Topic Paper on Trees and Hedgerows
Calne Community Neighbourhood Plan
Ver. DRAFT 8 8th January 2024

Tree of the Year winner 2022
Beech Tree on Castle Mound, Calne

Contents

Introduction and Summary

This topic paper has been prepared to aid in the review, update and understanding of the Natural Environment policies of the Calne Community Neighbourhood Plan (CCNP). In summary it was found that:

- The CCNP area has a tree canopy cover estimated at 17%. This is driven by the woodlands in the Bowood/Derry Hill area outside this the canopy cover is estimated at about 10% slightly below the national average of 13%. In the town of Calne two wards have canopy cover above 15%. These numbers are below the cover of 19% estimated to achieve carbon neutrality by 2050.
- Six veteran trees and two notable trees have been recorded in the area; however, it is known that there are many more unrecorded veteran trees in the area,
- Many of the trees in Calne are subject to Tree Protection Orders as well as being protected as they are in a conservation area,
- The area contains two nature reserves, one of which Penn Woods has planted 10,000 trees. There is also a 300 acre conservation area in Great Wood on the Bowood Estate,
- The species recorded in the area includes 55 species one of which (Common Juniper) is in Wiltshire Biodiversity Action Plan (those that are rare or locally rare) and is also a priority species that are protected under section 41 of the Natural Environment and Rural Communities Act 2006,
- Four opportunities for improvement are identified, and
- Four principles are proposed and 11 guidance points for proposed developments are identified for consideration in developing the updated CCNP policies.

The paper provides links to resources for further information and reference materials.

This topic paper guides the reader through the body of legislation and regulation concerning tree and hedgerow protection and planning.

It is noted that public awareness of the environment has increased since the made version of the CCNP was prepared. There is an expectation that this subject, which overlaps topics concerning biodiversity, green spaces, and climate change, will all be addressed effectively in the next CCNP.

Background

The made version of the plan (2018) states:

The area has invaluable landscape and views which require protection and enhancement.
This is in line with the Wiltshire Core Strategy. Our area includes the Bowood Estate, Marden Valley, Blacklands, together with part of the Avon Vales and also has ancient woodland, river courses, streams, water meadow and hedgerows. It is recognised as a unique landscape with important features and qualities.

All new development must be sufficiently screened by new tree & hedgerow planting to maintain (and enhance) current landscape views and rural character.

The CCNP also includes the following policy:

In addressing Wiltshire Core Strategy Core Policy 50, development proposals for Calne & Calne Without should consider, assess and address their potential to:

- *create additional habitat space, including roosting, nesting or shelter opportunities for wildlife; and*
- *facilitate or include wildlife corridors; and*
- *protect and enhance riparian corridors for protected species, such as otter, kingfisher and water vole, especially along the River Marden and the Wiltshire & Berkshire Canal to the west of Calne.*

Thus, the present CCNP, perhaps only indirectly, acknowledges the need to consider the trees and woodlands in making planning decisions.

Since the last plan was made in 2018 there has been a growing public awareness of the threats to the environment. It is thus appropriate the CCNP focusses on Trees and Hedgerows underpinning the CCNP policies regarding Green Spaces, Biodiversity and Climate Change.

It is worth noting that there is a 'Tree of the Year' award in Calne. Residents can nominate a tree they particularly like and it is awarded to the tree based on criteria such as townscape value, historical and cultural value, along with the tree's value to wildlife. In 2022 'Beechy' the copper beech, (Fagus *sylvatica f. purpurea*) that looks over Castlefields Park was named Calne's 2022 Tree of the Year. It is pictured on the front cover of this topic paper.

The importance and benefits of trees and hedgerows

The focus of this topic paper is the trees, woodlands and hedgerows within the CCNP area. Thus, in this context woodland refers to native woods rather than more commercial largely non-native forested areas which are rare in the area. It includes trees outside woods and considers both rural and urban trees. The many benefits of trees, woodland and hedgerows are well documented (Reference 1. and Reference 2) the following summarises some of these benefits:

1. Reducing the impact of carbon di-oxide
   Trees and woodland are most effective in the fight against climate change due to increased levels of carbon di-oxide. Photosynthesis by trees (which incidentally was discovered in 1779 by Jan Ingen Housz who later became a resident of Calne) is the process that takes the greenhouse gas, carbon di-oxide, from the atmosphere and locks up the carbon in the tree, sometimes for centuries. It is estimated that a young wood with a mix of native species can lock up, or sequester, over 400 tonnes of carbon per hectare. If the UK's target to become carbon net zero by 2050 is to be met, then it has been estimated that the national woodland cover needs to increase from the current 13% to at least 19%.

2. Reduction in flood impact
   Trees are a natural means to reduce the impact of flooding, every 5% increase in tree cover reduces water run-off by 2%. It is estimated that the value of trees in flood protection is £6.5 billion. (Reference 3.)

3. Provision of shade and temperature reduction
   Trees provide shade that reduces temperatures this is estimated to be of £6.1 billion in value for urban cooling. Rivers with riverside tree cover are found to have moderated river temperatures that help improve the aquatic habitat. Shading from riparian trees and shrubs can help reduce local stream temperatures with summer mean and maximum temperatures

on average 2°C to 3°C lower in shaded areas then in open sections[1]. Trees also moderate temperatures in an urban environment by reflecting sunlight, providing shade and evaporating water by transpiration.

4. Provision of key habitats
   Trees provide essential habitats for many species; a typical mature oak tree can host up to 5,000 different species of invertebrates that also provide food for birds and mammals. It is estimated that the UK's native species abundance index (the total number of different species) has fallen by 13% since 1970, thus it is important that such irreplaceable mature trees that are hosts to such a diversity of species are protected.

5. Improved air quality
   In the urban environment local air quality is improved by trees that reduce the level of airborne particulates and absorb nitrogen dioxide, sulphur dioxide and ozone. Roadside trees also reduce the transmission of traffic noise.

