing on areas with higher levels of deprivation. A MCDA approach has been used for an analysis of opportunities for increased ecological connectivity through tree planting in the Vale of Glamorgan's rural areas, which can be found in the document 'Guiding future tree planting in the Vale of Glamorgan'.

- As there is a significant amount of future development in the Vale of Glamorgan, **incorporating canopy cover targets into relevant planning policy and documents** may help to protect existing trees and encourage longevity of newly planted trees in new developments (for example, Wycombe Council). Promoting and instilling the importance of long-term care of trees so that they are retained and able to reach maturity is a key aspect of managing a sustainable tree population. As such, **removing reference to tree planting numbers and focussing instead on tree establishment targets**, is anticipated to yield much better results with regard to long-term tree planting success.
- Whilst tree planting is essential to increase and maintain canopy cover where losses are incurred, **protecting the existing tree resource** is equally important. Regularly reviewing Tree Preservation Orders to ensure all trees worthy of preservation are protected (including administering more TPOs where necessary) and following up on required actions is just one means of helping to protect the Vale's trees. Expanding on current understanding of the tree population through monitoring and surveys, collating data, such as street tree inventories, and utilising resources such as Treezilla (www.trezilla.org) can help to keep track of changes over time and may also help to unpick reasons for trends. Furthermore, **raising public awareness about the value and importance of trees and creating opportunities for community engagement**, will likely lead to greater success with ongoing tree protection and management, and new tree planting.

- Maintaining and growing the sense of place of the Vale's towns and countryside by **ensuring that trees are viewed as an integral component of landscape character** through creating quality greenspaces and implementing considered and distinctive planting schemes. By maintaining and creating characterful and attractive places in which to live and work, there may be positive effects on the local economy, tourism and wellbeing. Incorporating trees into the Local Plan or Neighbourhood Plan may help to reinforce the importance of trees in contributing to local character, and their role in delivering a multitude of benefits to people and the environment.

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Glossary of Terms

Biomass - the amount of living matter in a given habitat, expressed either as the weight of organisms per unit area or as the volume of organisms per unit volume of habitat.

Broadleaf species – for example, alder, ash, beech, birch, cherry, elm, hornbeam, oak, poplar, chestnut and sycamore.

Canopy / **Tree-canopy** - the upper most level of foliage/branches in vegetation/a tree; for example as formed by the crowns of the trees in a forest.

Carbon storage - the amount of carbon bound up in the above-ground and below-ground parts of woody vegetation.

Carbon sequestration - the removal of carbon dioxide from the air by plants through photosynthesis.

Champion trees – individual trees which are exceptional examples of their species because of their enormous size, great age, rarity or historical significance.

Council-owned trees – Trees owned and managed by the Vale of Glamorgan Council.

Crown – the part of a plant that is the totality of the plant's above-ground parts, including stems, leaves, and reproductive structures.

Deposition velocities - dry deposition: the quotient of the flux of a particular species to the surface (in units of concentration per unit area per unit time) and the concentration of the species at a specified reference height, typically 1m.

Diameter at Breast Height (DBH) – the outside bark diameter at breast height. In arboriculture and urban forestry, breast height is defined as 1.5m above the floor, on the uphill side of the tree.

Dieback – where a plant’s stems die, beginning at the tips, for a part of their length. Various causes.

Ecosystem services - benefits people obtain from ecosystems.

Height to crown base - the height on the main stem or trunk of a tree representing the bottom of the live crown, with the bottom of the live crown defined in various ways.

Leaf area index - the ratio of total upper leaf surface of vegetation divided by the surface area of the land on which the vegetation grows.

Meteorological - phenomena of the atmosphere or weather.

Particulate matter - a mixture of solid particles and liquid droplets suspended in the air. These particles originate from a variety of sources, such as power plants, industrial processes and diesel trucks. They are formed in the atmosphere by transformation of gaseous emissions.

Pathogen - any organism or substance, especially a microorganism, capable of causing disease, such as bacteria, viruses, protozoa or fungi.

Phenology - the scientific study of periodic biological phenomena, such as flowering, breeding, and migration, in relation to climatic conditions.

Public trees – Trees found on land-uses which are typically publicly-owned (but not necessarily by the local council) namely parks, cemeteries and transport land-uses.

Re-suspension - the remixing of sediment particles and pollutants back into the air, or into water by wind, currents, organisms, and human activities.

Structural values - value based on the physical resource itself (e.g. the cost of having to replace a tree with a similar tree).

Trans-boundary pollution - air pollution that travels from one jurisdiction to another, often crossing state or international boundaries.

Transpiration - the evaporation of water from aerial parts of plants, especially leaves but also stems, flowers and fruits.

Tree dry-weight – tree material dried to remove all the water.

Volatile organic compounds (VOCs) - one of several organic compounds which are released to the atmosphere by plants or through vaporization of oil products, and which are chemically reactive and are involved in the chemistry of tropospheric ozone production.Appendices

Appendices

Appendix I - Detailed Methodology

i-Tree Eco Models and Field Measurements

i-Tree Eco is designed to use standardised field data from randomly located plots along with local hourly air pollution and meteorological data to quantify:

- Tree resource structure (e.g. species composition, tree health, leaf area).
- Amount of water intercepted by vegetation
- Amount of pollution removed hourly by the urban forest and its associated per cent air quality improvement throughout a year. Pollution removal is calculated for ozone, sulphur dioxide, nitrogen dioxide, carbon monoxide and particulate matter (<2.5 microns; $PM_{2.5}$).
- Total carbon stored and net carbon annually sequestered.
- Replacement cost of the forest, in addition to the value of air pollutant removal, rainfall interception and carbon storage and sequestration.
- Potential impact of possible pests and diseases outbreaks (Nowak et al., 2008)

All field data were collected during the leaf-on season to properly assess tree canopies. Within each plot in urban areas, data collected included land use, ground and tree cover and individual tree attributes, including species, stem diameter, height, crown width, canopy missing and dieback. For rural plots, data collected included land use, tree cover, species, stem diameter and crown dieback.

Table A1. Land use definitions (adapted from the i-Tree Eco v6 manual)

Land-use	Definition
Residential	Freestanding structures serving one to four families each. (Family/person domestic dwelling. Detached, semi-detached houses, bungalows, terraced housing)
Multi-family residential	Structures containing more than four residential units. (Flats, apartment blocks)
Commercial/Industrial	Standard commercial and industrial land uses, including outdoor storage/staging areas, car parks not connected with an institutional or residential use. (Retail, manufacturing, business premises)
Park	Parks, includes unmaintained as well as maintained areas. (Recreational open space, formal and informal)
Cemetery	Includes any area used predominantly for interring and/or cremating, including unmaintained areas within cemetery grounds
Golf Course	Used predominately for golf as a sport
Agriculture	Cropland, pasture, orchards, vineyards, nurseries, farmsteads and related buildings, feed lots, rangeland, woodland. (Plantations that show evidence of management activity for a specific crop or tree production are included)
Vacant	Derelict, brownfield or current development site. (Includes land with no clear intended use. Abandoned buildings and vacant structures should be classified based on their original intended use)
Institutional	Schools, hospitals/medical complexes, colleges, religious buildings, government buildings,
Utility	Power-generating facilities, sewage treatment facilities, covered and uncovered reservoirs, and empty stormwater runoff retention areas, flood control channels, conduits
Water/wetland	Streams, rivers, lakes, and other water bodies (natural or man-made). Small pools and fountains should be classified based on the adjacent land use.
Transportation	Includes limited access roadways and related greenspaces (such as interstate highways with on and off ramps, sometimes fenced); railroad stations, tracks and yards; shipyards; airports. If plot falls on other type of road, classify according to nearest adjacent land use.
Other	Land uses that do not fall into one of the categories listed above. This designation should be used very sparingly as it provides very little useful information for the model.

[NOTE: For mixed-use buildings land use is based on the dominant use, i.e. the use that receives the majority of the foot traffic whether or not it occupies the majority of space.

Calculating the volume of stormwater intercepted by vegetation:

During precipitation events, a portion of the precipitation is intercepted by vegetation (trees and shrubs) while the other portion reaches the ground. The portion of the precipitation that reaches the ground and does not infiltrate into the soil becomes surface runoff. In urban areas, large extents of impervious surfaces can lead to highs amounts of surface runoff and to [localised] flooding during periods of high rainfall.

i-Tree Eco calculates the volume of precipitation intercepted by trees in order to enable valuation based upon, for example, flood alleviation or cost of treating surface water runoff avoided. To calculate the volume of surface runoff avoided calculations consider both precipitation interception by vegetation and runoff from previous and impervious surfaces. This requires field observation data, collected during the field campaign.

To calculate the volume of precipitation intercepted by vegetation an even distribution of rain is assumed within i-Tree Eco. The calculation considers the volume of water intercepted by vegetation, the volume of water dripping from the saturated canopy minus water evaporation from the canopy during the rainfall event, and the volume of water evaporated from the canopy after the rainfall event. This same process is applied to water reaching impervious ground, with saturation of the holding capacity of the ground causing surface runoff. Pervious cover is treated similarly, but with a higher storage capacity over time. The volume of avoided runoff is then summated. Processes such as the effect tree roots have on drainage through soil are not calculated as part of this model. See Hirabayashi (2013) for full methods.

The Standard volumetric rate – Surface water rebated per cubic metre value of £1.7318 set by Welsh Water (2021/22) was used as a representative value of the avoided cost of treating surface water runoff across the whole survey area.

Calculating current carbon storage

Biomass for each tree was calculated using equations from literature and measured tree data. Open-grown, maintained trees tend to have less biomass than predicted by forest-derived biomass equations (Nowak, 1995). To adjust for this difference, biomass results for open-grown urban trees were multiplied by 0.8. No adjustment was made for trees found in natural stand conditions. Tree dry-weight biomass was converted to stored carbon by multiplying by 0.5.

To estimate the gross amount of carbon sequestered annually, average diameter growth from the appropriate genera and diameter class and tree condition was added to the existing tree diameter (year *x*) to estimate tree diameter and carbon storage in year *x+1*.

Calculating air pollution removal

Estimates are derived from calculated hourly tree-canopy resistances for ozone and sulphur and nitrogen dioxides based on a hybrid of big-leaf and multi-layer canopy deposition models (Baldocchi, 1988; Baldocchi et al., 1987). As the removal of carbon monoxide and particulate matter by vegetation is not directly related to transpiration, removal rates (deposition velocities) for these pollutants were based on average measured values from the literature (Bidwell & Fraser, 1972; Lovett, 1994) that were adjusted depending on leaf phenology and leaf area. Particulate removal incorporated a 50% re-suspension rate of particles (Zinke, 1967).

Replacement costs

These are based on valuation procedures of the US CTLA approach (CTLA, 1992), which uses tree species, diameter, condition and location information. In this case, values are calculated using standard i-Tree inputs such as per cent canopy missing.

This dieback does not include normal, natural branch dieback, i.e., self-pruning due to crown competition or shading in the lower portion of the crown. However,

branch dieback on side(s) and top of crown area due to shading from a building or another tree would be included.

US Externality and UK Social Damage Costs

The i-Tree Eco model provides figures using US externality and abatement costs. These figures reflect the cost of what it would take a technology (or machine) to carry out the same function that the trees are performing, such as removing air pollution or sequestering carbon.

Official pollution values for the UK, however, are based upon three different appraisal methods, including the impact pathways approach (IPA), damage costs and activity costs. The damage costs approach was used for this project, the impact values for which are derived from the IPA, which is a more detailed approach to air quality appraisal. Values were taken from Defra (2021). There are three levels of 'sensitivity' applied to the air pollution damage cost approach: 'High', 'Central' and 'Low'. This report uses the 'Central' scenario based on 2020 prices.

CAVAT Analysis

An amended version of the CAVAT "quick" method was chosen to assess the trees in this study. To reach a CAVAT valuation the following was obtained:

- the current unit value factor rating
- DBH
- the Community Tree Index rating (CTI), reflecting local population density
- an assessment of accessibility
- an assessment of overall functionality, (that is the health and completeness of the crown of the tree)
- an assessment of safe life expectancy (SLE).

The unit value factor, which was also used in CTLA analysis, is the cost of replacing trees, presented in £/cm^2 of trunk diameter. The unit value factor used was £16.25/cm^2

The CTI rating was constant across the Vale of Glamorgan at 100%. In actuality therefore, the survey concentrated on accessibility, functionality, appropriateness and SLE.

Accessibility was generally judged to be 100% for trees in parks, street trees and trees in other open areas. It was generally reduced to 80% for trees on institutional land, 40-60% on vacant plots, and 40% for trees in residential areas and on agricultural land.

Because CAVAT is a method for trained, professional arboriculturalists the functionality aspect was calculated directly from the amount of canopy missing, recorded in the field. For highway trees, local factors and choices could not be taken into account, nor could the particular nature of the local street tree make-up. However, the reality that street trees often have to be managed for safety and are frequently crown lifted or reduced (to a greater or lesser extent) and that they will have lost limbs through wind damage was acknowledged. Thus, as highway trees would not be as healthy as their more open-grown counterparts so tend to have a reduced functionality, their functionality factor was reduced to 50%. This is on the conservative side of the likely range.

For trees found in open spaces, trees were divided into those with 100% exposure to light and those that did not. On the basis that trees in open spaces are less intensively managed, an 80% functionality factor was applied to all individual open grown trees. For trees without 100% exposure to light the following factor was applied: 60% to those growing in small groups and 40% to those growing in large groups. This was assumed more realistic, rather than applying a blanket value to all non-highway trees, regardless of their situation to light and/or other trees.

SLE assessment was intended to be as realistic as possible and was based on existing circumstances. For full details of the method refer to www.ltoa.org.uk/resources/cavat.

Appendix II – Species List

The following list is of all species recorded during the study, and their associated population estimates for urban or rural areas.

Species	Strata	Number of trees recorded	Proportion of strata population (%)
apple spp (*Malus*)	Urban	1	0.34
Australian fan palm (*Livistona australis*)	Urban	1	0.34
Austrian pine (*Pinus nigra*)	Urban	2	0.68
Babylon weeping willow (*Salix babylonica*)	Urban	1	0.34
Bay laurel (*Laurus nobilis*)	Urban	3	1.02
birch spp (*Betula*)	Urban	2	0.68
Black poplar (*Populus nigra*)	Urban	2	0.68
Blackthorn (*Prunus spinosa*)	Urban	3	1.02
Cherry plum (*Prunus cerasifera*)	Urban	1	0.34
Chinese lilac (*Syringa x chinensis*)	Urban	1	0.34
Cider gum eucalyptus (*Eucalyptus gunnii*)	Urban	1	0.34
Common apple (*Malus domestica*)	Urban	9	3.05
Common lime (*Tilia x europaea*)	Urban	2	0.68
Common plum (*Prunus domestica*)	Urban	2	0.68
Copper beech (*Fagus sylvatica* 'Purpurea')	Urban	5	1.69
Cupressus x leylandii (*Cupressus x leylandii*)	Urban	23	7.80
Deodar cedar (*Cedrus deodara*)	Urban	1	0.34
Durmast oak (*Quercus petraea*)	Urban	1	0.34
English holly (*Ilex aquifolium*)	Urban	5	1.69
English oak (*Quercus robur*)	Urban	20	6.78
English yew (*Taxus baccata*)	Urban	2	0.68
European alder (*Alnus glutinosa*)	Urban	1	0.34
European ash (*Fraxinus excelsior*)	Urban	32	10.85

European beech (*Fagus sylvatica*)	Urban	4	1.36
European bird cherry (*Prunus padus*)	Urban	4	1.36
European black elderberry (*Sambucus nigra*)	Urban	1	0.34
European filbert (*Corylus avellana*)	Urban	9	3.05
European hornbeam (*Carpinus betulus*)	Urban	2	0.68
European mountain ash (*Sorbus aucuparia*)	Urban	4	1.36
European white birch (*Betula pendula*)	Urban	16	5.42
Giant dracaena (*Cordyline australis*)	Urban	6	2.03
Golden-chain tree (*Laburnum anagyroides*)	Urban	1	0.34
Grey alder (*Alnus incana*)	Urban	1	0.34
hawthorn spp (*Crataegus*)	Urban	1	0.34
Hedge maple (*Acer campestre*)	Urban	5	1.69
Horse chestnut (*Aesculus hippocastanum*)	Urban	7	2.37
Indian paper birch (*Betula utilis*)	Urban	2	0.68
Japanese flower crabapple (*Malus floribunda*)	Urban	1	0.34
Japanese flowering cherry (*Prunus serrulata*)	Urban	5	1.69
Japanese maple (*Acer palmatum*)	Urban	2	0.68
Juneberry (*Amelanchier x lamarckii*)	Urban	1	0.34
juniper spp (*Juniperus*)	Urban	1	0.34
Kanzan cherry (*Prunus Kanzan*)	Urban	1	0.34
Kapuka (*Griselinia littoralis*)	Urban	1	0.34
Large gray willow (*Salix cinerea*)	Urban	1	0.34
lilac spp (*Syringa*)	Urban	1	0.34
Littleleaf linden (*Tilia cordata*)	Urban	4	1.36
Lombardy poplar (*Populus nigra* v. italica)	Urban	3	1.02

magnolia spp (*Magnolia*)	Urban	1	0.34
maple spp (*Acer*)	Urban	1	0.34
Monterey cypress (*Cupressus macrocarpa*)	Urban	2	0.68
Oneseed hawthorn (*Crataegus monogyna*)	Urban	24	8.14
Orange cotoneaster (*Cotoneaster franchetii*)	Urban	2	0.68
Orange eye butterflybush (*Buddleja davidii*)	Urban	2	0.68
plum spp (*Prunus*)	Urban	1	0.34
Port orford cedar (*Chamaecyparis lawsoniana*)	Urban	4	1.36
Purpleleaf plum (*Prunus pissardii*)	Urban	1	0.34
Scots pine (*Pinus sylvestris*)	Urban	1	0.34
Southern catalpa (*Catalpa bignonioides*)	Urban	1	0.34
Southern magnolia (*Magnolia grandiflora*)	Urban	3	1.02
Swedish Whitebeam (*Sorbus intermedia*)	Urban	1	0.34
Sweet cherry (*Prunus avium*)	Urban	9	3.05
Sweet chestnut (*Castanea sativa*)	Urban	1	0.34
Sycamore maple (*Acer pseudoplatanus*)	Urban	28	9.49
Tree of heaven (*Ailanthus altissima*)	Urban	1	0.34
Turkish hazelnut (*Corylus colurna*)	Urban	1	0.34
Whitebeam (*Sorbus aria*)	Urban	2	0.68
willow spp (*Salix*)	Urban	4	1.36
Nordmann fir (*Abies nordmanniana*)	Rural	5	0.5
Hedge maple (*Acer campestre*)	Rural	19	1.9
Norway maple (*Acer platanoides*)	Rural	3	0.3
Sycamore maple (*Acer pseudoplatanus*)	Rural	76	7.7

Horse chestnut (*Aesculus hippocastanum*)	Rural	2	0.2
European alder (*Alnus glutinosa*)	Rural	29	2.9
European white birch (*Betula pendula*)	Rural	26	2.6
birch spp (*Betula*)	Rural	1	0.1
butterflybush spp (*Buddleja*)	Rural	1	0.1
Bloodtwig dogwood (*Cornus sanguinea*)	Rural	2	0.2
European filbert (*Corylus avellana*)	Rural	75	7.6
Oneseed hawthorn (*Crataegus monogyna*)	Rural	136	13.8
hawthorn spp (*Crataegus*)	Rural	1	0.1
Leyland cypress (x *Cuprocyapris leylandii*)	Rural	2	0.2
Blue gum eucalyptus (*Eucalyptus globulus*)	Rural	1	0.1
European beech (*Fagus sylvatica*)	Rural	39	3.9
European ash (*Fraxinus excelsior*)	Rural	216	21.8
English holly (*Ilex aquifolium*)	Rural	9	0.9
European larch (*Larix decidua*)		13	1.3
Japanese larch (*Larix kaempferi*)	Rural	39	3.9
magnolia spp (*Magnolia*)	Rural	2	0.2
European crabapple (*Malus sylvestris*)	Rural	1	0.1
apple spp (*Malus*)	Rural	3	0.3
Sitka spruce (*Picea sitchensis*)	Rural	46	4.7
spruce spp (*Picea*)	Rural	8	0.8
Scots pine (*Pinus sylvestris*)	Rural	8	0.8
White poplar (*Populus alba*)	Rural	4	0.4
Sweet cherry (*Prunus avium*)	Rural	21	2.1
Cherry laurel (*Prunus laurocerasus*)	Rural	4	0.4
European bird cherry (*Prunus padus*)	Rural	1	0.1

Blackthorn (*Prunus spinosa*)	Rural	17	1.7
plum spp (*Prunus*)	Rural	1	0.1
European turkey oak (*Quercus cerris*)	Rural	2	0.2
Durmast oak (*Quercus petraea*)	Rural	1	0.1
English oak (*Quercus robur*)	Rural	40	4
oak spp (*Quercus*)	Rural	20	2
Black locust (*Robinia pseudoacacia*)	Rural	2	0.2
Goat willow (*Salix caprea*)	Rural	24	2.4
Large gray willow (*Salix cinerea*)	Rural	2	0.2
Basket willow (*Salix viminalis*)	Rural	15	1.5
willow spp (*Salix*)	Rural	15	1.5
European black elderberry (*Sambucus nigra*)	Rural	11	1.1
European mountain ash (*Sorbus aucuparia*)	Rural	4	0.4
English yew (*Taxus baccata*)	Rural	1	0.1
Bigleaf linden (*Tilia platyphyllos)*	Rural	2	0.2
Western hemlock (*Tsuga heterophylla*)	Rural	3	0.3
elm spp (*Ulmus*)	Rural	2	0.2
Wych elm (*Ulmus glabra*)	Rural	23	2.3
Dutch elm (*Ulmus x hollandica*)	Rural	9	0.9
Field elm (*Ulmus minor*)	Rural	1	0.1
English elm (*Ulmus procera*)	Rural	1	0.1

Appendix III. Pests and Diseases

Acute Oak Decline

Acute oak decline (AOD) mainly affects mature trees (>50 years) of both native oak species (Quercus robur and Q. petraea) and a variety of other oak species including:

- *Q. ilex*
- *Q. aliena var. accuserrata*
- *Q. palustris*
- *Q. pyrenaica*
- *Q. rubra*
- *Q. coccinea*
- *Q. cerris*
- *Q. nigra*
- *Q. fabri*

Some affected trees can die in as little as 4-6 years after symptoms have developed. Over the past few years, the reported incidents of stem bleeding and exit holes of the associated beetle *Agrilus bigatatus*, indicating potential AOD infection, have been increasing. The latest distribution map (Figure A1) shows a spread in cases westward and to the midlands. Figure A2 shows a medium to low probability that the Vale of Glamorgan's oak trees would be affected by AOD (based on modelling of predisposition factors including temperature, rainfall, and levels of atmospheric nitrogen pollution).

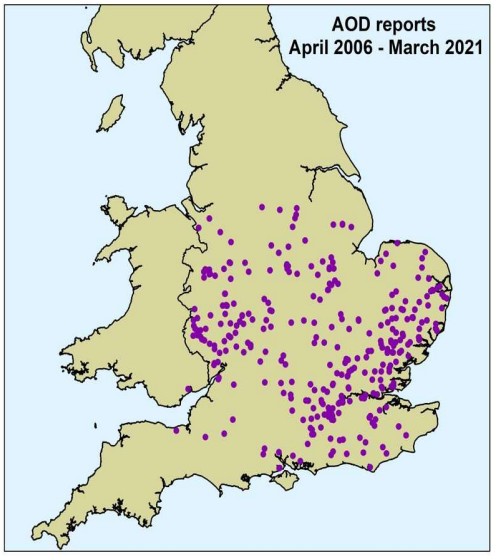

Figure A1. Locations where AOD has occurred between 2006-March 2021 (Forest Research, 2021)

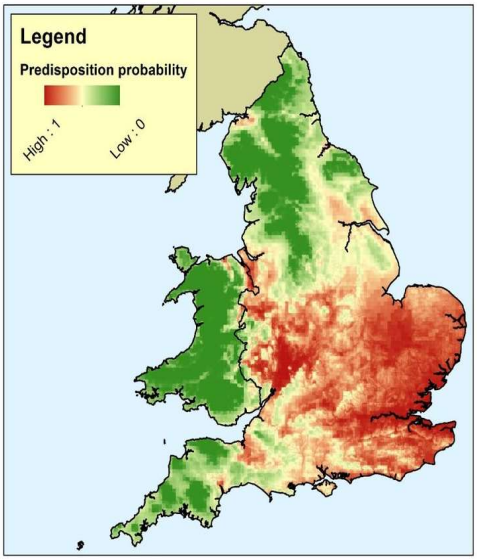

Figure A2. Probability of where AOD might occur based on modelling of predisposition factors (Forest Research, 2022)

Asian Longhorn Beetle

The Asian longhorn beetle (*Anoplophlora glabripennis*) is a major pest in China, Japan and Korea, where it kills many broadleaved species. There are established populations of Asian longhorn beetle (ALB) in parts of North America and have been outbreaks in Europe too. Where the damage to street trees is high, felling, sanitation and quarantine are the only viable management options. In March 2012 an ALB outbreak was found in Maidstone, Kent. The Forestry Commission and Fera removed more than 2,000 trees from the area to contain the outbreak. No further outbreaks have been reported in the UK.

The known host tree and shrub species include:

- *Acer spp.* (maples and sycamores)
- *Aesculus spp.* (horse chestnut)
- *Albizia julibrissin* (Mimosa silk tree)

- *Alnus spp.* (alder)
- *Betula spp.* (birch)
- *Carpinus spp.* (hornbeam)
- *Cercidiphyllum japonicum* (Katsura tree)
- *Corylus spp.* (hazel)
- *Fagus spp.* (beech)
- *Fraxinus spp.* (ash)
- *Koelreuteria paniculata* (Golden rain tree)
- *Malus spp.* (apple)
- *Platanus spp.* (plane)
- *Populus spp.* (poplar)
- *Prunus spp.* (cherry, plum)
- *Pyrus spp.* (pear)
- *Robinia pseudoacacia* (false acacia/black locust)
- *Salix spp.* (willow, sallow)
- *Sorbus spp.* (rowan, whitebeam etc)
- *Styphnolobium japonicum* (Japanese pagoda tree)
- *Quercus palustris* (American pin oak)
- *Quercus rubra* (North American red oak)
- *Ulmus spp.* (elm)

Bronze Birch Borer

The Bronze birch borer (*Agrilus anxius*) is a wood-boring beetle that feeds on the inner bark and cambium of birch trees. The disruption to water and nutrient flow that occurs as a result means that trees can die within a few years after symptoms appear. At current, the Bronze birch borer is present across North America, including the United States, where it is native, and Canada. Here, the borer has caused extensive mortality of *Betula* spp. planted as street and

ornamental trees in towns and cities, due to its ability to colonize most birch species and cultivars.

Chalara Dieback of Ash

Ash dieback, caused by the fungus *Hymenoscyphus fraxineus*, is a highly destructive disease of ash trees, including *Fraxinus excelsior, F. excelsior* 'Pendula' and *F. angustifolia*. Young trees are particularly susceptible and can be killed within one growing season of symptoms becoming visible. Older trees can take longer to succumb, but can die from the infection or secondary pathogens (e.g. Armillaria) after several seasons. *H. fraxineus* was first recorded in the UK in 2012 in Buckinghamshire and is now widespread across the UK, including in urban areas. It is in these urban areas, along transport routes and rights of way/footpaths, that the dieback of the tree's woody components as a result of infection presents a significant health and safety risk.

Emerald Ash Borer

Emerald ash borer (EAB) is likely to have a major impact on our already vulnerable ash population in the UK if established. There is no evidence to date that EAB is present in the UK, but the increase in global movement of imported wood and wood packaging heightens the risk of its accidental introduction. EAB is present in Russia and Ukraine and is moving West and South at a rate of 30-40 km per year, perhaps aided by vehicles (Straw et al., 2013). EAB has had a devastating effect in the USA due to its accidental introduction and could add to pressures already imposed on ash trees from diseases such as Chalara dieback of ash.

Larger eight-toothed spruce bark beetle

The larger eight-toothed spruce bark beetle (*Ips typographus*) is a pest of conifers, including those of the spruce genus (*Picea* spp.), fir trees (*Abies* spp.), pines (*Pinus* spp.) and larch trees (*Larix* spp.). The beetles tend to favour

stressed trees, such as those that have been windblown or recently felled. However, they can also move to nearby live trees and cause significant damage by carving out galleries so that they can lay their eggs. *Ips typographus* can also spread pathogenic fungi between trees, such as the blue-stain fungus (*Endoconidiophora polonica*), which can weaken trees further.

Neonectria neomacrospora

A fungus that causes severe cankers of fir trees (*Abies* spp.) and can result in lesions, crown dieback and eventually even tree death. It has been reported on a variety of fir species in Europe and the UK including:

- *Abies alba*
- *A. amabilis*
- *A. balasmea*
- *A. cephalonica*
- *A. concolor*
- *A. durangensis*
- *A. fargesii*
- *A. fraseri*
- *A. grandis*
- *A. kawakamii*
- *A. koreana*
- *A. lasiocarpa*
- *A. magnifica*
- *A. nebrodensis*
- *A. procera*
- *A. nordmanniana*
- *A. pinsapo*
- *A. sibirica*
- *A. vejarii*

N. neomacrospora has been found in England and Wales and is of particular significance to Christmas tree plantations and forestry plantations, where large numbers of dead firs could present a heightened fire risk during periods of hot, dry weather.

Oak Processionary Moth

Oak processionary moth (OPM) was first accidentally introduced to Britain in 2005 and now there are established OPM populations in most of Greater London and in some surrounding counties. It is thought that OPM has been spread through imported nursery trees and it has been estimated that OPM could survive and breed in much of England and Wales. The caterpillars cause serious defoliation of oak trees, their principal host, which can leave them more vulnerable to other stresses. The caterpillars have urticating (irritating) hairs that can cause serious irritation to the skin, eyes and bronchial tubes of humans and animals. They are considered a significant human health problem when populations reach outbreak proportions, such as those in the Netherlands and Belgium in recent years. Whilst the outbreak in London is beyond eradicating, the rest of the UK maintains its European Union Protected Zone status (PZ) and restrictions on moving oak trees are in place to minimise the risk of further spread.

Phytophthora pluvialis

A water mould (fungus-like pathogen) that was first discovered in the UK in a Cornish woodland in 2021. Since then, it has also been identified in multiple sites in England, Scotland and Wales. Affected sites have been given Demarcated Area Notices which means that there are movement restrictions on materials that could spread the disease further. It has been found affecting Western hemlock (*Tsuga heterophylla*), Douglas fir (*Pseudotsuga menziesii*), Tanoak (*Notholithocarpus densiflorus*) and some pines (*Pinus radiata, Pinus patula* and *Pinus strobus*).

Phytophthora ramorum

A water mould that has caused dieback of a significant scale (mainly of the UK's larch trees) since it was first reported in the UK in 2002. *P. ramorum* affects a wide range of plant species but has especially severely affected larch (*Larix*

spp.), resulting in large losses of the species either through succumbing to the pathogen or through removing and killing affected trees as required. It has also been found on Sweet chestnut (*Castanea sativa*) on a few sites in the South of England. *P. ramorum* has been reported throughout most of the UK, but its distribution is generally more concentrated to the west of the UK, where conditions are wetter.

Xylella fastidiosa

Xylella fastidiosa is a bacterium that has the potential to cause significant damage to a range of broadleaf trees and commercially grown plants. The bacterium has been found in Italy, France, Spain, the Americas and Taiwan, and can be spread through the movement of infected plant material and through insects from the Cicadellidae and Ceropidae families. There are four known sub-species: *Xylella fastidiosa* subsp. *multiplex, Xylella fastidiosa* subsp. *fastidiosa*, *Xylella fastidiosa* subsp. *pauca* and *Xylella fastidiosa* subsp. *Sandyi.* The subspecies *multiplex* is thought to be able to infect the widest variety of trees and plants, including *Quercus robur* and *Platanus occidentalis*.

For further information on the pests and diseases listed above, as well as other pathogens that pose a threat to the UK's trees, please visit https://www.forestresearch.gov.uk/tools-and-resources/pest-and-disease-resources.

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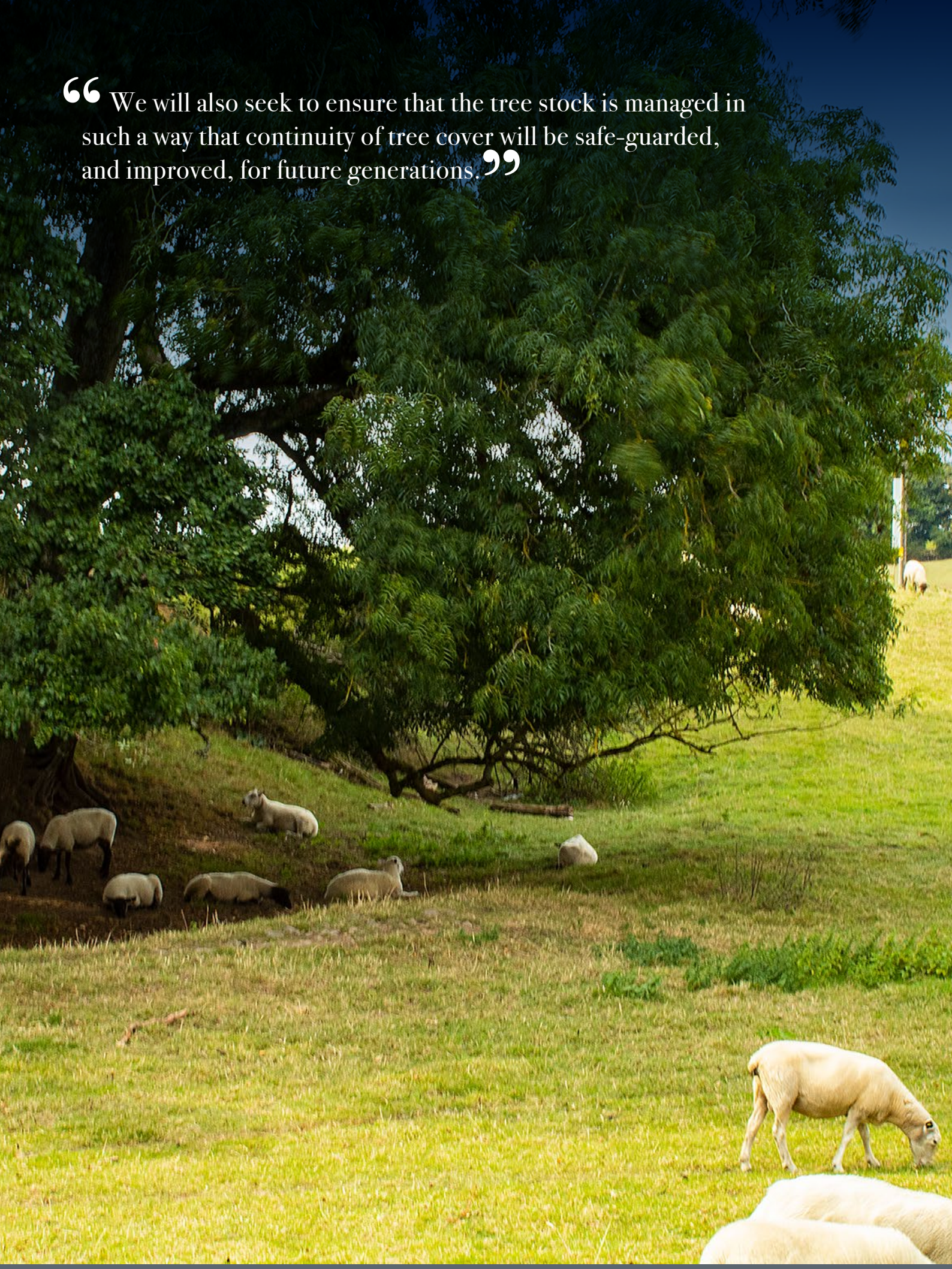
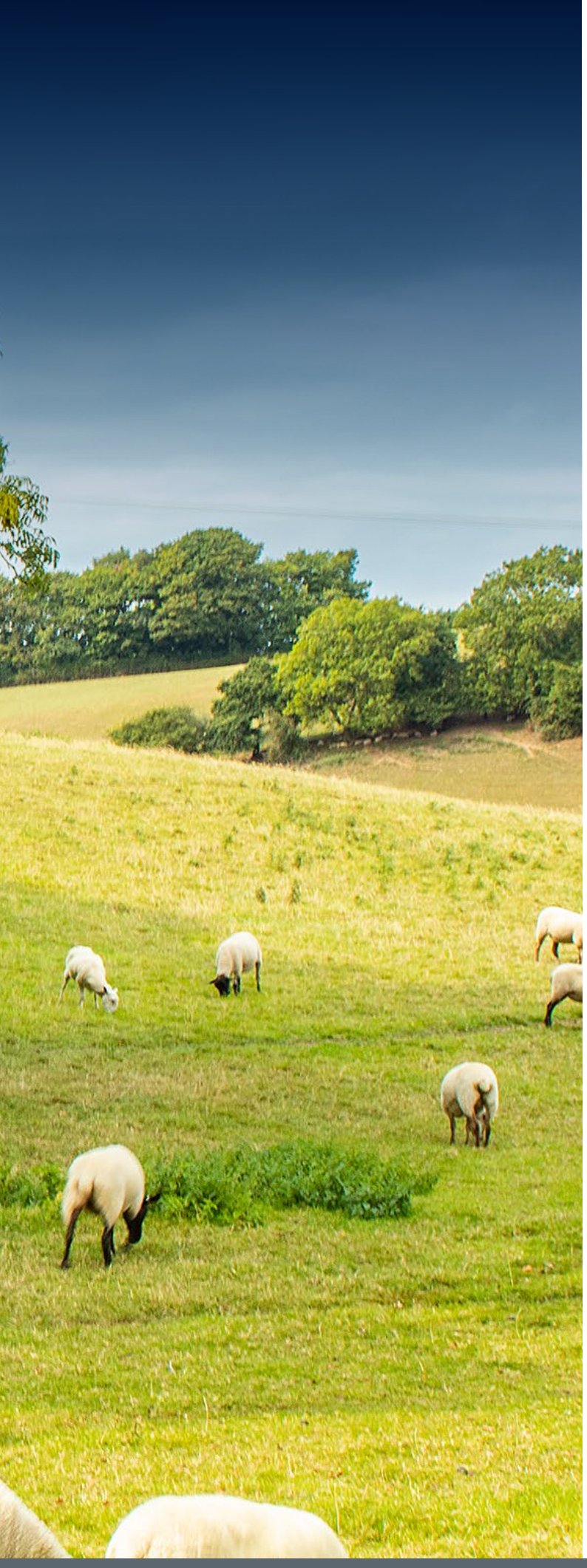
THE VALE OF GLAMORGAN COUNCIL