6. Attractive landscapes
   Trees can transform the appearance of urban spaces and developments creating a more diverse and pleasing environment. Trees and greenspaces can increase property values by 15 to 18%. Larger trees provide a greater increase in value. A sense of place and community pride can be improved by tree planting.

7. Indirect economic and social benefits
   Studies of indirect economic benefits also found that employment or industrial spaces with greenspaces and trees result in higher employment satisfaction and productivity. Also, retail spaces with trees tend to outperform those without trees. Studies of the social benefits of trees found that:
   a. The presence of trees often encourages people to exercise more,
   b. Trees lowered air pollution and thus reduced asthma incidence,
   c. Shade from trees lowered UV levels and should reduce skin cancer incidence,
   d. The presence of trees can alleviate anxiety, depression and insomnia,

8. Hedgerows as local history markers
   Hedgerows like trees can be an important aspect to the character of an area. They can provide important indicators of historical land usage and ownership.

9. Hedgerows as key habitats
   Hedgerows contribute significantly to biodiversity and are the natural green corridors for many species. Bats and moths use hedgerows as linear guides to help them navigate.

10. Hedgerows for soil improvement
    Hedgerows benefit the soil as they reduce water run-off from fields protecting soil fertility. They also act as windbreaks that also reduces soil erosion and provide shelter for livestock.

While some of the above benefits are based on national or international studies and supported with national statistics the benefits are all applicable to the local Calne Community area.

[1] Data from Bristol Avon Rivers Trust

Planning Policy Context

Regulations and guidelines regarding trees

The most recent update of the National Planning Policy Framework (July 2021) (Reference 4), includes a new paragraph on trees which states:

> *Trees make an important contribution to the character and quality of urban environments and can also help mitigate and adapt to climate change. Planning policies and decisions should ensure that new streets are tree-lined, that opportunities are taken to incorporate trees elsewhere in developments (such as community orchards), that appropriate measures are in place to secure the long-term maintenance of newly planted trees, and that existing trees are retained wherever possible. Applicants and local planning authorities should work with local highways officers and tree officers to ensure that the right trees are planted in the right places, and solutions are found that are compatible with highways standards and the needs of different users.* (NPPF 2020, para 131)

The National Model Design Code (draft, also consulted on in Feb – March 2021) also states the government's intention that all new streets should include trees (Reference 5).

The Royal Town Planning Institute's ReTreeFit (Reference 6) campaign promotes planning for and planting of trees in within existing environments and streets, not just within new developments.

Planning guidelines and regulations regarding the importance of trees and woodland in both urban and rural planning and conservation matters have a considerable depth of material (Reference 7), indicating the importance that should be weighed in terms of trees in the consideration of such planning requests. Some of the relevant legislation and guidelines are noted below:

Legislation	Statutes relating to trees
The Town & Country Planning Act 1990	Part 8 (Special Controls), Chapter 1 (Trees): Section 197 – when granting planning permissions planning authorities are to preserve and plant trees Sections 198-202 – Tree Preservation Orders (TPOs) defined Sections 203-205 – TPO compensation Sections 206-210 – legal consequences of TPO removal specified Sections 211-214 – trees in conservation areas Section 300 – Crown land disposal and TPOs Note: the Forestry Commission is a statutory consultee for Local Planning Authorities in the case of mineral site restoration and aftercare
The Planning Compensation Act 1991	Part 1, sub-chapter 'Controls over particular matters' – Section 23 – substitutes Section 207 of the Act above concerning consequences of TPO removal
The Town & Country Planning (Trees) (England) Regulations 1999	These regulations make provision for the form of TPOs and applications to carry out work on them
The Planning & Compulsory Purchase Act 2004	Part 7, Chapter 1, sub-chapter 'Trees', sections 85 & 86 are substitutions for sections 200 & 211 of the 1990 Act concerning Crown activity featuring TPOs and trees in Conservation Areas
The Planning Act 2008	Part 9, Chapter 2, sub-chapter 'Trees', sections 192 & 193 amend sections 198, 199, 201, 202 and 203-205 of the 1990 Act relating to TPOs
The Town & Country Planning (Trees) (England) (Amendment) Regulations 2008	These 2008 regulations amend the 1990 Regulations to provide the use of the 1APP to apply for TPO consent
The Forestry Act 1967 (as amended)	Part 1, Section 1 sets out the statutory basis of the Forestry Commission; Section 2 covers constitutional matters; Section 3 management of Forestry land of which Part 2 includes the legislative provision for tree-felling Note: wherever planning has been granted there is no immediate requirement for a felling licence for the purpose of undertaking the actual development
The Climate Change Act, 2008	The world's first legally binding long-term framework to cut carbon emissions. It also creates a framework for adapting the UK to climate change, plus the role of trees to support such adaptation

Reference 3: The case for trees in development and the urban environment, Forestry Commission England, July 2010

Regulations and guidelines regarding hedgerows

The main regulations with respect to hedgerows is *The Hedgerows Regulations 1997.* The following is based on a summary of its provisions provided by Historic England (Reference 8)

Hedgerows, like trees, can make an important contribution to the character of an area and may be important as indications of land use and previous ownership. They also contribute significantly to biodiversity.

The removal of a hedgerow is unlikely to require planning permission, but if removal is proposed as part of a planning application, then its impact on the heritage significance of the area and its impact on the setting of any heritage assets around may be taken into account in accordance with planning policies in the National Planning Policy Framework (NPPF) (Reference 4) and the local development plan.

In addition to the protection provided by the planning system, hedgerows are offered some specific protection under The Hedgerow Regulations 1997 (Reference 8). This complex mechanism offers some protection for hedgerows of more than 20 metres in length or which join other hedgerows provided they adjoin agricultural land, forestry, paddocks, common land, village greens, a site of special scientific interest or a local nature reserve.