WORKING TOGETHER
FOR A BRIGHTER FUTURE

TREE STRATEGY
2024-2039



“We will also seek to ensure that the tree stock is managed in such a way that continuity of tree cover will be safe-guarded, and improved, for future generations.”



We are delighted to introduce a Tree Strategy for the Vale of Glamorgan which provides a framework for the sustainable management of the trees up to 2039 (15 years).

Trees and woodlands are an essential part of the Vale's Green Infrastructure and help identity and define the character of communities and areas where we live, work and play.

Like all local authorities, we have a duty to protect our natural heritage and recognise our trees as a valuable asset. It is widely accepted that trees and woodlands, particularly those around our towns have a vital role to play in promoting healthy communities. We manage large numbers of trees both directly and indirectly, ensuring their protection and enhancement to offer the many benefits they provide both individuals and our communities now and for future generations to come.

In addition, responding to the Climate emergency is a key priority for the Council and we have sought to build on a firm foundation of work that has been undertaken over a number of years to address the challenge of climate change in the Vale of Glamorgan.

This commitment is reflected in our Corporate Plan, covering 2020-2025, which includes a Wellbeing Objective focused specifically on the environment. Detail on how we will take forward specific work to address climate change is also set out in our Annual Delivery Plan.

Therefore, a great deal of activity has taken place, or is planned, to tackle climate change in our area, this Tree Strategy will help inform and develop future opportunities to prevent tree loss across the Vale and the Council achieve its objectives.

This Strategy has been subject to consultation and the Council has listened to the views expressed. As a result, several changes have been made to the Plan throughout the consultation process. As Cabinet Member for Neighbourhood and Building Services, and Cabinet Member for Sustainable Places we would like to thank all of those who have contributed to the development of this important document.

Cllr. Mark Wilson
Cabinet Member for Neighbourhood and Building Services

Cllr Bronwen Brooks
Deputy Leader and Cabinet Member for Sustainable Places

EXECUTIVE SUMMARY

In July 2019, the Vale of Glamorgan Council joined the Welsh Government and other Local Authorities across the UK in declaring a Climate Emergency in response to the United Nations Intergovernmental Panel on Climate Change Report into the impact of global warming.

In addition to this in July 2021, the Council declared a Nature Emergency following the `State of Nature 2019` National Biodiversity Network (NBN) report that found that 8% of tree species found in Wales (523) are threatened with extinction from Britain, 17% (666) are threatened with extinction from Wales and 73 have already become extinct.

The Council have delivered this Tree Strategy as trees, woodlands and hedgerows have a vital role in addressing climate extremes and the loss of biodiversity. This strategy will look at how we protect, manage and increase our tree canopy cover to build resilience, address climate change and biodiversity loss as trees are integral to our environment and have a key role in tracking climate change.

Trees are a cost-effective way to improve the environmental quality within our towns and villages, delivering physical, social wellbeing and economic benefits, as well as mitigating biodiversity loss, climate change, carbon storage, air quality, storm water management and improving amenity value.

The annual benefit of the eco-system service provision of our current urban tree stock has been estimated at £2.05m, with a replacement structural value of a £126m.

In considering trees and planning for the future, we will need to ensure that trees are recognised as public assets, rather than liabilities. The Council will focus its efforts on actively protecting and increasing tree cover on its land, with a commitment to increase canopy cover by 5% over the next 15 years, ensuring that the right tree is planted in the right place.

> “The Council’s commitment to both the Climate Emergency and the Nature Emergency will mean that all actions and polices of the Council will need to take into consideration the impact on both the climate and biodiversity within the Vale of Glamorgan.”

WHY DO WE NEED A TREE STRATEGY?

Trees and Woodlands form an important part of both the urban and rural landscapes of the Vale of Glamorgan. The Council takes pride that it has responsibility for an area with many landscapes where trees are an important part of the environment.

> “Over recent years research has shown the many benefits trees bring to social, economic, cultural and environmental well-being, with improvements to local air quality, reduced summer temperatures, increasing water retention and thus reducing localised flooding caused by ‘run off’ and improving mental health and well-being.”

With climatic conditions clearly changing and more frequent extreme weather events predicted, protecting, managing and enhancing our existing tree asset and setting targets to increase the tree canopy cover, is essential.

The Council is responsible for many thousands of trees. However, town tree canopy cover for the Vale of Glamorgan as a whole is 13% compared with the Welsh average 16.3% with a varied picture of canopy cover and tree management practices in different areas of the Vale. Tree cover has continued to decline and there is a disparity between areas, particularly within deprived areas, as highlighted in the Natural Resources Wales Report *`Town Tree Cover in the Vale of Glamorgan`*.[1]

There are challenges in retaining current urban tree canopy cover or increasing this cover generally. This is due to footway damage that has been caused by existing trees and constraints on space available, including underground utility apparatus in urban environments, restricting opportunities to plant new trees and making it expensive. Many of the urban trees have suffered from reduced levels of maintenance, leading to structural weaknesses and tree health issues.

Trees add to the landscapes of our towns, villages and countryside creating visual interest through their shape, bark, leaf colours, flowers, fruit and seeds. They mark the passing of the seasons and are bastions of history, reflecting civic pride and the

culture of the past. The ancient churchyard Yew, the parkland Horse Chestnuts and the Victorian planted avenues of Plane and Lime and hedgerows planted with a variety of native tree and shrub species were all planted or allowed to grow on by our ancestors.

When added together with our local green spaces, river corridors, road verges, railway lines, allotments and gardens there is a significant green network within our towns and villages that has the potential to be good for both people and wildlife. Ensuring that our green networks are protected and managed with increased tree cover where appropriate is essential for future generations.

In looking forward the Council and other organisations, communities, businesses and individuals need to plan for the future so that we can have a more significant, varied and better managed treescape in the Vale of Glamorgan.

This Strategy, which is supported by an action plan, sets out the strategic framework for the management of trees across the Vale of Glamorgan for the next 15 years to 2039. It has been prepared with reference to local, regional and national policies and guidance and will complement the emerging Green Infrastructure Strategy being developed for the Vale of Glamorgan.

13%

Town tree canopy cover for the Vale of Glamorgan

The Green Infrastructure policy will inform where maximum gains can be developed, enabling the Council to achieve its future aims and objectives.

Through appropriate management of existing trees and targeted tree planting programmes, the Council will seek to reverse the trend of the continuing loss of tree canopy cover.

The Council will protect and enhance the tree stock while remaining sympathetic to the interests of residents. We will also seek to ensure that the tree stock is managed in such a way that continuity of tree cover will be safe-guarded, and improved, for future generations.

The tree lined streets and parks are an attractive feature of the Vale of Glamorgan and have helped enhance the quality of life for generations. The continued maintenance and enhancement of trees is a key priority to ensure that the area remains an attractive and pleasant place for the future.

The Tree Strategy will develop and evolve as and when new data and information is obtained and as such the Strategy will develop further when the Council has developed a Green Infrastructure Strategy *(approx. 2025)*.

16.3%

Welsh average of tree canopy cover in towns

THE VALE OF GLAMORGAN
TREE STRATEGY AIMS AND OBJECTIVES

The Tree Strategy covers trees growing on public land and adopted highway managed by the Vale of Glamorgan Council, as well as trees on private land where they are affected by national and local policies such as Tree Preservation Orders.

The Strategy's guiding PRINCIPLES are to:

- Commit to protect and care for our tree stock.
- Commit to work to retain existing mature tree stock, wherever possible in both public and private settings.
- Commit to identify suitable locations across the Council's land holding where additional tree planting can be accommodated, without detriment to the existing habitats.
- Commit to ensure that trees that are lost are replaced in greater numbers by planting a minimum of 2 trees for every one removed within the urban environment and develop a sliding scale of mitigation based on the extent of tree loss.
- Commit to plant a minimum of 1500 trees annually, which will include a minimum of 500 standards *(2m tall trees)*, in predetermined targeted areas (right tree, right place), across the Council estate.
- Commit to develop tree planting schemes/natural regeneration.
- Commit to ensure that the right tree is planted in the right place.
- Commit to increase urban street canopy cover within the built adopted Highway year on year.
- Commit to a net increase in canopy cover in urban areas on Council owned land by **5%** by 2039.

All the above would have to be quantifiable and measurable to evidence targets were being met and this would need financial provisions.

Objectives:

- Protect and enhance the current tree stock.
- Ensure that the Council has an accurate database of its tree stock.
- Raise awareness of the Council's tree stock and the environmental and social benefits it provides.

> "We will protect, maintain and enhance our tree population for the multiple benefits to the environment and the people living, working and visiting the Vale - now & for future generations to come."
>
> *Mission Statement*

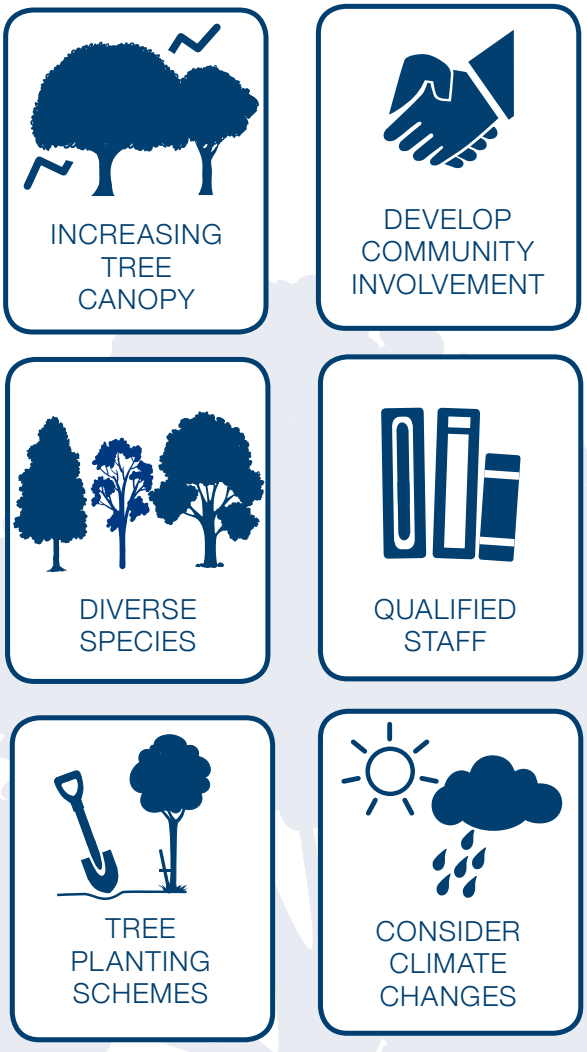
- Ensure that all tree related decisions and activities are made in a consistent and structured way across all Council departments.
- Develop community involvement in tree related issues, including opportunities for grant aided funding.
- Increase tree planting and natural regeneration on Local Authority land and influence tree planting on new developments and private land through the planning system and the provision of grants.
- Prioritise increasing canopy cover in areas identified in the i.Tree survey with less than 10% cover.
- Prioritise tree planting in urban areas with the highest levels of deprivation.
- Establish a healthy and diverse tree population maintaining tree numbers and canopy cover wherever possible.
- Take into account the current and future changes in climate and manage the tree stock accordingly.
- Ensure that there is diverse species coverage to increase resilience and mitigate against future tree disease.
- Ensure that the right tree is planted in the right place.
- Deal with queries relating to trees from stakeholders in a consistent and effective manner.
- Protect the Council from any third-party risks associated with trees.
- Ensure all operational staff have received Quantified Tree Risk Assessment (QTRA) training. (https://www.qtra.co.uk/)

The Strategy is intended to be a live document, with measurable aims and objectives. It is a statement of the Council's policies and procedures in relation to trees and their management.

This Strategy will be subject to a bi-annual review, particularly in the event of changes in environmental, cultural or social needs. The future Green Infrastructure Strategy will inform where maximum gains can be developed, enabling the Council to achieve its future aims and objectives.

The Strategy will also look at how we as a Council can influence and encourage developers to safeguard and retain existing trees and to plant trees as a matter of priority, particularly in new housing developments or major infrastructure projects.

Objectives:



POLICY CONTEXT

The Well-being of Future Generations (Wales) Act 2015 contains well-being goals that public bodies, including local authorities, must work to achieve. One of the seven well-being goals is to maintain and enhance biodiversity and ecological resilience.

More recently, the **Environment (Wales) Act 2016** has put in place the legislation needed to plan and manage Wales's natural resources in a more proactive, sustainable and joined-up manner.

The planting and sustainable management of urban trees clearly meets with these Acts and the Welsh Government's overarching goal of taking care of the environment.

The Council has a statutory duty of care under the Health and Safety at Work Act 1974 and the occupiers Liability Act 1957 and 1984 to ensure that members of the public and employees are not put at risk because of any failure by the Council to take all reasonable precautions to ensure their safety. A Risk Assessment is required under the Management of Health and Safety Regulations 1999. There is a need to inspect trees in or near public places, or adjacent to buildings or working areas to assess whether they represent a risk to life or property, and to take remedial action as appropriate.

The Welsh Government published **Woodlands for Wales** in 2018, updating an earlier version from 2001. The Strategy sets out an ambition of increasing woodland cover by 2,000 ha per annum and for tree cover to increase elsewhere as well as the following aims:

- Woodlands and trees are used more creatively in the green infrastructure in and around urban areas to provide people with better quality, easily accessible green space.
- Local authorities and others further develop their programmes of urban tree planting and woodland management and use the i-Tree Eco or similar tools to quantify the structure and environmental effects of urban trees and calculate their value to society.
- Communities are more involved in the decision making and management of woodlands and trees so that they deliver well-being benefits to more people.
- More people of all ages and backgrounds benefit from accessible woodland and trees as settings for education, learning and play, leading to an improved understanding of woodlands and trees and the wider benefits they provide in terms of our environmental, economic, social and cultural well-being, and more sustainable.

In March 2020, the First Minister for Wales announced the **National Forest for Wales** which would be a connected ecological network running throughout Wales and will play an important role in protecting nature and addressing biodiversity loss. The ambition is to create new woodlands and to maintain and restore ancient woodlands.

In November 2020, 14 sites were identified across Wales as the start of the National Forest. Grant aid was provided in 2021 to stimulate new woodland planting, due to the success of the pilot scheme Welsh Government opened a new round of funding in June 2022, under The Woodland Investment Scheme (TWIG), it is anticipated that will continue in future years.

I-Tree Eco – 2021

The Natural Resources Wales **'Tree Cover in Wales' Towns and Cities'** was set up to provide baseline information for every local authority and suggest ways forward that would help increase the tree cover. The Report for the Vale of Glamorgan was published in 2017. The Report shows a decline in both tree cover and the number of mature trees in the Vale in the period 2009 – 2013. Clearly setting goals for increasing tree cover and identifying opportunities on both public and private land are recommended as ways of responding to the loss and the need to redress it.

The Council has since commissioned an i.Tree survey of the Vale *(see Appendix 1)* to provide an update picture of canopy cover in 2021/22. The Survey shows that the Vale's current urban canopy cover is 13%, a slight increase on the previous report carried out and the rural areas having 14% canopy cover. This Survey provides vital background evidence for this Strategy.

The Council has devised this Strategy so that it focuses on local needs and demand but which also helps deliver the wider aims at a regional and national levels in relation to trees, nature and climate.

The national, regional and local policy documents that have assisted in the development of this Strategy are at Appendix 1.

THE VALUE OF TREES

Trees provide a range of benefits that can be both direct and indirect. These benefits can be broken down into environmental, cultural, social, economic and health and wellbeing.

Reducing Air Pollution

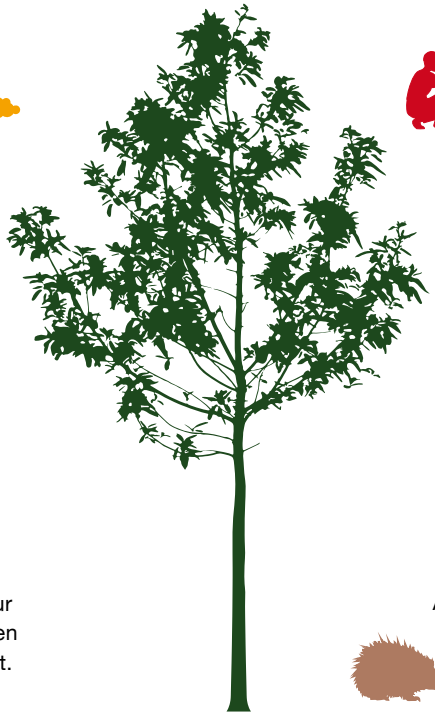
Street trees improve air quality by absorbing pollutants and intercepting harmful particulates.

Fighting Climate Change

Increasing tree cover in towns and cities by just 10% can keep surface temperatures at current levels despite climate change.
(University of Manchester)

Improving Image

Street trees improve the image of our neighbourhoods and make them even better places to live, work and invest.



Building Communities

Getting residents involved in caring for their trees helps them re-connect with their neighbours.

Boosting Health

Research shows that children who live in tree-lined streets have lower rates of asthma .
(Columbia University, USA)

Benefiting Wildlife

As well as being great for people, street trees also offer much needed habitat for wildlife too.

ENVIRONMENTAL BENEFITS

Tackling climate change and reducing air pollution

Trees can help reduce overall exposure to air pollutants harmful to human health, such as nitrogen dioxide (NO_2) through absorption or interception. Trees can also reduce local temperatures which reduces the rate at which some pollutants (e.g. ozone, O_3) are formed. With appropriate species selection and planting design trees and hedges can decrease air pollution by trapping dust and absorbing air pollutants such as ozone and particulates. This is especially important along busy transport corridors shared by vehicles cyclists and pedestrians.

It is estimated that the Vale of Glamorgan's urban forest removes **36 tonnes** of airborne pollutants each year, including NO_2/NO_x (nitrogen dioxide/oxides of nitrogen), O_3 (ozone), SO_2 (sulphur dioxide), CO (carbon monoxide) and PM (particulate matter) (for further information on sources and health implications of these pollutants, see iTree report). Ozone is removed in the greatest quantity, with over **24 tonnes** removed per year.

The annual removal of airborne pollutants by trees in the Vale of Glamorgan's urban forest is valued at **£212,481** per year.

This Tree Strategy will feed into the Vale of Glamorgan Council's climate change challenge plan. This Plan sets out the Council's commitment to achieving net zero by 2030 as a Council and net zero by 2050 as a country. *Project Zero Challenge Plan* (valeofglamorgan.gov.uk).

Carbon Storage & sequestration

Reducing CO_2 emissions could help reduce the impact of climate change. CO_2 can be removed from the atmosphere by trees and stored within their woody components. These trees can continue to isolate carbon throughout their lifetime. In the UK it is estimated that trees remove four million tonnes of carbon from the atmosphere each year.

It is estimated that the Vale of Glamorgan's urban forest stores a total of **57,314 tonnes** of carbon and sequester **1,977 tonnes** annually. 1 Tonne of CO_2 is equivalent to 85% of the average annual mileage (6,800 miles) for a small petrol car in the United Kingdom.

Producing Oxygen

The process of photosynthesis in plants including trees takes in carbon dioxide and this results in the release of oxygen purifying the atmosphere.

Mitigation of climate change

Trees provide natural shade in hot weather, shelter from prevailing winds and reducing the need to use energy for air conditioning and heating.

Trees and Flooding

As well as protecting and enhancing the urban environment trees and green spaces can provide complimentary benefits to surface water management.

These benefits are mainly through:

- Transpiration – through their leaves trees evaporate water into the air and thus reduce water in the soil around their roots.
- Interception – reducing the amount of water that reaches the ground by absorbing rain through leaves.
- Increased infiltration and attenuation of water – tree roots, and the soil in the planting pits, increase the capacity of the ground to hold water by keeping the soil structure open. The retained water can be used by the tree or will infiltrate into the surrounding ground.
- Phytoremediation – using plants to turn harmful chemicals into less harmful substances e.g. trees taking in carbon monoxide from vehicle exhausts, storing the carbon and releasing oxygen into the atmosphere.

A variety of engineering techniques are available to manage surface water but planting with a range of tree pits and planters can collect and slow down the flow of water in heavy storm events.

Future maintenance is also an important issue that needs to be considered to ensure trees remain healthy and continue to deliver surface water management benefits. Trees can also assist in managing erosion along slopes adjacent to rivers or roads. For guidance, please refer to the SuDS manual (section 19). *See link - Item Detail* (ciria.org). Depending on the scale of wider works associated with a planting scheme, tree pits could be part of a wider SuDS scheme requiring SAB approval. In which case the entire SuDS strategy would have to be in accordance with the Statutory standards for sustainable drainage systems in Wales, available here.

Trees in the Vale of Glamorgan's urban forest intercept an estimated 78,438m^3 of rain fall per year, this saves £135,838 in avoided sewerage charges.

Benefitting Wildlife

Trees play a vital role in our urban ecosystem, providing many benefits for wildlife. Birds, bats, mammals and invertebrates use trees, scrub and hedgerows as roosts, nesting sites and feeding areas, while deadwood associated with these habitats is valuable for a variety of organisms such as bacteria, insects, lichens and fungi which help decompose the deadwood. The Nature Recovery Action Plan (NRAP) and the Councils Biodiversity Forward Plan aim to conserve and enhance our natural environment to protect these species and habitats and leave a legacy for future generations. The NRAP consists of a series of plans for priority habitats and species which are considered to be under threat locally and nationally. There are several woodland and plantation sites within the Vale that are important in biodiversity terms with many designated as Local Nature Reserves, Sites of Importance for Nature Conversation and so forth,.

Any planned work on trees or woodland on Council land will take account of the NRAP/ Biodiversity Forward Plan / Environment (Wales) Act and will work towards helping the Council meet its aims and objectives. This consideration will also be given when providing advice, guidance and planning recommendations provided to private landowners.

Cultural & Social Benefits

Trees are important for setting the context for everyday living, for providing a link to the past and for marking the passage of time through seasonal changes. In many locations they can be distinctive and local landmarks.

Landscape value and features are important to cities with trees and hedges adding to this value by providing physical features such as historical boundaries, rides and woodlands. Trees have an architectural and place-making role. On a local level they can improve the quality of our environment by screening, enhancing the sense of scale, reducing glare from buildings and hard surfaces, directing pedestrians, slowing vehicular traffic. They bring colour and character to our urban and rural areas.

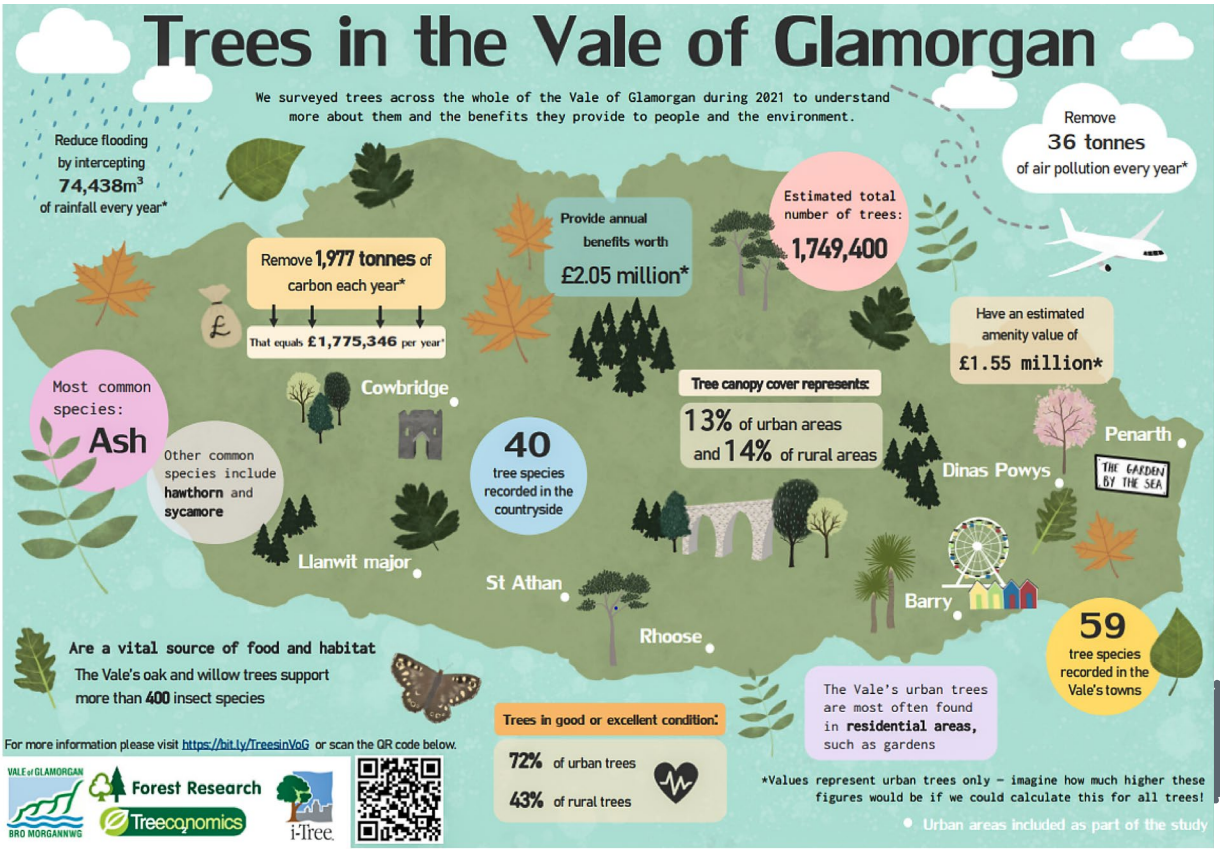
- Providing amenity, aesthetic value and historical continuity. Many of the Victorian centres of towns in the Vale are notable for their street trees whilst in parks and churchyards there are many veteran trees. Maintaining this heritage requires good tree management and a programme of continued planting to ensure continuity.
- Marking the changing seasons with leaf changes, leaf fall and floral displays
- Symbolising community focal points
- Encouraging walking and cycling through the creation of more attractive routes
- Social cohesion – from campaigning to save threatened trees, being involved in the active management of urban and rural green spaces and carrying out tree planting
- Local identity where trees form an important part of our immediate landscapes.

Health and Well Being

International studies and research have identified that urban trees provide ‘breathing spaces’ in cities, decrease respiratory problems by ‘capturing’ airborne pollutants, provide environments that encourage walking and cycling, reduce traffic speeds and generally help to reduce stress. The Nature Conservancy report ‘Funding Trees for Health’ demonstrates these benefits.

- Reducing skin cancers by providing shade from harmful ultra-violet radiation.
- Reducing stress and illness by providing psychological refreshment and a sense of wellbeing through softening the built environment, creating character and a sense of place and permanence.
- Releasing scents and aromas that provide a positive emotional response contributing to health and well-being.
- Being outdoors more in the environment thanks to the shade of tree cover.

The Environmental Benefit of Trees within the Vale of Glamorgan



Economic Benefits

Our trees can make the Vale of Glamorgan a more attractive place to live, work and play and thus contribute to inward investment in new and expanding enterprises and more jobs. Good quality landscaping has been found to contribute up to 20% in the value of properties.

- Potential to increase property values.
- Providing a sustainable source of graded timber and mulch.
- Providing a sustainable source of woodchip for biofuel.
- Providing a sustainable source of compost (leaf litter)
- When planted strategically trees can reduce fossil fuel emissions by reducing fuel costs for heating and cooling buildings.
- Reducing flooding severity frequency due to impact on surface water runoff.
- Economic value by decreasing health budget spend.
- Urban amenity trees within the Vale have an approximate value of £1.55m.

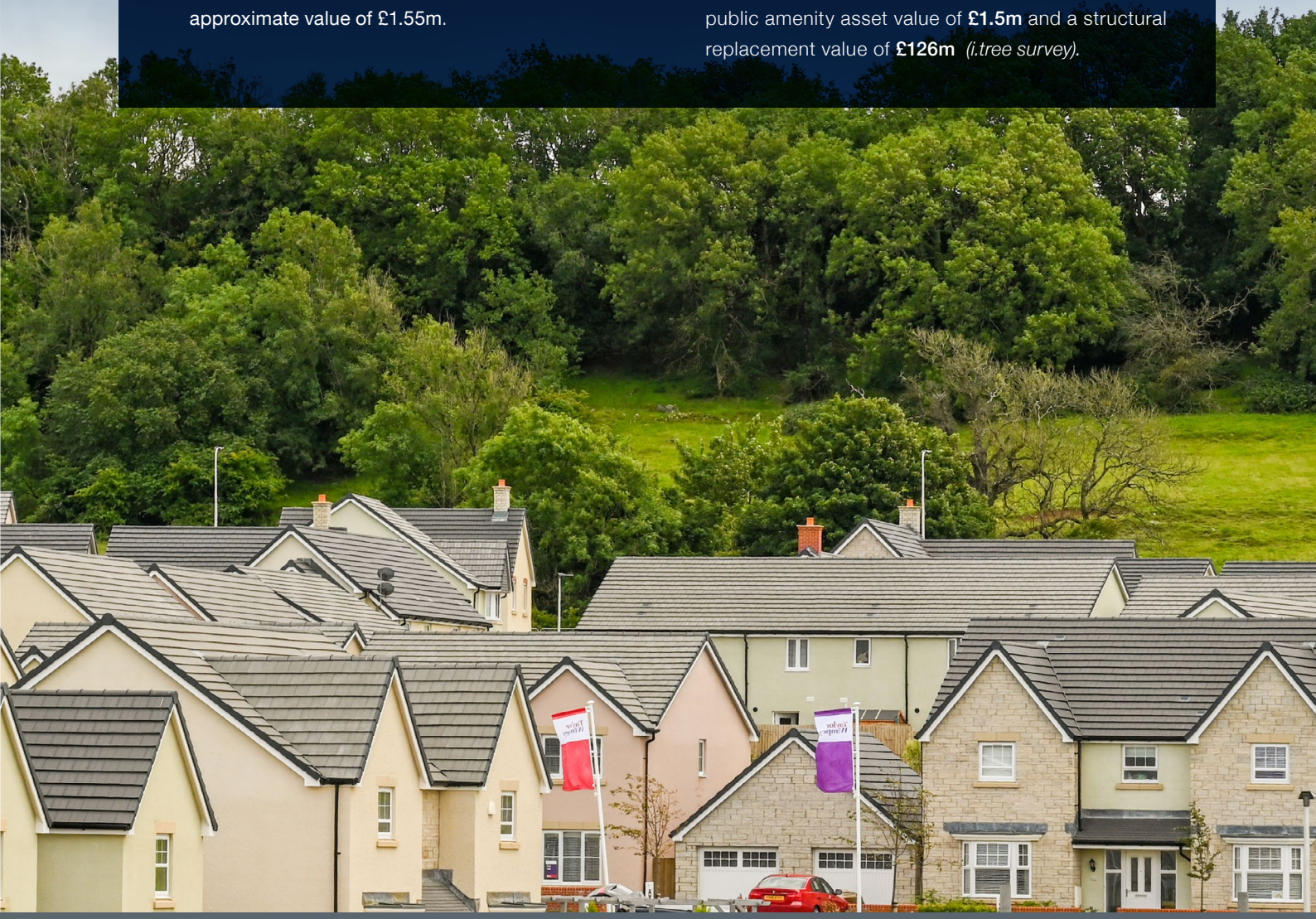
Capital Asset Valuation of Amenity Trees (CAVAT)

CAVAT provides a method for managing trees as public assets rather than liabilities. It is designed to be a strategic tool to aid decision-making about the tree stock as a whole and to be used where the value of a single tree needs to be calculated in monetary terms. The Council uses CAVAT as a method for use in decisions concerning individual trees or groups.

In summary CAVAT delivers:

- A monetary value for amenity trees based on tree size having a trunk formula valuation method adjusted for tree health and function.
- It adjusts valuations for human population density to account for all potential beneficiaries.
- The system using the 'Full Method' can be used to give compensation values for damaged public trees.
- The 'Quick Method' has informed urban forest succession planning and resource allocation.

The Vale of Glamorgan's urban forest has an estimated public amenity asset value of **£1.5m** and a structural replacement value of **£126m** *(i.tree survey).*



TREES IN OTHER LOCATIONS

Woodlands

In the Vale of Glamorgan there are approximately 2,231 hectares of broadleaved woodland and 427 hectares of coniferous woodland found throughout the county, canopy cover within urban area is 13% and rural areas 14%. In some areas woodlands occur in urban settings and provide important spaces for people and wildlife. Research undertaken by Plantlife has shown that many of our woodlands are undermanaged or unmanaged leading to a loss of wildlife due to over shading and invasive species such as Rhododendron.