To remove such a hedgerow an owner must serve notice on the local planning authority who then decides if it is 'important' and if found to be then it decides if the hedgerow should be retained. If the local planning authority requires the hedgerow's retention, then removal of the hedgerow is a criminal offence.

A hedgerow is 'important' if it has existed for 30 years or more and it meets one of the criteria set out in the Regulations, which include:

- It marks a boundary between parishes existing before 1850;
- It marks an archaeological feature or a site that is a scheduled monument or noted on the Historic Environment Record;
- It marks the boundary of a pre-1600 estate or manor or a field system pre-dating the Enclosure Acts.

Current Situation in CCNP Area

Tree canopy cover

The available data on existing tree canopy cover in the area is shown in the following table:

Ward	Canopy (%)	Ward area (km^2)	Canopy area (km^2)
Calne Central	15.43	1.53	0.24
Calne Chilvester and Abberd	15.43	1.03	0.16
Calne North	9.33	1.48	0.14
Calne South and Cherhill	8.33	28.7	2.39
Calne Rural	12.6	99.6	12.55

(Reference 9.)

The above data does not correspond to the CCNP area. In order to estimate the tree Canopy coverage of the CCNP area first an estimate of Calne South is made, this area is largely residential with some

parks and established trees it is thus likely to have a higher percentage canopy cover than the combined Calne South and Cherhill area (8.3%) as that contains large areas of open farmland. Satellite imagery suggests that the area is similar to Calne Central (15.4%) and Calne North (9.3%) so an estimate of based on the average of these wards (12%) was used.

To estimate the tree canopy coverage for Calne Without is somewhat more complex. The eastern part of the area (about 16km^2) is well wooded, in particular the Bowood estate around Derry Hill. Much of which is sustainably managed woodland the Bowood Estate reports planting in excess of 1.2 million trees over the last 50 years. A detailed measure of the woodland shown on OS maps was made for this area giving 5.37 km^2 of woodland corresponding to a local canopy percentage of 32%. The remainder of the Calne Without area is generally open farmland with some small woods and copses and is likely to have a canopy coverage similar to the remainder of Calne Rural (8.8%) or the remainder of Calne South and Cherhill (8.1%). These estimates result in the table below:

Ward	Canopy (%)	Ward area (km^2)	Canopy area (km^2)	Source
Calne Central	15.43	1.53	0.24	Ref. 9
Calne Chilvester and Abberd	15.43	1.03	0.16	Ref. 9
Calne North	9.33	1.48	0.14	Ref. 9
Calne South	12.0	1.33	0.16	Estimated
Calne Total	12.9	5.37	0.69	Sum of above
Bowood/Derry Hill	32.4	16.00	5.18	OS map measure
Remainder Calne Without	8.5	27.027	2.3	Estimated
Calne Without	17.4	43.027	7.48	Sum of above
CCNP area	16.9	48.397	8.17	Sum of above

In total of the CCNP area of 48.397 km^2 has an estimated tree canopy of 8.7 km^2 or about 17%. As can be seen from this table the tree canopy cover exceeds 15% in two Calne wards, but these have small areas and thus do not contribute greatly to the total tree canopy area. It is high in the Bowood – Derry Hill area exceeding 32% and dominates the overall tree canopy area. Outside this area the remaining 32km^2 is estimated to have about 3km^2 of tree canopy or just under 10%. This reflects the open agricultural nature of the landscape and could represent opportunities for increased tree planting.

Thus, the CCNP (due to the large woodland areas in the Bowood/Derry Hill area) exceeds the current national average of 13% and meets the goal of 15%. To meet a goal of 19% that is estimated to be required to meet the climate change target to be net zero by 2050 an addition of 1km^2 of woodland canopy would be required an increase of about 12.5%.

The Urban Forestry and Woodland Advisory Committee Network[2] advise that 'a minimum standard for tree canopy cover is set for a local area, with evidence showing that 20% is a good aspiration'.

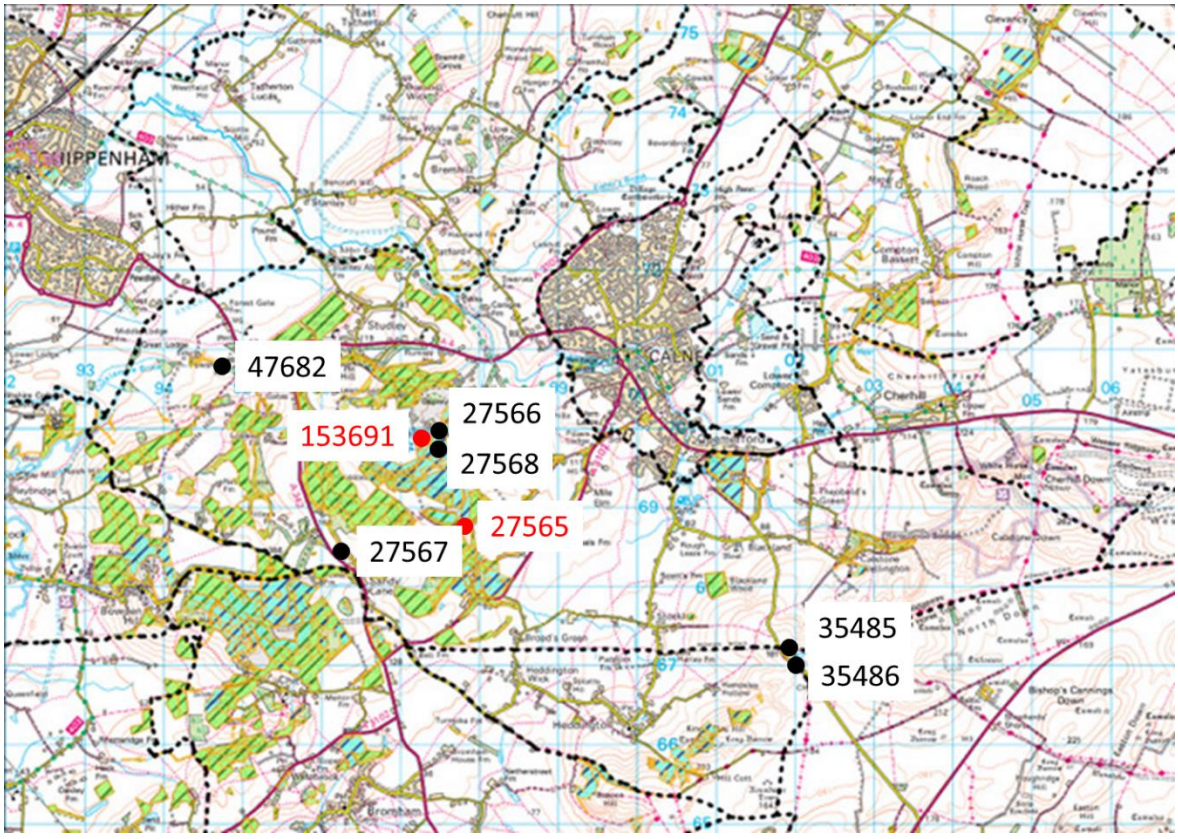
Canopy cover is a fundamental measure of the quantity of woods and trees in an area. It provides a measure to allow progress towards achieving goals for woodland expansion and replacing and