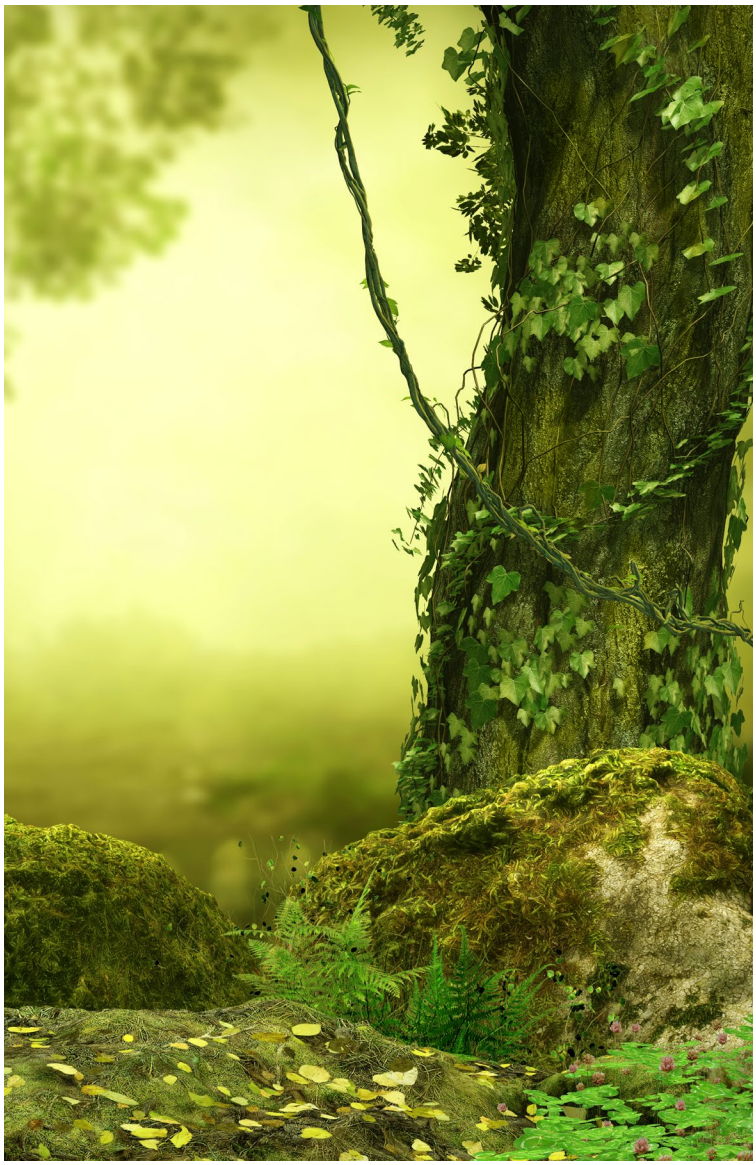
There are important groups and areas of woodland in the Vale some of which are Sites of Special Scientific Interest, Local Nature Reserves and Sites of Importance for Nature Conservation. Such areas include the Barry Woodlands complex, Hensol Wood, Porthkerry Woodlands, Leckwith Woodlands.

Ancient semi-natural woodlands

Ancient woods are those which have been continuously wooded since 1600 and are home to more threatened species than any other habitat in the UK. A closely-knit network of plants and animals, some of which are rare and vulnerable, has developed and are dependent on the stable conditions which these ancient woodlands provide. Therefore, if tree species change, they may become threatened and vulnerable to climate change. It is the closest we have to natural woodland in the UK and is an irreplaceable part of our heritage. Many have been left to develop naturally but most have been altered in some way with additional planting.

Mixed woodlands and Conifer plantations

Mixed woodlands include both broadleaved and coniferous trees to varying degrees. It may have been that previous owners have planted specimen trees to add to the interest of a woodland or that conifers were used as a nurse crop for broadleaved trees and never completely removed. Some mixed woodlands will occur on ancient woodland sites and the aim should be to progressively remove the conifers in favour of the broadleaved trees.



> “Conifer plantations contain only conifers and often in a monoculture i.e., all the same species. Only three British native trees are coniferous - Scots Pine, Yew and Juniper. So, these plantations are made up of non-native species that are grown for timber or wood pulp.
> In the Vale there are areas of coniferous woodlands. Like the mixed woodland they are often planted to replace broadleaved trees but have also planted on heathlands and other poor-quality land.
> The aim should be to return these to their former state wherever possible.”

Veteran trees

Veteran trees are usually in their second or mature stage of life and have exceptional cultural, landscape and nature conservation value. Veteran trees are identified by signs of aging. They may have started hollowing out and have patches of decay, broken branches or flaking bark that provide holes, cavities and crevices in the trunk and large limbs which are especially important for roosting and nesting bats and birds. However, decay and other physical defects can pose a danger to the public and this must be managed as appropriate.

Orchards

There are many orchards in the Vale of Glamorgan with several craft cider and perry makers. More recently there has been increased interest in the development of Community Orchards and the planting of fruit trees in urban and peri-urban areas where people can help themselves. Community orchards have been planted at Porthkerry Country Park, Cosmeston Lakes Country Park, Wenvoe, White Farm, Barry, with other orchards across the Vale.

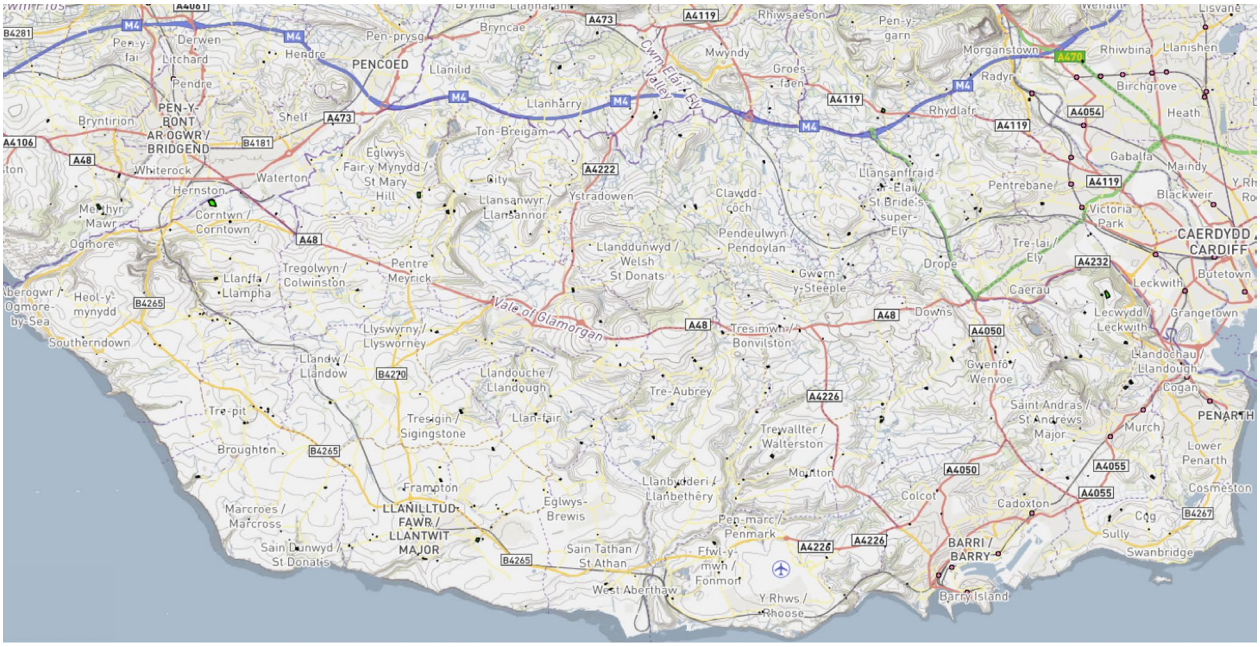


Fig 1- Orchards in the Vale of Glamorgan.

KNOWING WHAT YOU'VE GOT

Understanding our tree population

Before we can consider the future of the Council's tree stock we need to know what we have now and consequently our inventory needs to cover all Council owned land. We also need to be aware of trees, woodlands and orchards elsewhere.

Trees can be considered in terms of individual tree numbers and species. However, to supplement the inventory data an iTree canopy survey has been undertaken to supplement the data in the NRW tree report for urban areas within the Vale. Latest estimated figures indicate that canopy cover in urban areas within the Vale was 13.4% in 2009 and down to 12.3% in 2013.

The recent I.Tree survey carried out in 2021/2022 has indicated a canopy over 13% in urban areas and 14% canopy cover in rural areas. However, this falls below WG target of 20%.

The i.Tree study highlights areas of good and poor tree cover and identifies areas for future tree planting allowing assessment of the required level of investment to deliver improvements to the environment and the health of its residents. The Study will provide the Council with information policy makers can use to take full account of trees in future decision making.

Canopy cover targets

The Vale will commit to increasing canopy cover by 5% on the Council owned estate by 2039. Connectivity will be integral to all future works. The number of new trees that can be planted is governed by several factors including availability of planting land, funding etc.

POLICIES, GUIDELINES & ACTION PLANS

The Strategy aims to ensure responsible proactive management, maintenance and protection of its tree population.

The Council will prioritise the maintenance and protection of existing trees to maximise the benefits of these assets.

By promoting the benefits of trees and their management requirements, the Council will assist the community in active participation projects including the Friends Tree Initiative, a Tree Warden Scheme and tree planting initiatives. Details of such initiatives will be promoted on the Council's website and other media outlets.

It is generally recognised that large trees, particularly in our towns bring considerably more benefits than smaller trees. Finding room for large trees can be a problem in many locations, especially in residential or urban streets. The Right Tree, Right Place approach is intended to allow any trees planted to reach full height and maturity and remove the requirement for regular pruning, which is very resource intensive, as well as to minimise any later nuisance impact.

Additionally, the Council will explore financial options to increase tree planting in urban areas to increase the canopy cover. This will include working with partners who may be able to access additional funding for trees not available directly to the Council.

> "The Council will utilise a tree management and associated GIS database system to manage the tree population by ensuring they are incorporated into a cyclical program to meet statutory obligations, resources, and service demands."

The Council will implement a system to manage the risk posed by trees. As part of this process the Council already ensures that its trees are inspected on a regular basis and a proactive management regime and reactive maintenance arrangements are in place to deal with residents' concerns. This Strategy will further promote the updating of the Council's systems to ensure they meet the legal requirement placed upon the Council.

As part of these statutory obligations the Council is required to have a proactive programme of inspection. The Council will put in place a plan that ensures each individual tree in the Vale is inspected every three years. Where remediation work has been identified works will be prioritised dependant on the level of risk. Further information is detailed in the Appendix 2 Tree risk management strategy.

At present trees that are removed are replaced on a two for one basis, the Council's Parks, Gardens and Country Parks, usually acting as the receptor sites. Where highway trees have been removed, they are normally replaced off the highway estate, however, if resources are available trees will be replaced within street locations where suitable.

This Strategy seeks to identify planting opportunities closer to the highway, wherever possible, particularly in areas where tree cover is low. The Council has a rolling programme of preparing management plans for its parks and other green spaces. Management plans may serve a variety of needs such as maintaining health and safety risk assessments, providing work programmes prioritising resources, seeking funding and applying for and retaining the valued Green Flag accreditation.

A voluntary Friendship Tree scheme has already been established, in some parks, to encourage and enable

community involvement in tree and woodland management. This Strategy seeks opportunities for expanding this role by exploring the appetite for a Vale wide tree 'friends' scheme. The Strategy also seeks to increase involvement in tree planting programmes across its schools and within local communities.

Like all living organisms, trees are subject to decay at some point in their lifespan. However poor the physical condition of a tree, remedial action is only necessary where there is a clearly quantifiable risk to life or property. This might mean removing part of the tree, the whole tree, or for example, reducing the level of public access in the vicinity.

> "Risk is related to the location of the tree. It reflects the intensity of use of the immediate surroundings of the tree and the proximity of the tree to people, buildings or other structures *(targets)*."

THE TREE ASSESSMENT PROGRAMME

It is the responsibility of the Council to ensure that tree inspection procedures are in place and that they are undertaken only by staff or others who meet the requirements of competence.

The tree assessment programme has four stages;

1. Assessment of risk;
2. Assessment of hazard;
3. Prescription for remedial action and
4. A plan for the recording and re-inspection process.

As part of the Council's statutory obligations, it has a proactive program of tree inspections. The Council will put in place a Plan that ensures each individual tree in the Vale is inspected every three years, where remediation has been identified works will be prioritised dependant on the level of risk.

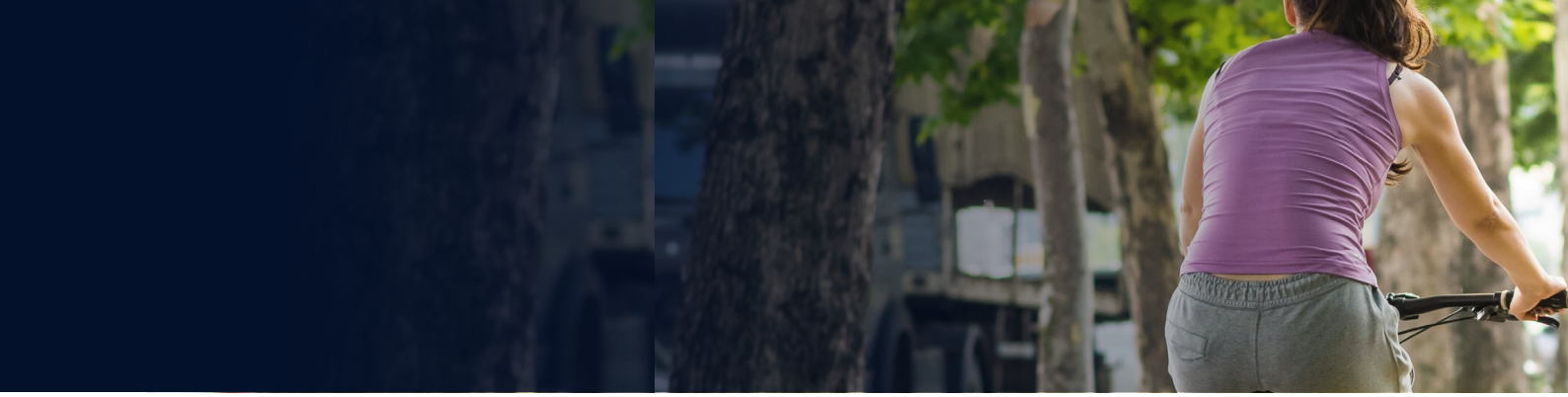
When prescribing work the Council also recognises that in addition to the risk assessment, there is a need to carry out an ecological assessment to protect bats, birds and other protected species.

It is imperative for safe delivery that competent arboricultural professionals are integral to the Plan and the carrying out of duties in relation to this. This will ensure accurate, efficient and informed decisions with duty of care being met in all circumstances where possible.

The Quantified Tree Risk Assessment (QTRA) *(Ellison, 2005)* Quantified Tree Risk Assessment (qtra.co.uk) is accepted within the arboricultural industry as an appropriate risk assessment tool to assist either in reaching decisions regarding the future management of a tree identified to have significant faults, or to identify the appropriate interval between, or intensity of, tree inspection regimes. (Appendix 2)

QTRA is not intended to be predictive but instead estimates the probability of the risk of harm the public, property or vehicles (over a period of one year). This is estimated in terms of the likelihood of the event that a tree or tree part fails and that this event coincides with the occupation of the "target" zone (the area likely to be impacted were a tree to fail), by a pedestrian, vehicle or property.

The Council has invested financially in developing the necessary skills of staff to undertake QTRA surveys and this will be rolled out to key staff within all departments, to ensure a generic approach to tree assessment across the Council.



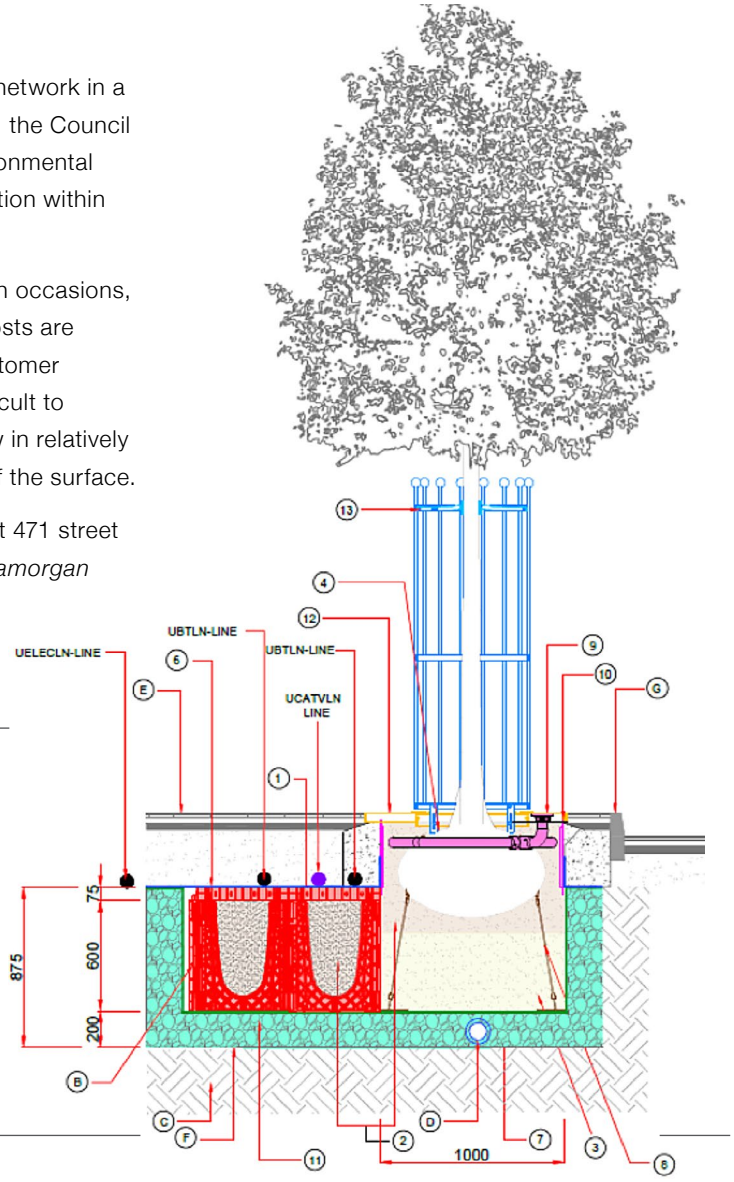
Highway Trees

The Council, is responsible for maintaining its local highway network in a condition that is safe for users. In addition to this safety duty, the Council is required to comply with all necessary ecological and environmental legislation in managing and enhancing the street tree population within the urban environment.

Trees bring with them both benefits and liabilities that can, on occasions, lead to conflict. Many of the liabilities and their associated costs are estimated by highway and tree managers, who deal with customer concerns, whilst the benefits can sometimes be seen as difficult to quantify. Trees growing in pavements, or hard surfaces, grow in relatively harsh conditions and their roots can result in deformations of the surface.