[2] England's Urban Forests: Using tree canopy cover data to secure the benefits of the urban forest, Urban Forestry and Woodland Advisory Committee Network

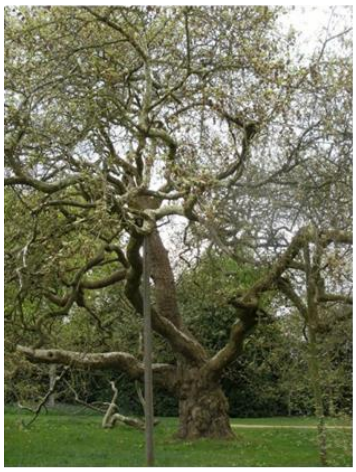
planting new trees outside woods. Such broad measures of the total extent of woodland, however, hide nuances in the quality of habitat for nature, the provision of benefits for people, and their role in regulating climate. Woodland patch size is also a critical factor and much of the woodland in the area outside Bowood/Derry Hill is in small blocks.

Ancient and Veteran Trees

There are only six veteran trees identified by the Woodland Trust in the area (one appears to be on the boundary of the area) and two notable trees. These are shown in the following map and pictured below. No images are available of tree 27565 an Aspen and tree 27567 a Beech. There are in fact many more notable and established trees in the area that have not been recorded. (Reference 10)



Ref. Woodland Trust's Ancient Tree Inventory Map



153691
Oriental Plane

47682
Pedunculate Oak

27566
Pedunculate Oak

27568
Sweet Chestnut

35485
Common Beech

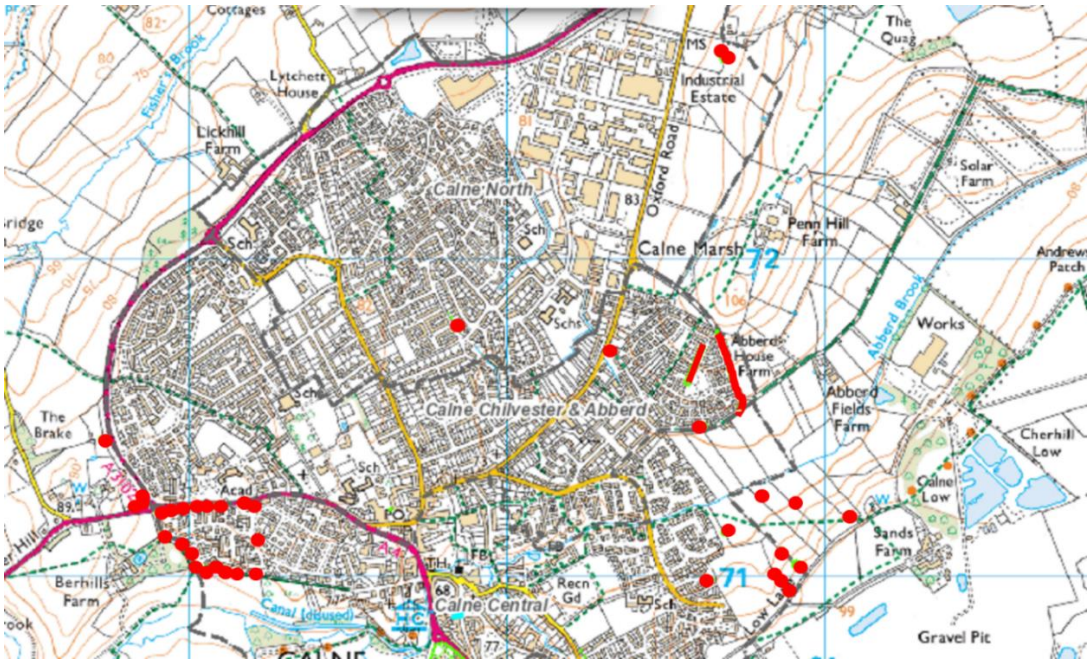
35486
Field Maple

Images by permission of The Woodland Trust

Ancient and veteran trees are of critical importance for wildlife; each tree is an ecosystem, providing a range of specialist habitats for animals, plants and fungi that depend on conditions found in the decaying wood, sap runs, cavities and crevices. They also play a vital role in long-term carbon stores, especially in the soil around and beneath them.

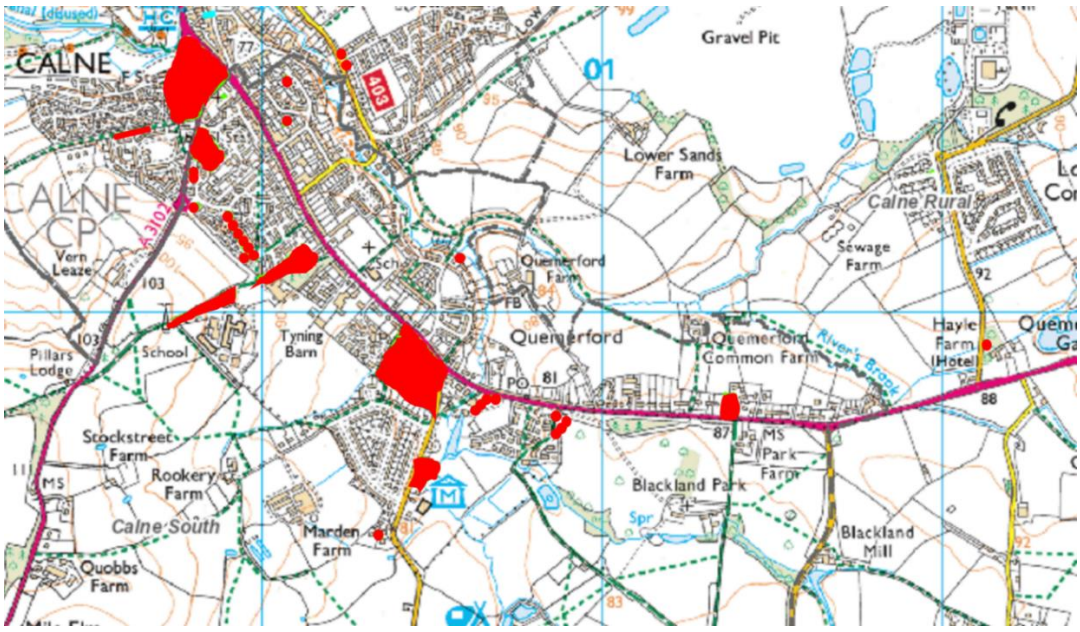
Tree Preservation Orders in the area

The Wiltshire planning portal (Reference 11) shows the location of tree preservation orders in the CCNP area and are indicated below.



Reference: Wiltshire Planning Portal

Tree Preservation orders in Calne (Northern section).



Reference: Wiltshire Planning Portal

Tree Preservation orders in Calne (Southern section).

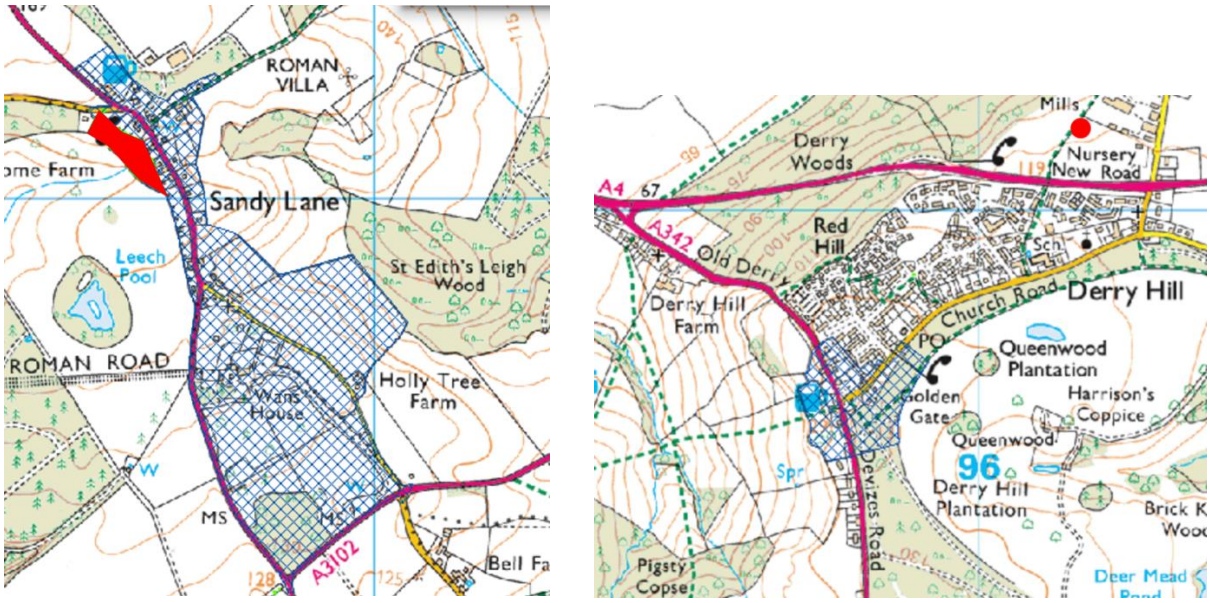
There are several different types of tree protection. Tree Preservation Orders can be placed on trees by the local authority. Tree Preservation Orders (known as TPOs) can be placed on either individual trees or on groups, areas or even entire woodlands. TPOs give trees a high level of protection because the local authority must give permission on any proposals to fell or carry out any works to them.

Calne Conservation area (Reference 11.)

Trees within conservation areas are protected if they meet the minimum size requirements. They must have a trunk diameter of 7.5cm or more measured at 1.5 metres above ground level. If the trees in question are this size or larger, then they are protected regardless of their species.

There are numerous tree preservation orders in the area, but it is notable that many prominent trees are not protected by a specific order. For example, the large plane trees on the Warf, the old beech tree on Castle Mound, the large plane tree above the old Co-op car park, and the trees around the Green are not subject to a TPO.

It is proposed that as an ongoing project, initiated by the Planning Environment Working Group, to create a log of all the significant trees in the area noting key information including their species, size, health, and location. As a result of such a project it will be possible to identify trees with potential for tree preservations orders (TPOs) and for listing on the Woodland Trust's Ancient Tree Inventory, which would grant them further protection. Community involvement is key to the project; nominations and suggestions for significant trees will come directly from the community via online engagement and other methods.