A Natural Resources Wales study found that the Vale has lost 471 street trees during 2006 to 2013. *Town Tree Cover in the Vale of Glamorgan* (naturalresourceswales.gov.uk)

Example of typical detail & requirements for a tree set into a Highway footpath.



Target minimum recommended Root Available Soil Volume (RASV)'s

- **30m³** for individually planted large-medium trees.
- **20m³** per large-medium tree when planted as a group of two or more with shared RASV.
- **10m³** for individually planted small trees of approximately 6m height and 3m diameter branch spread after 25 years.
- **5m³** per small tree when planted as a group of two or more with shared RASV.

PACKAGE INCLUDES THE FOLLOWING GREENBLUE URBAN PRODUCTS PER TREE

1. Rootspace @ 600mm depth (1 units deep) C/W twin walled geonet & open reinforcing mesh - GBURS61A
2. Rootsoil 20 topsoil for use within top 600mm of soil profile - rootsoil 20
3. Rootsoil sub subsoil for use within soil profiles 600mm or deeper - rootsoilsuba
4. Rootstart professional Mycorrhiza Fungi allow 200g per tree - RSPMF 2.5LA
5. Rootrain arborvent cast aluminium trafficable aeration inlet with 150mm square top and manifold - RRARBV150B
6. Twin walled structural geonet (included in item (1.)) see note (A.) - GLTWGNA
7. 20mm open reinforcing mesh (included in item (1.)) see note (A.) - GRN20A
8. Arborguy anchorplate strapped anchor system - SASAP06A
9. Rootrain urban irrigation system - RRURB1A
10. Reroot 600 root barrier 600mm deep with root deflecting ribs. Use RERJTA reroot jointing tape for any overlaps - RER600A
11. 10-20mm Clean angular drainage aggregate - GBUDRSA
12. Adur design cast ductile tree grille 1200mm square with 600mm central aperture with galvanised support frame, including rootrain hydrogrille irrigation system - ADUR12A
13. Ullswater vertical steel tree guard 1800mm high X 600mm Ø including tree guard tie - ULLSSP6A

NOTES:

A. Allow 20% additional for geotextile and reinforced geogrid for overlap and cutting requirements
B. Install rootspace side panels to installation as directed by engineer
C. Existing ground
D. Positive drainage pipe (110mm perforated pipe)
E. Build-up to suit engineer designs and requirements
F. Soft landscape area
G. Kerb (as per standard)

STRUCTURAL ENGINEER'S NOTE:

H. Additional twinwall geonet (GLTWGNA) to be installed where sub-base is installed below 3% CBR - minimum 2% CBR of formation level to be assessed by engineer

In order to redress this balance and recognising that street trees offer benefits opportunities to plant trees will be pursued in street locations, particularly in areas where trees have been removed, subject to available resources.

When planning any future planting on the highway, careful consideration will be given to the species, available space, location and constraints of a particular site. Planting will prioritise larger growing shade providing trees, scaling down to smaller ornamental trees where larger trees are not suitable. The Council will also look to establish a diversity of tree species to mitigate against pests and disease that can threaten entire species.

Housing (Communal Land) Trees

Vale Homes provide services to over 4000 council tenants, making the Council, the largest landlord in the Vale. Individual tenants are responsible for trees in their gardens. Trees on communal housing land, are the responsibility of the Council.

Future planting in communal housing land will reflect the need for a variety of species and the need to provide an attractive environment. Future tree planting, in these areas, will involve discussions with neighbourhood housing officers to ensure the local community are consulted, aware and supportive.

Parks and Gardens

There are many parks and gardens throughout the Vale of Glamorgan. From urban parks in Barry and Penarth to rural parks across the Vale as well as playing fields to local nature reserves and country parks. Parks contain a high proportion of large, mature, high asset value trees and provide habitats that increase biodiversity levels in the area as a whole. The Council is committed to the quality management and enhancement of these important assets.

Careful consideration will be given to future tree planting at these sites to ensure a mix of species and ages of trees.

Leckwith Woods and the two Country Parks, Porthkerry and Cosmeston Lakes contain high proportions of large, mature, high asset value trees and provide habitats that increase biodiversity levels in the area as a whole. In light of this and the numerous other benefits trees provide the Council is committed to the high-quality management of this important asset and understands proactive management can provide all levels and ages for our residents and visitors.

> “Parks and Country Parks will also continue to offer a memorial and sponsored tree service, where the purchaser can choose and purchase a tree from an approved list of trees.”

Education

Trees on education sites have historically been dealt with by each individual school. Discussions will be held with schools with the aim of incorporating education sites into the Council's inspection program to ensure statutory obligations in regarding to trees are met. However, it is acknowledged that the final decision regarding this will, remain with the schools governing body.

The 21st Century Schools Officer will liaise with Planning department and Ecologists with regards to future schemes, this will ensure that the right tree is planted in the right place, this will ensure that the project will be of maximum educational value.

Cemeteries

Cemeteries come under the control of the individual churches/chapels, the Church in Wales, Community Councils and the Council. Cemeteries can contribute enormously to biodiversity as the long running 'Caring for Gods Acre' charity has proved plus they often contain interesting and ancient trees.

> "We will work with all interested groups and partner organisations to develop community involvement in tree planting schemes, whether it is on Council estate, private land or within the private sector. This will help create a sense of ownership for newly planted trees, developing a sense of pride."

Council owned Commercial sites

The Council owns and operates commercial sites which will be reviewed on an annual basis to ascertain opportunities to increase canopy cover. Any new commercial development will incorporate new plantings, such as the transport hub at the Docks office, Barry.

Working in Partnership

To achieve the ambitious Vision set within this Strategy, the Council will work with communities, landowners, private sector, and other partnership organisations, to help ensure future success.

The Council is committed to building on and developing communication with all interested bodies, building on existing community support and volunteer engagement that currently exists.

We will work with all interested groups and partner organisations to develop community involvement in tree planting schemes, whether it is on Council estate, private land or within the private sector. This will help create a sense of ownership for newly planted trees, developing a sense of pride.

ACTION PLAN

How we will increase our canopy cover

The iTree Eco-survey has identified sites where new tree planting is both possible and most beneficial to improve canopy cover, air quality, flood prevention and habitat quality. It will not be possible to deliver target canopy cover on just Council owned land alone so other ways could be investigated.

These include:

- Use of planning conditions and obligations in Development Management
- Working with community partners on funding bids through mechanisms such as LNP
- Working with other bodies / individuals such as the Woodland Trust, NRW, landowners / farmers and organisations such as Penarth Civic Society, voluntary organisations and third sector.
- Working with private businesses, Community Councils, Public Health Board and Housing Associations.
- Giving advice, encouragement and raising awareness.

Tree planting - what we will do

There are many factors which need to be considered when planting urban trees involving both species selection and the actual growing and living conditions for the trees in the future. If trees merely survive, rather than thrive, then they will not provide the many benefits we plant them for such as their ecosystem benefits and aesthetic qualities.

A detailed action plan is attached at Appendix 3 that details the Councils approach to implementing the Tree Strategy.

Replacement planting

Replacement planting, particularly in urban areas is essential to ensure continuity of our tree stock and canopy cover, the

Council recognises the fact that a single young tree takes many years to achieve the size and scale of a large mature tree and that one replacement does not give the same benefit, nor does it have an immediate effect on the canopy cover.

If there is a need to remove trees the Council will ensure that an appropriate replacement take place in line with the table below, this will help us achieve our tree canopy cover target by 2039.

We will generally replace trees in the same location, but in some circumstances a nearby location may be more practical and appropriate i.e. right tree, right place. However, if trees are removed within woodlands we will allow natural regeneration to take place.

Trunk Diameter of existing tree (cm)	Number of replacement trees
Up to 39.9	2
40 to 49.9	3
50 to 59.9	4
60 to 69.9	5
70 to 79.9	6
80 plus	7

Local Provenance tree stock

The importation of tree diseases on stock meant for planting within the UK plus the acknowledgement of the importance of conserving local genetic distinctiveness in native species has meant that there is now an increasing and largely unmet demand for what is known as local provenance tree and shrub stock.

These are plants which have been grown from seeds, berries, nuts, fruit and occasionally grafts or layers of local trees and shrubs and then grown on locally. They are ideally suited to local conditions. The Woodland Trust and Llais y Goedwig are working to establish community tree nurseries and some other charities and private companies are now also starting to supply local provenance material.

Future tree planting

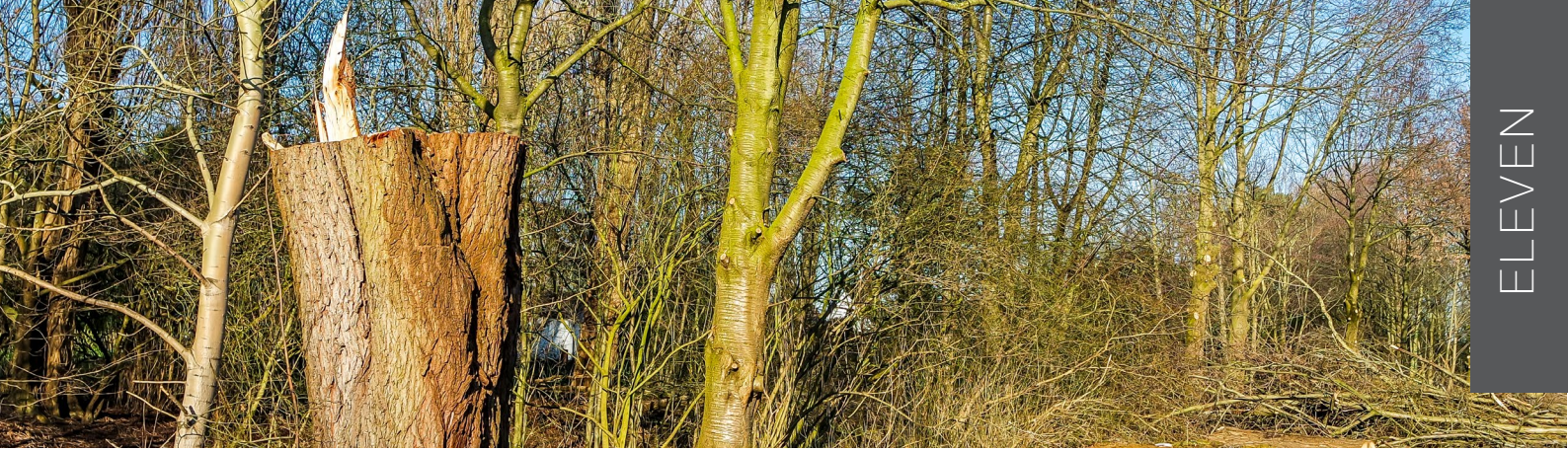
Climate change means that the range and distribution of trees, tree pests and diseases will change over time. Increasing temperatures may allow more non-native trees to survive over a wider area, but reduce the suitability of some native tree species, especially in urban areas across the Vale. This presents challenges for how we manage our existing tree stock and our future planting programmes:

- Consideration of the future climatic suitability of new trees as the climate in Wales, especially given the long- life span of many trees
- Consideration of how our existing tree stocks may be affected by changing climatic conditions and potentially greater frequency of extreme weather events.
- Impact of pests and diseases – how to build resilience in our existing tree stock and reduce the risks to new planting.

Whilst trees will be affected by climate change, they are part of the solution to how we mitigate and adapt to the challenges that climate change presents. There are many factors which we need to consider when planting urban trees, woodland trees and hedgerows, involving both species selection and the actual growing and living conditions for the trees in the future.

Natural Regeneration

Natural regeneration is where nature is left to its own devices. The removal or reduction of grazing pressure on grasslands will result in the development of taller vegetation. Depending on the availability of nearby seed sources, scrub will soon develop followed by young trees that then result in new woodland. Natural regeneration works best near or next to existing woodland where species can spread through natural methods in the natural regeneration area.



OTHER TREE ISSUES

Tree Preservation Orders

Tree Preservation Orders (TPO's) can be placed on single trees, groups of trees and even whole woodlands. If a TPO is in force Council approval must be sought before carrying out any work to the trees covered. Unauthorised work to a tree (either protected by a TPO or a tree within a conservation area) is a criminal offence **Trees and Hedges** (valeofglamorgan.gov.uk)

Conservation Areas

All trees with a stem diameter of 75mm or more (measured at 1.5 metres above natural ground level) are protected in a Conservation Area. Anyone intending to carry out any work to a tree in a Conservation Area has a requirement to notify the Council. If there are concerns that the work may be damaging to the amenity of the area, consideration will be given to issuing a Tree Preservation Order.

What type of trees can be covered by a TPO?

Any tree may be covered by a TPO as there is no minimum size, but bushes or shrubs of any size cannot be protected. TPO's protect trees that make their local surroundings more attractive. Protected trees should normally be visible from a public place, but in some cases other trees may be protected.

Applying for work to a protected tree

If you wish to undertake work to a tree within a Conservation Area or a tree covered by a TPO, you should complete the application form for tree works. The form and guidance can be assessed from the planning section of the Vale of Glamorgan website **Planning and Building Control** (valeofglamorgan.gov.uk)

How do I find out if a tree has a TPO or is in a Conservation Area?

The Council's website contains an interactive map. Locate the site you are interested in and then select the Environment and Planning category on the map. You can then select 'conservation area' or 'tree preservation order' to see if the site contains protected trees. See link - **Trees and Hedges** (valeofglamorgan.gov.uk)

Felling Licences

Under the Forestry Act 1967 (as amended) the volume of growing timber which can be felled in each calendar quarter without a Felling Licence is restricted. The controls are administered by Natural Resources Wales and subject to certain exemptions, prevent the felling of trees not covered by a TPO, within a Conservation Area or other restrictions.

Occasionally the Felling Licence controls overlap with the TPO and Conservation Area legislation and it is necessary for officers from each organisation to liaise with each other. When carrying out work to trees on its own land the council must have regard to the Felling Licence controls and seek consent from CNC/NRW.
See link - Natural Resources Wales / Apply for a felling licence

Biosecurity

The increase in the number of pests and diseases affecting trees and woodlands makes biosecurity very important. Human activity is the key factor in the spread of tree pests and diseases present in the soil (i.e. mud) or on plant material.
See link - Information Portal » NNSS (nonnativespecies.org)

Arboriculture Officers, Parks and Open Spaces operatives and Countryside Rangers follow Forestry Commission guidance on biosecurity to reduce the risk of spread. This guidance recommends ensuring clothing and equipment is cleaned regularly to avoid spreading material from site to site, sourcing trees from trustworthy nurseries that supply UK grown healthy stock and ensuring vehicles are kept free of mud and debris. Members of the public visiting woodland will be encouraged to follow biosecurity measures that are relevant to the risk and in accordance with best practice advice.

As well as being irresponsible and illegal, the tipping of garden waste in the countryside increases the risk of tree pests and diseases. There is also a risk of spreading invasive plants.

Trees in an urban environment

Residents often live in close proximity to trees, particularly in urban areas. These trees are either their own, their neighbours or quite commonly belong to the Council. Inconvenience to residents can be caused by trees when they grow near dwellings. A dilemma often occurs when the tree makes an important contribution to the local environment but also cause inconvenience or creates safety issues to those living nearby.

With any population of trees there are several common sources of complaints including overhanging branches, shade, leaf/fruit fall, obstruction and physical damage, etc. Some of these problems can be dealt with by regular management by the appropriate landowner. (See Appendix 4 for FAQ's).

Damage and vandalism

Damage to trees, both deliberate and through ignorance, is common. Criminal damage includes cutting down or lopping or topping, snapping saplings, setting fires beneath trees and various other attempts to kill Council trees. Some damage to trees is through ignorance for example by failing to maintain trees or leaving on stakes, ties metal grilles etc. or through the fixing of decorative lights which are not loosened on a regular basis.

Damage related to highway use and maintenance, causes compaction of rooting areas, branches can be torn branches by high vehicles, the installation of driveways cutting across verges or through contamination from salt in grit or hydrocarbons. Enforcement action will be taken against anyone who damages Council trees.

Pests and diseases

Climate change is changing and extending the range of pests and diseases and this will affect the UK as new pests and diseases become more common in this country. In the 1970's Dutch Elm disease was introduced into the UK and is one of the most well-known examples of a 'new' pathogen dramatically changing the look and makeup of our urban forest.

The following are some of those currently present

> "The importation of trees, along with their associated soil and packaging materials, from across Europe and elsewhere continues to bring threats and these imported pests and diseases are already having an effect on the tree population of the Vale."

in the Vale or which could pose a threat in the future: Ash dieback, Dutch elm disease, horse chestnut leaf miner. With other diseases spreading in to parts of the UK such as acute oak decline (in the Midlands), sweet chestnut blight (most in southern England but outbreaks elsewhere), Asian longhorn beetle (southern England), Gypsy moth (southern England).

> “Horse Chestnut is affected by Bleeding Canker (*caused by Pseudomonas syringae pv. aesculi)* and Horse Chestnut Leaf Miner, both of which have been highly significant in the Vale, as well as much of the UK.”

The Council will only purchase new trees for planting from nurseries which work in accordance with strict bio-security polices and will use, wherever possible trees raised entirely in the UK.

Currently the main threat to our native oaks in the UK is from Acute Oak decline.

Ash dieback is also a significant issue which is a threat throughout the Vale of Glamorgan. Ash is the predominant tree species within the Vale and it is expected that there will be up to an 80% loss of the species.

See link - Notifiable pests - UK Plant Health Information Portal (defra.gov.uk)

Town & Country Planning Act 1990 (Trees)

Part of this Strategy is to recognise the importance of trees as a material consideration in planning decisions. Awareness will continue to be raised with private owners, managers and developers of the importance of their trees and woods and the many benefits they provide our communities. Having a suitably qualified tree officer within the planning department to assess applications will help address the risk posed to trees through development.

Loss or damage through development

Demolition and construction can damage trees in a variety of ways. This may be through direct loss to make way for the development, a reduction in space for retained trees' future growth and spread, direct damage due to compaction of soil, severing roots or branches or from spill of chemicals or the use of fire. Infrastructure and service installation can also be damaging due to open trenching. For new trees, the presence of pre-existing or new utility provision must be carefully considered if future conflict is to be avoided.

The Councils tree stock and canopy cover will be increased by 5% by 2039 to give greater species and age diversity to ensure a healthy, balanced, tree population.