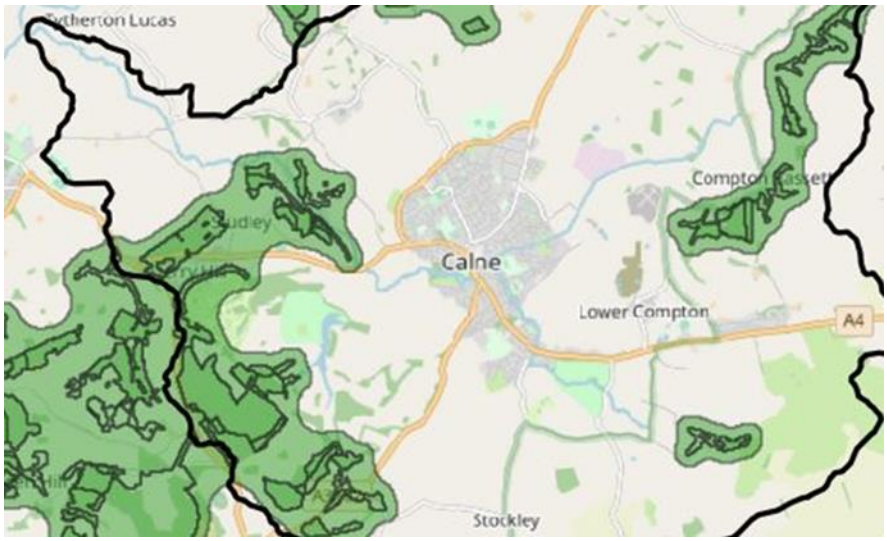


Sandy Lane and Derry Hill conservation areas (hatched blue) and TPO areas (red)

Woodland in the area

The following map shows the woodland in the area (dark green) and suitable buffer zones around them[3].

[3] Report on the Marden Valley Landscape by Wiltshire Wildlife Trust for the Friends of the Marden Valley



Areas of ancient woodland

Ancient (over 140 years old) woodland and wood-pasture is shown by the green and blue striped shapes with orange borders, parish boundaries as black dotted lines[4].

Ancient woodland describes woods often with centuries of continuity. For practical identification purposes, woods that are thought to have been present since 1600 in England are identified as

[4] Reference Euan McKensie, the Ancient Woodland Inventory Officer, at WWT.

ancient, because planting was uncommon at that time and reliable maps are available from this date. Much of the ancient forest in the western part of the CCNP area shown in the above map is in the area once covered by the Forest of Pewsham that dates from Saxon times. These ancient woodlands and their soils and wildlife have thus in some cases co-evolved for thousands of years, creating diverse, distinctive, and valuable ecosystems that cannot be re-created.

Wood pastures are mixed environmental systems which typically include grazing animals, an open ground layer or grassland or heath, shrubs and scrub, veteran trees, and decaying wood. Such a wood pasture structure arises through a combination of management and land use. It is found in some parks or common land and in agroforestry systems. Where there is a long continuity of this habitat, some wood pastures also overlap with ancient woodlands. The mixture of features in wood pastures means they host a distinctive suite of wildlife. It is estimated (Reference 2) that 105 of the priority species in England are associated with wood pasture, including fungi, lichens and invertebrates which live in the crevices, cavities, and decaying wood of veteran trees.

Trees outside woods (TOW's) such as small copses, hedgerows, street trees, trees on farms and along rivers, and in wood pastures and parklands can contribute significantly to total canopy cover and provide valuable habitat and ecological corridors between woodland areas. Traditionally, TOWs have been managed for timber, fuel, fodder and used to mark land boundaries. These management practices, along with reduced competition from neighbouring trees, have allowed many TOWs to become ancient and veteran trees.

Health of our woodland

In addition to the quantity of woodland in the area there is a need for it to be heathy for it to flourish and support a diversity of wildlife. A survey was conducted on the ecological health of woodlands in 2015 (Reference 11.) it found that only 7% of native woodland was in a good ecological condition overall. Symptoms of a healthy ecological state are:

- A mix of tree sizes and ages
- A mix of tree species
- Standing and fallen large-diameter deadwood
- Diverse ground flora
- Abundant natural regeneration
- Open habitats and glades

Urban Trees

Indian Bean Tree in flower in Calne

In the CCNP there is a small urban area of approximately 5.37 km^2 with a canopy cover estimated as 13%. This is slightly below the national average for urban areas of 16%. Urban trees, or the urban forest as it sometimes termed, includes individual trees, street trees, riverine trees, hedgerows in parks, woods, or gardens. Urban trees can make a huge difference to the appearance of the street scape they also can improve air quality, noise levels and temperature extremes.

Opportunities and priorities for improvement

The following are all considered opportunities for improvement: (not prioritised)

1. Identification of Veteran and Ancient Trees

   More comprehensive identification of ancient and veteran trees is needed. Only then can appropriate sensitive land management plans and legislation prepared to protect them. The Ancient Tree inventory (ATI) should be continuously added to, not only through professional ecological and arboricultural surveys but by the addition of new citizen science records.

2. Protection of existing trees

   It may not be practical to process a TPO for all trees in the area that are worthy of protection unless they are under a direct threat. However, it is proposed that as part of the above survey to identify veteran trees that an inventory be prepared of other notable or mature trees within the area.

3. Increase of Canopy cover

   Adopting a long-term target for the tree canopy cover of 20% in the CCNP area. Only support any development proposals that meet this target.

   Adopt the Bristol Tree Replacement Standard (2022)

   Partner with Avon Needs Trees, charity that has planted 22,000 trees in Wiltshire, and is actively seeking new sites to plant on. There are public spaces that could support new planting such as:
   i. Wide verges alongside the bypass on the north side of Calne
   ii. Grassed areas near the head of the Abberd Brook

4. Linkage of woodland and Blue-Green corridors
   It is proposed that initiatives jointly with landowners be made to encourage planting of trees within hedgerows that could when mature provide linkages between isolated woodland areas and along the 13 blue-green corridors identified in the area.

Threats to Trees and Hedgerows

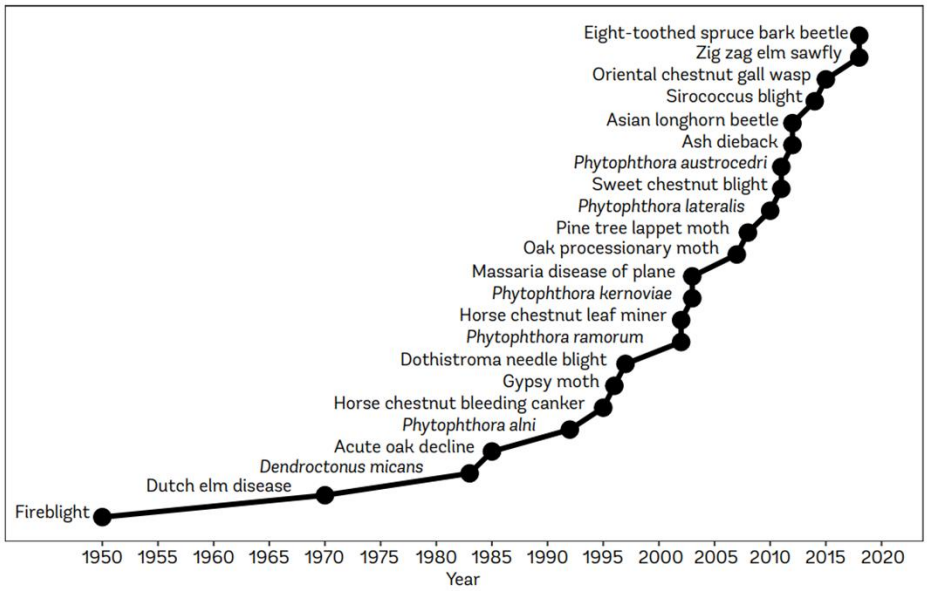
1. There is uncertainty regarding the scale of further development in the CCNP area. Such development if of a scale and type might well reduce the quality or quantity of woodland habitats and require the loss of trees,

2. Notwithstanding recent legislation (The Environment Act 2021) there is still a lack of currently implemented and effective standards for the preservation of habitat and non-listed trees in many cases,

3. Native species in the CCNP area are under threat from invasive species such, Muntjac deer (destructive of habitats for many species), invasive plant species are also present including Himalayan Balsam, Japanese Knotweed and Bamboo. Without natural predators or pests, the population of invasive species can increase rapidly.

4. To some extent all species have always been at risk from disease and pests; since 1990, there has been a marked increase in incidences from outside the UK. Perhaps the most infamous tree disease that has killed many thousands of elm trees is Dutch Elm disease it is caused by the fungus *Ophiostoma novo-ulmi* which is spread by the elm bark beetle that was introduced from Canada in the 1960's. Ash dieback is expected to kill perhaps 80% of ash trees across the UK. It will change the landscape and threatens many species which rely on ash. Ash dieback (*Hymenoscyphus fraxineus*) is a fungus which originated in Asia. It doesn't severely damage its native hosts, the Manchurian ash and the Chinese ash. However, its introduction to Europe about 30 years ago has devastated the European ash (*Fraxinus excelsior*) as it has no natural

defence against the fungus. There are also threats to Birch, Chestnut, Beech, Oak, Plane and Juniper trees that are all in the CCNP area.



Date of introduction of woodland pest and disease to UK (Reference2)

5. Pollution

a. Water Pollution

The Environment Agency in October 2021 stated that only 16% of England's water bodies are at good ecological status. Trees are particularly susceptible to:

i. Nutrients from agricultural land run-off

Agriculture uses fertilizers, manure and slurry that all contain nitrates, ammonia, and phosphates to improve plant development. Run off from farmland can reach watercourses. These excess nutrients cause eutrophication, this is the overfeeding of aquatic plants such as algae, with a corresponding lowering of dissolved oxygen levels in the water, resulting eventually the death of aquatic plants and animals. Run off from farmland also is a cause of high sediment levels in brooks and streams in the area.

ii. Pesticide and herbicide usage

Agricultural practice frequently employs large scale usage of pesticides and herbicides. As these chemicals make their way into water courses, they can be highly damaging to aquatic plants and animals. Some pesticide usage is made of highly toxic chemicals. The impact of long-term low-level exposure to such toxic chemicals on aquatic animals is detrimental but the severity is not fully understood.

b. Air Pollution

The subject of air quality has often focussed on the impact on peoples' health and less on the impact on other species. There is now a concern about the amount of nitrogen and ammonia from vehicle emissions, fossil fuel usage and agriculture that enters the

environment. This eutrophication causes an excess of nitrogen-loving plants like nettles, brambles and cow parsley driving out other vulnerable plants. Verges that are heavy with such species may be indicative of this effect. Many catalytic converters change nitrogen oxides into ammonia, better for humans, but possibly much worse for roadside habitats. Hybrid vehicles area particular concern as their ammonia pollution spikes when their engine starts.

Air quality has been a long-standing concern in the area as the A4 runs through the planning area and high levels of air-borne particulate levels have been measured for many years.

6. Climate change
   The environmental changes being driven by climate change are disturbing natural habitats and species in ways that are still not clear. There are signs that rising temperatures are affecting biodiversity, while changing rainfall patterns, extreme weather events, are putting pressure on some species. The threat posed by climate change is expected to increase, yet thriving ecosystems also have the capacity to help reduce the impacts of climate change. Climate change, that is rising global temperatures, can lead to:
   i. Reduction in water vapour levels (observed since 1970's)
   ii. Periods of low rain or even droughts
   iii. Increase in grassland and woodland fires
   iv. Increased intensity storms
   v. Changes in plant phenology – recent studies by the University of Cambridge (Reference 13) indicate UK plants are flowering a month earlier than historical records this leads to a phenomenon termed ecological mismatch as other species that synchronise their migration or hibernation can be left without the flowers and plants they rely on which in turn can lead to biodiversity loss if populations cannot adapt quickly enough.