The Council will use its powers to prevent unnecessary damage to trees within all construction/development and pursue enforcement action where appropriate if trees are damaged or destroyed.

Works in the vicinity of trees

The Council's specialist tree lead will be advised when works are to be carried out in the vicinity of retained council owned trees on development sites and as part of general works of highway, including by statutory undertakers, to enable the trees to be evaluated both before and after works. Any unacceptable damage caused to trees will be pursued.

Permitted Development Rights

Where a planning application is needed, there is the opportunity for trees and hedges to be considered and protection sought if needed. If development is 'permitted' this means that no planning application is needed and there is no third party to assess removal or the potential damage to trees.

Probably of most relevance to our urban trees is maintenance and improvement of the highway by Highways department, repairs to services by utility companies and small extensions or alteration to dwellings or commercial buildings.

Work associated with installation and repair of utility services

Street trees are very vulnerable to damage which can cause at best, loss in vigour and at worst, death, both of which may take several years to become evident. It also poses a health and safety risk if trees are made unstable (severing of major roots) and work just covered over. Such works undertaken in the vicinity of trees will follow National guidance document written by the National Joint Utilities Group.

See link - http://streetworks.org.uk/wp-content/uploads/V4-Trees-Issue-2-16-11-2007.pdf

Highway Improvements

Raising the awareness of the impact of improvements on the existing tree stock encouraging suitable tree surveys to be undertaken and appropriate arboricultural advice to be obtained prior to developing and finalising proposals to minimise impact and protect trees where possible.

Work associated with installation and repair of utility services.

Street trees are very vulnerable to damage which can cause at best, loss in vigour and at worst, death, both of which may take several years to become evident. It also poses a health and safety risk if trees are made unstable (severing of major roots) and work just covered over. Such works undertaken in the vicinity of trees will follow National guidance document written by the National Joint Utilities Group.

See link - http://streetworks.org.uk/wp-content/uploads/V4-Trees-Issue-2-16-11-2007.pdf

Specification, planting and maintenance

Unless a tree reaches maturity and is healthy, it cannot deliver its full benefits. Many of the trees in urban areas across the Vale are merely ‘surviving, not thriving’ wasting the time and finance invested in their purchase and planting.

To ensure that the trees we plant reach their potential they need to be correctly sourced, planted, established and then maintained. Poor planting with trees planted too deep, in tree pits with inappropriate surfacing or small soil volumes either kills or stunts the trees.

Poor establishment maintenance (particularly insufficient watering), tree guards, stakes and grilles left in place so damaging to bark and stems and a lack of thinning of plantations also reduces the value our tree stock.
As mentioned above a limited palette of trees species reduces species diversity and also the landscape value. Correct species choice for the final setting of the mature tree is essential at the initial design stage.

TREE MANAGEMENT OBJECTIVES

1.	Trees in Council ownership will be inspected for safety, on a cycle between one and three years according to size, targets, condition and survey recommendation for each tree. This information will be recorded on the Council's data base.
2.	Tree inspections will only be undertaken by people who are qualified, experienced and competent to undertake the Quantified Tree Assessment (QTRA) survey method.
3.	The Council will prioritise tree work according to the individual tree's health & safety risk, taking into account current available resources. Tree works will normally be completed in safety priority order.
4.	The Council will not carry out works to trees, or fell them, unless it is necessary to do so. When works are carried out, the reasons for the work will be documented and recorded.
5.	The Council accepts the right of householders to remove overhanging branches, (subject to compliance with Tree Preservation Orders and/or Conservation Area status) and where required will assist householders to identify a suitable arboriculture contractor who can carry out works to the appropriate standard.
6.	For non-emergency tree-related safety issues the Council will aim to carry out a tree inspection within 20 working days of receipt of the enquiry and the customer notified thereafter within 10 working days of what action the Council intends to take.
7.	The Council will make safe any unacceptable carriageway obstruction due to street trees owned by the council affecting the safe passage of highway users.
8.	The Council will undertake work to a tree in Council ownership to maintain (where reasonably feasible) a minimum 5.05m height clearance over the carriageway.
9.	The Council will undertake work to a Council owned tree to maintain a minimum (where reasonably feasible) 2.4m height clearance over a footway.
10.	The Council will undertake work to a tree in is ownership to ensure that it does not unduly obstruct the streetlight zone of illumination.
11.	The Council will undertake work to a tree in its ownership to ensure that it does not unduly obstruct traffic signals or street signs.
12.	Where trees are potentially impacted by vehicle crossover applications, the Council's Tree Manager will be consulted by the highway department. A site visit may be necessary to make a decision on whether the tree has amenity value and should remain, or whether removal and replacement would be the best and most sustainable solution. Any costs associated with tree removal and replacement of a tree is to be borne by the applicant.
13.	The Council will not prune or fell a Council owned tree simply because it is considered to be 'too big' or 'too tall'.
14.	The Council will not prune or fell a Council owned tree to remove or reduce leaf fall or remove fallen leaves from private property.

15. The Council will not prune or remove trees in cases where they cause a reduced amount of light to fall on a property.

16. The Council will not prune or fell a Council tree to remove or reduce bird droppings from trees or remove bird droppings from private land.

17. The Council will not prune or fell a Council owned tree to remove or reduce the nuisance of fruit/berries or nuts or remove such fallen fruit from private land.

18. The Council will not prune or fell a Council owned tree to remove or reduce honeydew or other sticky residue from trees.

19. The Council will not prune or fell a Council owned tree to remove or reduce the release of pollen.

20. The Council will not prune or fell a Council owned tree to prevent perceived interference with TV / satellite installation / reception.

21. The Council will not prune, fell or cut the roots of a Council owned tree to prevent roots entering a drain that is already broken or damaged.

22. In the event that a Council tree is causing damage to property, the Council will aim to respond within 10 working days and, if appropriate, remedial works will be undertaken. For emergency tree incidents, it will aim to attend within 2 hours of its report to assess the situation and start the process of making the site safe.

23. The Council will not prune or fell a Council owned tree to improve the view from a private property.

24. The Council will endeavour to maintain its tree stock and increase current tree numbers by planting. The Council will look to increase and improve its tree cover within available resources as part of an annual tree planting programme, paying particular attention to those with the least canopy cover. With the target of increasing the canopy cover by **5%** by 2039.

25. The Council will endeavour to maintain newly planted trees appropriately to ensure they have the best chance of establishing. (Right Tree Right Place) *see link* - 7111_fc_urban_tree_manual_v15.pdf (forestresearch.gov.uk)

26. The Council will manage veteran and ancient trees sympathetically according to good arboriculture practice, striking a balance between public safety and biodiversity.

27. Where practicable, all arisings (logs, branches etc.) from tree works in high amenity areas will be removed and used in an environmentally sustainable manner. In woodland situations however standing dead wood, logs and chippings may often be left on site, where this can be done safely, to enhance biodiversity and increase wildlife habitats.

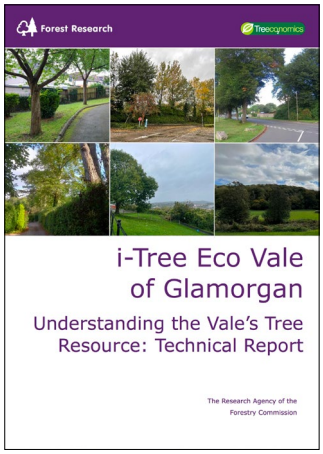
28. Where a Council owned tree or woodland is associated with criminal activity and/or anti -social behaviour, measures to alleviate the problem will be implemented on a site-by-site basis in consultation with the Police, Communities and citizens.

29. The Council will ensure that all demolition, construction and development, near to trees complies with BS:5837 (2012) “Trees in relation to design, demolition and construction - Recommendations” and that the most recent National Joint Utilities Group “Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees” are followed where carrying out works in root protection areas cannot be avoided.

APPENDIX 1

LINKS TO DOCUMENTS INFLUENCING THIS STRATEGY

- **Blue Green Urban** - Resource Centre - Download Literature - GreenBlue Urban
- **Blue Green Urban** - Street tree cost benefit analysis 2018 - https://www.bing.com/ck/a?!&&p=e3b2f81b62d80129JmltdHM9MTY4ODY4ODAwMCZpZ3VpZD0zYjk1M2RkMi1mMzQ3LTZjMDYtMDEwNS0yZWQyZjlyYzZkZDMmaW5zaWQ9NTE4OA&ptn=3&hsh=3&fclid=3b953dd2-f347-6c06-0105-2ed2f22c6dd3&psq=gbu+street+tree+cost+benefit-analysis+2018&u=a1aHR0cHM6Ly9ncmVlbmJsdWUuY29tL2diL3JIc291cmNlLWNlbnRyZS9zdHJlZXQtdHJlZS1jb3N0LWJlbmVmaXQtYW5hbHlzaXMv&ntb=1
- **The Environment (Wales) Act 2016**.
  See link - Environment (Wales) Act 2016 (legislation.gov.uk)
- **National Standards for Sustainable Drainage Systems (SuDS)** - National standards for sustainable drainage systems (SuDS) | GOV.WALES
- **NJUG Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees** - National Joint Utilities Group (streetworks.org.uk)
- **NNSS-GB non-native species secretariat** - Information Portal » NNSS (nonnativespecies.org)
- **NRW South Central Wales Area Statement** https://naturalresources.wales/about-us/area-statements/south-central-wales-area-statement/?lang=en
- **Natural Resources Wales.**
  See link - Natural Resources Wales
- **NRW – Town and tree cover in the Vale of Glamorgan** - Town Tree Cover in the Vale of Glamorgan (naturalresourceswales.gov.uk)
- **Suds legislation Wales.**
  See link - National standards for sustainable drainage systems (SuDS) | GOV.WALES
- **The SuDS Manual (C753F)** - Item Detail (ciria.org)
- **The Planning (Wales) Act 2015.**
  See link - Planning (Wales) Act 2015 (legislation.gov.uk)
- **The Right Tree in the Right Place for a Resilient Future (Forest Research)**
  7111_fc_urban_tree_manual_v15.pdf (forestresearch.gov.uk)
- **Vale of Glamorgan Biodiversity Action Plan.**
  See link - Biodiversity Action Plan (valeofglamorgan.gov.uk)
- **Vale of Glamorgan Biodiversity SPG**
  Biodiversity-Development_SPG (valeofglamorgan.gov.uk)
- **Vale of Glamorgan Council's Corporate Plan 2020-2025**
  'Working together for a brighter future'
  See link - Corporate Plan 2020-2025 (valeofglamorgan.gov.uk)
- **Vale of Glamorgan Local Development Plan (LDP) 2011-2026 Planning Obligations SPG** - Adopted July 2017 (valeofglamorgan.gov.uk)
- **Vale of Glamorgan Council – Supplementary Planning Guidance, Trees, Woodlands, Hedgerows & Development.**
  See link - Final Trees, Woodlands, Hedgerows and Development SPG 2018_Compressed (valeofglamorgan.gov.uk)
- **The Well-being of Future Generations (Wales) Act 2015.**
  See link - 150623-guide-to-the-fg-act-en.pdf (futuregenerations.wales)
- **Woodlands For Wales** - Strategy Welsh Government.
  See link - Woodlands for Wales: strategy | GOV.WALES
- **Vale of Glamorgan I.Tree survey**
- **Vale of Glamorgan I.Tree Summary report**



APPENDIX 2 Tree Risk Management

THE QUANTIFIED TREE RISK ASSESSMENT (QTRA) METHODOLOGY

The Quantified Tree Risk Assessment (QTRA) (Ellison, 2005) is generally accepted within the arboricultural industry as an appropriate risk assessment tool to assist either in reaching decisions regarding the future management of a tree identified to have significant faults, or to identify the appropriate interval between, or intensity of, tree inspection regimes.

QTRA

Is not intended to be predictive but instead estimates the probability of the risk of harm to members of the public, property or vehicles (over the period of one year) . This is estimated in terms of the likelihood of the event that a tree or tree part fails and that this event coincides with the occupation of the "target" zone (the area likely to be impacted were a tree to fail), by a pedestrian, vehicle or property.

Risk of harm within the methodology is estimated as the product of the likelihood that the target area is occupied, the size of the part most likely to fail (expressed as a fraction of the maximum size of part) and the likelihood that the tree or tree part will fail. Within the methodology these factors are referred to as the Target Value, the Impact Potential (Size of Part) and the Probability of Failure. The resultant value for risk of harm is called the Risk Index.

Pedestrian usage within the system is calculated in terms of the number of seconds the area beneath a tree is occupied as a fraction of the total number of seconds available. QTRA assumes a typical pedestrian would take 5 seconds to pass beneath a tree.

An assessment of the stem and crown structure of each tree is undertaken to identify the size of the part within each tree considered as posing the highest risk of failure.

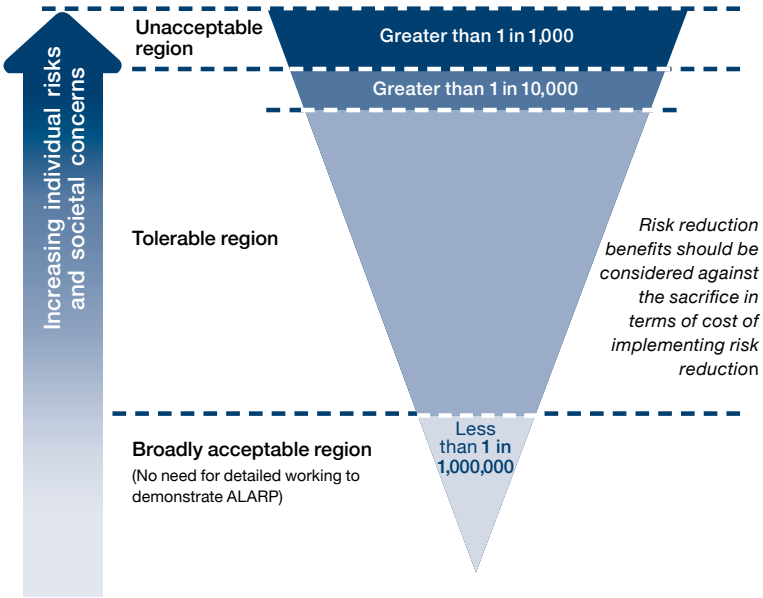
An estimate of the likelihood of failure of the part most likely to fail is then made. In the case of the three trees subject of this report, the most significant risk being assessed is whole tree failure onto neighbouring private, third part property (fences, parked cars and gardens).

The risk of harm estimated using QTRA is the key system output and should be interpreted with reference to the Tolerability of Risk framework (HSE, 2001). Briefly, this recommends that risks identified as higher than 1/10,000 should be considered as unacceptable, with appropriate management introduced to reduce risks to within a region that can be considered to be tolerable (between 1/10,000 and 1/1,000,000) . Risks lower than 1/1,000,000 should be considered to be broadly acceptable and resources should not be allocated to reduce these further. Based on this framework, the Risk Index values should be read as follows:

1/1 – 1/10,000 – Manage immediately

1/10,000 – 1/1,000,000 – Apply scheduled management (may include regular re-inspection).

1/1,000,000 – Does not currently require risk management.



Source: The Tolerability of Risk Framework from QTRA Practice Note (adapted from HSE Framework for Tolerability of Risk (TOR)

APPENDIX 3 Action Plan

5 YEAR ACTION PLAN *(to be reviewed)*

	Action	Corporate Plan Objective	Well Being Objective	Time	Lead Dept	Other Partners	Funding
1)	Ensure that all sections of the Council are aware of legal obligations with regards to trees. • Write to all sections of the Council with regard to trees on their sites • Offer an internal service of inspection. Costs based upon size of the site and number of trees	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	December 2024	Neighbourhood Services & Transport	Education, Social Services, Housing, Estates, Countryside, Highways	Recharge for work undertaken for other departments
2)	Set up a dedicated electronic system to record findings and plot Council owned trees	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	Completed by end 2024	Neighbourhood Services & Transport		Existing resources
3)	Produce a schedule for tree inspections based upon size, age and position of tree	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	April 2026	Neighbourhood Services & Transport	Education, Social Services, Housing, Estates, Countryside, Highways	Additional Resources required.
4)	Highway & Park trees plotted and recorded on new electronic system and inspected	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	Completed by 2027	Neighbourhood Services & Transport	Education, Social Services, Housing, Estates, Countryside, Highways	Additional resources
5)	All remaining Council estate trees plotted and recorded on new electronic system and inspected.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	Completed by 2028	Neighbourhood Services & Transport	Education, Social Services, Housing, Estates, Countryside, Highways	Additional resources
6)	Progress 3 yearly tree inspection programme, on all trees.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	2024, completed by 2027	Neighbourhood Services & Transport	Education, Social Services, Housing, Estates, Countryside, Highways	Existing resources
7)	Enable all relevant inspecting officers to assist in the inspection of the Council's tree stock and aid in the identification of tree issues as part of their inspections.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	2024	Neighbourhood Services & Transport		Existing resources and addition funding for staff training
8)	Adopt C.A.V.A.T as a tree evaluation model to be applied as policy to aid decision-making around potential tree removals	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	April 2024	Neighbourhood Services & Transport		Existing resources
9)	Identify locations for tree planting /natural regeneration across the VOG working with other departments.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	2025	Place, Neighbourhood Services & Transport All departments	Various partners Private sector organisations (notably developers), land owners.	Existing Resources

	Action	Corporate Plan Objective	Well Being Objective	Time	Lead Dept	Other Partners	Funding
10)	Plant a minimum of 1500 trees, which will include a minimum of 500 standards, in predetermined targeted areas (right tree, right place), across the Council estate, annually.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	Annually	All departments		Additional resources required, through internal and external sources
11)	Look at potential Council land to develop a community tree nursery of approximately 2Ha in size	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	December 2024	All departments	Various partners Private sector organisations (notably developers)	External funding
12)	Look to develop a local tree nursery in partnership with third party organisations.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	December 2026	Places, Neighbourhood Services & Transport	Various partners Private sector organisations (notably developers), land owners.	Addition funding and externally sourced funding
13)	Draft trees, woodlands and Hedges SPG to reflect the climate emergency	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	2024	Place	Planning Department	Part of the ongoing LDP process.
14)	Launch a web page for the Council's internet site giving information on trees throughout the Vale.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	April 2025	Neighbourhood Services & Transport Corporate Communications	Corporate Communications	Existing resources
15)	Actively seek funding opportunities to plant more trees on Council land to increase the town tree canopy.	An Environmentally Responsible and Prosperous Vale	To protect, enhance and value our environment	On-going	Neighbourhood Services & Transport Planning	Various partners Private sector organisations (notably developers)	S106 / CIL etc.
16)	Launch a voluntary friends of Trees Scheme	An Environmentally Responsible and Prosperous Vale An Aspirational and Culturally Vibrant Vale	To protect, enhance and value our environment	September 2025	Neighbourhood Services & Transport Corporate Communications	Stakeholders (including Town and Community Councils) Education, Social Services, Housing, Estates, Countryside, Highways	Existing resources
17)	Review the tree strategy every 2 years	An Environmentally Responsible and Prosperous Vale An Aspirational and Culturally Vibrant Vale	To protect, enhance and value our environment	2026	All departments	Stakeholders (including Town and Community Councils) Education, Social Services, Housing, Estates, Countryside, Highways	Existing resources

	Action	Corporate Plan Objective	Well Being Objective	Time	Lead Dept	Other Partners	Funding
18)	To increase canopy cover by **5%** across the Council estate over the next 15 years	An Environmentally Responsible and Prosperous Vale An Aspirational and Culturally Vibrant Vale	To protect, enhance and value our environment	2039	All departments	Stakeholders (including Town and Community Councils) Education, Social Services, Housing, Estates, Countryside, Highways	Additional funding required
19)	I.Tree survey to be repeated, to ensure that targets have been achieved.		To protect, enhance and value our environment	2032	Countryside & Environmental		Additional funding required
20)	Incorporate the tree strategy into the Green Infrastructure plan		To protect, enhance and value our environment	2024	All departments		Existing resources

APPENDIX 4 Frequently asked questions

FREQUENTLY ASKED QUESTIONS, INCLUDING THE COUNCILS POSITION:

1. **The tree looks dangerous and moves in the wind.**

   The Council has a qualified tree expert who will inspect any tree following an enquiry or in line with the Tree Risk Management Strategy following routine inspections. Our inspection will determine its condition and safety. Trees have a natural movement in windy conditions with flexing of the trunk and movement of branches being quite a normal response.

2. **The tree has not been pruned for a long time. It is too tall and needs to be pruned.**

   Trees across the Vale are regularly assessed, and any safety or maintenance related works are reported at this time. The Council does not reduce the height of trees as a matter of course, as this can stimulate rapid re-growth and/or cause defects in the tree's structure and exacerbate the original reported issue.

   The Council will prune highways trees as necessary also ensure that encroaching branches are pruned where they are obstructing roads and footpaths, hiding streetlights, road signs and other street furniture, so as to maintain vehicular and pedestrian safety on the highway.

3. **Tree branches encroaching a garden/boundary.**

   When tree branches or roots encroach on to neighbouring land they are legally regarded as a nuisance. Under the terms of law the tree owner is not obliged to cut back the branches overhanging their neighbours' garden unless damage is being caused. However, the owner of the adjacent land has the legal right to 'abate the nuisance' by cutting the branches or roots encroaching on other property.

   Where requests are made to prune trees that overhang a boundary each instance will be assessed on its merits. As a general policy, the Council will only undertake work where a tree's branches touch or are very close to an occupied building and consequently could cause physical damage.

4. **Shading and Blocking Views**

   Householders have no right to light from across a neighbour's land. Likewise, there is no right to a view, and a view obstructed by the growth of trees cannot legally be regarded as a nuisance.

   Where requests are made to prune trees to increase light levels, as a general policy the Council will not undertake pruning simply to allow more light to a property.

   An individual's tolerance of shade or their need for light is a subjective and personal matter whilst some people prefer shade there are those that have desire for sunlight. Many people are aware of the ancient and prescriptive right to light, but this only relates to loss of light over a considerable period of time in certain specific circumstances. Where trees are concerned there is no 'right to light'.

5. **TV/Satellite Reception.**

   There is no legal right to television reception. Existing trees on neighbouring land which interfere with television reception, especially with satellite transmissions, are unlikely to be regarded as a nuisance in law. The Council will not carry out tree pruning simply to improve television or satellite reception, where the trees in question would not otherwise require pruning.

   In the vast majority of cases, interference can be reduced by an engineering solution such as the relocation of the aerial or by the use of "booster boxes", which often improve the reception significantly.

6. **Pollen and Allergies**

   Whilst some kinds of tree pollen are known to bring on in sufferers the symptoms of hay fever this is not considered justification for either the pruning of Council trees, or their removal.

7. Leaf fall

The Council does not carry out a public leaf collection service. Although complaints are sometimes received about the problems caused by leaves falling from trees, the loss of leaves from trees in the autumn is part of the natural cycle and cannot be avoided by pruning. The maintenance of gardens and gutters is the responsibility of the landowner and the Council is not obliged to remove leaves that may have fallen from Council owned trees. Where gutters are regularly blocked by fallen leaves gutter guards may be fitted to provide a low maintenance solution.

8. Fruit, berries and nut fall

There are certain locations where fruit trees are not desirable, for example where soft fruit would make the pavement slippery or where anti-social behaviour could encourage fruit being thrown at houses or cars. When considering the 'right tree for the right place, the Council takes account of the likelihood of such problems. Equally, where fruit trees are established but where there is a significant anti-social behaviour problem the Council will consider phased removal and replacement in extreme cases.

9. Sap/ honeydew -The tree is making a sticky mess on my car or garden.

Honeydew is caused by greenfly (aphids) feeding on the tree, which excrete a sugary sap. Often the honeydew is colonised by a mould, which causes it to go black. This is a particular problem with tree species such as lime and sycamore.

Unfortunately, there is little that can be done to remove the aphid which causes the problem and pruning the tree may only offer temporary relief. Any re-growth is often more likely to be colonised by greenfly thereby potentially increasing the problem. Honeydew is a natural and seasonal problem. Where new trees are planted we try to choose trees that are less likely to cause this problem. Where honeydew affects cars, warm soapy water will remove the substance, particularly if you wash the car as soon as possible.

10. Bird droppings

Bird droppings may be a nuisance, but the problem is not considered a sufficient reason to prune or remove a tree. Even when branches are pruned, the bird will often just move to another branch. Nesting birds are protected under the Wildlife and Countryside Act 1981 (and other related wildlife law). Warm soapy water will usually be sufficient to remove the bird droppings.

11. The tree is causing damage to my drains

Tree roots typically invade drains that are already broken or damaged. Trees themselves very rarely break or damage the drain in the first place. Tree roots found in a drain are usually symptomatic of an underlying problem requiring repair of the broken pipe.

Tree roots can cause damage to paving, lawns and the foundations of buildings or walls. Again, where a neighbour's tree is causing problems, an owner is within their rights to cut back roots to the boundary of their property, unless it is protected by a TPO or is within a Conservation Area. However, appropriate advice must be sought from a suitably qualified arboricultural consultant to minimise the risk of undermining the future health and stability of the tree that may lead to liability for any future damage caused.

12. The tree is covered in ivy and is killing it

Ivy is a climbing plant abundant as a groundcover shrub in many rural types of woodland. It has a variety of conservation benefits and forms an integral part of woodland's habitat. In the urban environment there is a need to balance three main considerations for its retention: tree safety, conservation and aesthetics.

In some situations, it may be considered unsightly and more importantly can create problems for efficient management by obscuring potential defects and fungal fruiting bodies. It also increases the weight of a tree's crown and the 'sail' effect during the wet, windier, winter months, when deciduous trees have shed their leaves. As a general policy the Council undertakes the removal of ivy from trees only where it is considered necessary to aid visual tree health assessment.

13. I have a big tree near my property. I am worried about the damage the roots may be doing to my house. What should I do?

Tree roots may potentially cause damage to built structures in two ways:

Direct damage – this is caused when the physical expansion of tree roots or stem lifts paving stones or cracks walls etc. Due to the weight of a house no amount of physical expansion will affect it, but garden walls and small structures such as garages or outbuildings might be at risk.

Indirect damage – this can be caused to larger structures such a houses when tree's roots grow underneath the foundations, extract the water there causing clay soils to shrink and the structure to subside. If a building has been built on clay soil near an existing tree, and that tree is then removed, the soil may expand which can cause heave (the opposite of subsidence).

Modern building standards mean that the risk to newer buildings tends to be isolated and the Council will expect new buildings to be built to industry guidance and therefore they should not subside due to trees that were in existence at the time they were built. Should you believe that trees are the cause of cracking to a property, you should consult with your building insurers to determine the probable cause. *See Appendix 5 for guidance*

14. Can I have new trees planted outside my house/in my street?

Tree planting will be incorporated into the cyclical program to ensure newly planted trees are distributed where they are most needed, where resources are available. The planting season is normally from October to the beginning of March each year.

15. How can I tell if my tree is safe?

Advice should be sought by a professional qualified arboriculturalist. You can find qualified arborists on the Arboricultural Association website https://www.trees.org.uk/Registered-Consultant-Directory

The Council unfortunately will not generally get involved in private matters unless there is an issue of public safety but will offer general advice in the best way to resolve any issues residents may be experiencing.

16. What do I do if I think someone is carrying out work on a protected tree or intends to do so?

You can check the Vale of Glamorgan website interactive map available at website to see if the tree is protected through a Tree Preservation Order or is within a Conservation Area. Trees and Hedges (valeofglamorgan.gov.uk)

Locate the site you are interested in and then select the Environment and Planning category on the map. Then you can select 'conservation area' or 'tree preservation orders' to see if the site includes any protected trees. You can also check the planning history of the site to see if permission has been granted for work to a tree.

If you believe unauthorised work is being carried out, **contact the Council call centre immediately on 01446 700111. All queries regarding potentially unauthorised works will be dealt with in the strictest confidence.**

17. My neighbours have a high hedge. What can I do about it?

The High Hedge Regulations were made by the Welsh Assembly Government in December 2004 and came into force on 31st December 2004. The regulations apply to evergreen and semi-evergreen hedges of over two metres in height.
See link - Trees and Hedges (valeofglamorgan.gov.uk)
The legislation provides for those who feel that a neighbour's hedge is hindering the reasonable enjoyment of their property to submit a formal complaint to the Council. The Council will then investigate the matter and may, if considered appropriate, serve a notice on the hedge owner requiring them to reduce the hedges height.

In most cases, it is possible for neighbours to agree on a course of action without formal complaint being necessary. This is certainly the preferable approach for all concerned. If you are unable to reach agreement with your neighbour, try contacting a local mediation service, the mediation process is essential before making a formal complaint to the Council.

APPENDIX 5

TREES, BUILDINGS & STRUCTURES

The potential of indirect (subsidence) and direct root damage to property within urban settings with trees in close proximity to buildings and structures can on occasion escalate to potential claims, although dependant on various factors, trees can co-exist with a structure or building without any detrimental effects.

How the Council respond to tree related claims

The Council will challenge non substantiated claims or enquiries that do not meet the criteria set in policy and documents therein

In response to claims the Council has adopted the guidance documents below which ensure responses in dealing with claims in relation to trees and damage to property in an efficient and cost-effective process. This will provide a consistent response dealing proactively with claims and enquiries in relation to trees and vegetation.

> “It is the enquirers and claimant’s responsibility to substantiate with evidence any damage to property, the council will consult with appropriate colleagues and professionals in consideration of the enquiry and claims to evaluate and conclude”

Residents who have concerns in regard to damage to property in relation to trees and vegetation would be advised to discuss with their insurance providers on such matters, additionally the Council are more than happy to discuss concerns raised.

Joint Mitigation Protocol

A method agreed with multi-industry partners and L.T.O.A. *(London Tree Officers Association)* for the process and investigation of root tree induced building damage with benchmarked timescales for responses and standards of evidence.

This will be Council procedural guidance in dealing with all enquiries and claims regarding direct and indirect damage to property.

The Protocol is intended to reflect the spirit of the Civil Procedure Rules and aims to ensure that before the commencement of any proceedings:

- Pre action contact and exchange of information are encouraged
- Improved quality evidence and information is presented in support of the claim
- Both parties have provided sufficient clear evidence and information regarding their position on the matter
- Each party has had the opportunity to consider the evidence and information
- Each party can accept or reject the claim or each other’s position at the earliest possible stage
- Each party can modify its own position at the earliest possible stage
- The time period between notification and completion of co-operation or rejection of the claim is reduced
- The issue of tree removal / reduction / replanting is completed on a non-adversarial and ecologically friendly basis
- There is an opportunity for both parties to meet informally without prejudice to liability and resolve disputed cases

Evidential Requirements for Council Owned Trees

(see the table below)

Date of Submission	31-03-2008	Interim	Summary	☐
Statutory Authority	Any Town Council			
Property Owner	A.N.Other			
Damage Address	Address: 2 The Avenue Any Town SX1 5PH			
Area of Damage	Stepped cracking to front lounge, entrance hall stairs, plus front two bedrooms.		**Category per BRE 251** 3	
Site Plan To include all relevant vegetation and significant drain layout. Plan to indicate position of rooms	Attached. Drainage to rear not detailed as remote beyond any potential significance.			
Photographs These are indicative and are not a complete record of the full extent of the damage	Attached – showing general situation, policyholder's hedge and Local Authority street tree			
Arboricultural report	Not obtained			
Details of Statutory Authority Third Party Vegetation	One - Street tree within pavement to front right of house			
Details of Policyholder Vegetation	Beech hedge 2m high 3m from corner of house			
Details of Other Third Party Vegetation	None			
Root Analysis	Plane (confirms subject tree) 1.5m below fdn			
Foundation depth	750mm below ground level			
Subsoil	Clay - see attached analysis			
Factors indicating clay shrinkage	Pattern of damage shows rotation towards the street tree Timing of damage - started late summer, not now progressive Attached site investigation data indicates desiccation to 3.00M as shown by the soil suction profile, compares with root profile to 2.70M			
Date damage discovered	September 2007			
Monitoring	Not obtained. All evidence obtained clearly demonstrates influence of the street tree			
Drains	None to front of property			
Estimated cost of repairs	**Protocol Mitigation**	**Delayed / Rejected Mitigation**		
Investigation	£ 800	£ 1,400		
Substructure	Not anticipated	£ 8,300		
Superstructure	£ 6,800	£ 7,400		
Alt Accn	Not anticipated	Not anticipated		
Fees & Expenses	£ 1,900	£ 2,100		
Total	£ 9,500	£19,200		
Mitigation Request	Immediate removal of street tree			
Comments (use this box to add further engineering comments if required or advise if engineering report attached)	Customer's beech hedge not considered relevant and all roots sampled were Plane			

Source: London Tree Officers Association Joint Mitigation Protocol: Submission of Evidence (Appendix A)

Joint Mitigation Protocol Evidential Requirements for Council Owned Trees

Maximum Timeline in	Building Insurer (or their representative) visits the property & assesses if cause of damage is subsidence and if council tree or other factors are likely to be implicated. If the tree, then the Tree Controller/Risk Manager is identified.
7 days	Building Insurer (or their rep.) writes to Tree Controller within 7 calendar days of identifying Tree Controller seeking: 1. Contact details of the individual/department responsible for control of the tree, along with any reference, to assist communication regarding tree management and liability. 2. Contact details of their liability Insurer if appropriate. 3. The value of the tree (low, medium or high) as determined by the Tree Officer.
21 days	Within 14 calendar days of receiving the correspondence referred to above, the Tree Controller/Tree Officer will respond to the Building Insurer (or their rep.) giving responses to questions 1, 2 & 3 above.
81 days	Within 60 calendar days of receiving the value of the council tree, the Building Insurer (or their rep.) will submit either: a) A letter confirming withdrawal of the case, on the basis that the site investigation has not implicated the council tree in the damage, and that the file should be closed. b) A **"Submission of Evidence"** based on the tree's CAVAT value with the requested mitigation (pruning/felling). Low Value Trees - may be removed & replaced. Medium Value Trees - make an important contribution to the area. High Value Trees - make an extremely important contribution to the area. **Low Value Trees:** 1. Report on damage to building. 2. Plan & profile of foundations. 3. Plan of site showing location of building in relation to all trees and significant vegetation in vicinity of site. 4. Trial pit cross section to underside of foundation depth plus borehole through base of trial pit to a minimum depth of 3m (explanation to be provided if borehole unable to reach 3m depth). Borehole log to be provided. 5. Root ID from beneath underside of foundation. **Medium Value Trees:** All of the above plus: 6. Soil moisture content readings at 0.5m centres, starting at the underside of the foundation, down to 3m depth of B/H. 7. Liquid limit test results at underside of foundation and approx 2m depth 8. Plastic limit test results at underside of foundation and approx 2m depth. 9. Soil plasticity calculated from LL – PL. 10. Control borehole to 3m depth with log, with same tests as above, if it is possible to locate such a borehole on the site and remote from the influence of any vegetation. If impossible then explanation needed. 11. Oedometer or suction test results at underside of foundation & 1.0m centres down depth of 3m borehole **ONLY** when there is **NO** control borehole. If there is a control borehole then other tests listed are sufficient. 12. Shear vane test results at 0.5m centres, starting at the underside of the foundation, down to 3m depth of borehole(s). 13. CCTV & hydraulic testing to drains (excluding Water Board owned) located within 3m distance of area of subsidence damage. If unable to water test due to no access/blind entries/etc then give reason. 14. Crack monitoring is required on a maximum of 2 month frequency and is to be set up ideally at time of first visit by building insurer representative or within 7 days of 1st visit. Send all available readings with Submission of Evidence. **High Value Trees:** All of the above **EXCEPT crack width monitoring**, plus: 15. Control borehole (if possible) & point of subsidence borehole, each to 5m depth (not 3m as for medium value). 16. Level monitoring commencing at outset of claim for a relevant period (max. 12 months) using a deep datum (if possible) to 8m depth, otherwise use deep manhole. 17. Particle Size Distribution Analysis to BS 1377 Part 2 test 9.0 on a single soil sample taken from a 1m zone below the underside of foundation (Only if drains are present within 3m of the site of damage).

Source: London Tree Officers Association Joint Mitigation Protocol: Submission of Evidence (Appendix A)

Working Together for a Brighter Future

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