   All these factors have the potential to impact woodlands both directly and indirectly through lower water levels, the drying out of wetlands, increased soil erosion.

Tree Replacement

Replacement Quantities

The importance of trees in the area and the need to improve tree canopy cover in the area is clear. Tree loss and replacement because of development may be unavoidable in some cases. In many instances it will not be practical to replace the value of a felled tree with a single new planting, for example the value of a veteran oak cannot be replaced with a single semi-mature tree. However, the Bristol Tree Replacement Standard (BTRS) (Reference14)which considers tree maturity and therefore its value. It uses a system of compensation for the loss of trees from development sites dependent upon the size of the tree to be lost. It is also recognizes that trees may be felled in preparation for development, some time in advance of a planning application. Where there is evidence of prior felling, this could be applied retrospectively to include all trees felled within the year before the planning application. In this way any trees felled before the development could be considered when calculating the appropriate replacement number. Replacement planting should normally be within the development site but could also be planted at a suitable location off-site if that is not feasible.

Trunk Diameter of Tree lost to development (cm measured at 1.5 metres above ground level)	Number of Replacement Trees
Less than 15	0 - 1
15 - 19.9	1
20 - 29.9	2
30 - 39.9	3
40 - 49.9	4
50 - 59.9	5
60 - 69.9	6
70 - 79.9	7
80 +	8

Bristol Tree Replacement Standard (2013)

Considering the requirements of the Environment Act (2021) and the requirement for there to be a net benefit of 10% in the biodiversity index in June 2022 the Bristol Tree Forum proposed a change of the above standard to the following:

Category	Diameter at breast height	Number of Replacement trees required
Small	30 cm. or less	2
Medium	30 cm. to 90 cm.	10
Large	Greater than 90 cm.	21

The proposed new BTRS tree replacement table (2022)

It is proposed that the new BTRS above should be used to determine the quantity of replacement trees when a tree is lost in the area.

Replacement or New Tree Quality

New or replacement trees should be selected to be appropriate for the location. New trees, when planted, should be of size which is at least 'standard' tree size (8cm to 10cm) in accordance with BS3936-1 (Nursery stock – Part 1: Specification for trees and shrubs). At times the landscape design may require larger trees to give depth and maturity to the design, or also 'feathered' trees (multi-stemmed trees).

It is recommended that UK suppliers be used to prevent the import of possible non-native diseases or pests.

Replacement or New Tree Selection

The Government's Urban Tree Manual (Reference 15) offers guidance on the selection of appropriate tree species in the urban environment. The Woodland Trust has considerable information to guide tree selection for both urban and rural areas. Both resources highlight issues of the threats to trees

from pests, disease and climate change, and describes the benefits to the environment that a particular species can provide.

The function a tree is expected to provide should be understood so that an appropriate species can be selected. Subject to the function of the tree and the nature of the site, there is generally a preference for native trees and large-canopied species to be planted, as these can provide a wider range of ecological benefits than other species.

The following are likely to be suitable species for the area.

Species for gateway or landmark trees could include:

- English Oak (*Quercus robur*) — large canopied
- Purple Beech (*Fagus sylvatica purpurea*) — large canopied
- Sweet Chestnut (*Castanea sativa*) — large canopied

Neighbourhood or urban street trees could include:

- Small Leafed Lime (*Tilia cordata*) — large canopied
- Field Maple (*Acer campestre*) — large canopied
- Bird Cherry (*Prunus padus*)
- Silver Birch (*Betula pendula*)

Trees for gardens could include:

- Alder (*Alnus glutinosa*)
- Silver birch (*Betula pendula*)
- Crab apple (*Malus sylvestris*)
- Rowan (*Sorbus aucuparia*)
- Goat willow (*Salix caprea*)
- Bird cherry (*Prunus padus*)
- Apple (*Malus x domestica*) — orchard tree (non-native)
- Pear (*Pyrus communis*) — orchard tree (non-native)
- Plum (*Prunus domestica*) — orchard tree (non-native)

Species for hedgerows could include:

- Hawthorn *(Crataegus monogyna)*
- Buckthorn (*Prunus cathartica*)
- Crab apple (*Malus sylvestris*)
- Wild cherry *(Prunus avium*)
- Elder *(Alnus glutinosa)*

Principles for Plan Policies

The following principles and guidelines are proposed concerning the development of CCNP policies regarding the protection of trees and hedgerows and appropriate development and the improvement of existing communities.

1. Protection of Ancient and Veteran Trees and Hedgerows

   To be supported any development proposal should ensure no loss or deterioration of the habitats of ancient woodlands or veteran trees unless it can be clearly demonstrated that the development in that location is essential, and the benefits clearly outweigh the loss. A

minimum buffer of 20m in width should be maintained between any development boundary (including gardens) and any ancient woodland. A buffer around an ancient or veteran tree should be the greater of 20m or 15 times the diameter of the tree.

2. Protection of other trees and hedgerows

   To be supported, development proposals should ensure there is no damage to, or loss of, trees or hedgerows of ecological, aboricultural, or amenity value. Such trees and hedgerows should be retained to the maximum extent possible and incorporated into new development as placemaking features.

3. Replacement planting

   Whenever a development cannot avoid the loss of trees then replacement planting shall be made that meets or exceeds the quantity specified by the Bristol Tree Replacement Standard (2022) and with consideration of the species selection guidance of within this topic paper.

4. Tree canopy cover

   Development proposals over 0.5 ha. that include the following should be supported:

   - A minimum of 20% future tree canopy cover, for residential development this could include trees in gardens,
   - Incorporate gateway or landmark trees for place making purposes, and
   - Use commuted sums to deliver new street trees and/or maintaining existing street trees.

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